

# **MAURICE WILKINS CENTRE**

New Zealand's Centre of Research Excellence  
targeting human disease

## **Annual Report 2015**

# 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 2015 it comprised 165 investigators throughout the country, and over 170 early-career affiliates, linking researchers from six Universities, three Crown Research Institutes and two private research institutes. 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](http://www.mauricewilkinscentre.org)

For more information on New Zealand Centres of Research Excellence see [www.acore.ac.nz](http://www.acore.ac.nz)

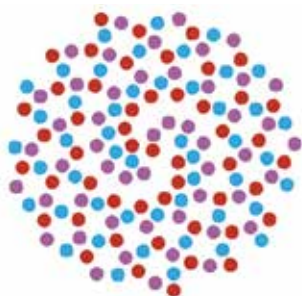


Te Whare Wānanga o Ōtāgo  
NEW ZEALAND



CallaghanInnovation





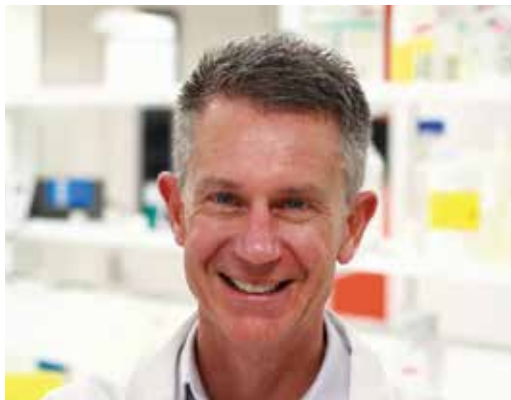
## MAURICE WILKINS CENTRE FOR MOLECULAR BIODISCOVERY

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# Director's Report

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2015 was the first year of the Maurice Wilkins Centre's third 6 year funding cycle. As a Centre of Research Excellence, the MWC is now mature, with strong administration in place, and a superb national team of leading biomedical researchers. So it's pleasing to report notable success in expanding New Zealand's horizons in medical research, as well as research results with potential for major impact on health.

Of the many research highlights on the following pages, one warrants particular comment – not least because of what it tells us about the growing international reach of our investigators. In 2015 the drug tarloxitinib bromide (or TH-4000), invented by MWC investigators Adam Patterson and Jeff Smaill, entered phase II clinical trials in lung cancer patients in the USA. This drug builds on decades of world-leading research at the Auckland Cancer Society Research Centre designing drugs that only become activated when they enter the oxygen-depleted environment of growing tumours. Adam and Jeff have taken this drug design platform in a novel direction and targeted signalling molecules inside cancer cells. The principles used to design tarloxitinib bromide can be copied to attack other classes of signalling molecules, so the team has effectively established a new platform for cancer drug discovery. Just as impressive as their approach to drug design was the route Adam and Jeff took to having tarloxitinib bromide trialled in lung cancer: they went to one of the USA's leading cancer centres and convinced some of the world's top lung cancer specialists that this drug addressed an unmet need in their treatment programmes. It's very encouraging for the future of New Zealand's biomedical research that our investigators are not only capable of inventing whole new classes of cancer drugs, but also have the experience and insight to know exactly where these drugs fit globally, so they can rapidly be adopted into the clinic.

Of course none of this would have been possible without sustained investment over decades in the New Zealand teams and facilities on which such highly advanced innovation is built. And given that sustained investment, it's important to note the relevance of this research to our society: although there is still quite some distance between a phase II clinical trial and providing widespread benefit to cancer patients, this new drug has potential to abate the dreadful toll that lung cancer exacts in New Zealand, especially amongst Māori.

Another notable international achievement during the year was reaching a new benchmark in the MWC's sustained engagement with leading Chinese researchers and institutions. As reported on page 15, the establishment of a Joint Research Centre in Biomedicine with

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the Guangzhou Institutes of Biomedicine and Health (GIBH) marks a new level of scientific cooperation between the two countries. Not only is the Centre supported by the Chinese Academy of Sciences, and both city and provincial governments in China, it is the first joint research centre of any kind to be formally recognised by the Chinese Ministry of Science and Technology. This acceptance of the MWC at the heart of China's medical research strategy is a tremendous testament to the talent of researchers on both sides, and to the very cordial working relationship they have developed over many years. The MWC's capability in establishing and maintaining such effective relationships is now providing a template for other parts of the New Zealand science system to engage more deeply with their Chinese counterparts – a great tribute to Deputy Director Peter Shepherd and International Liaison Advisor Peter Lai who have led this engagement from the start.

On the domestic front, in 2015 the MWC introduced an expanded Facilities Access Scheme to improve investigators' access to advanced technology. As anticipated, many of our investigators have since requested access to advanced facilities they could not otherwise afford to use. In some cases it was also apparent that enabling that access provides much needed supportive funding to facilities that are under-utilised – potentially providing interesting examples of gaps between research infrastructure planning and ultimate use.

As reported on page 25, our national database of high technology facilities that our investigators wish to access has grown rapidly, and we will continue to track demand from our network of leading biomedical researchers for the different classes of technology they represent. At the same time, our investigators are constantly scanning their international networks for new technologies that enable step-changes in their research capabilities – indeed many of these are brought to our attention in applications for support to collaborate with labs overseas breaking hard new technical ground. All this information should help inform institutional decisions when considering opportunities to invest in advanced technology to support biomedical science. However at present there is no apparent mechanism for a co-ordinated inter-institutional approach to building up and maintaining our national research infrastructure. A clear example of the need for such co-ordination is the potential to avoid duplication where a single facility would provide sufficient capacity for total national demand. The Centres of Research Excellence offer an ideal forum to gauge the demand signals from national investigator networks, potentially informing co-ordinated investment in research infrastructure. So in this respect we look forward to working with our institutional partners and government agencies to ensure New Zealand can make the most of its research resources.

Rod Dunbar  
Director



# Mission and Strategic Outcomes

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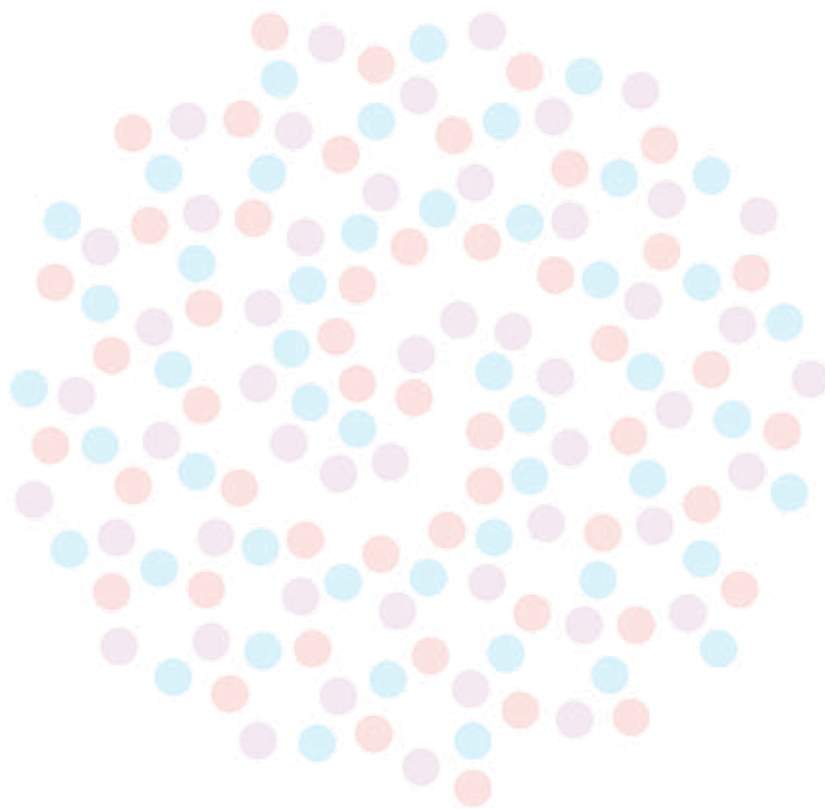
## Mission

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.

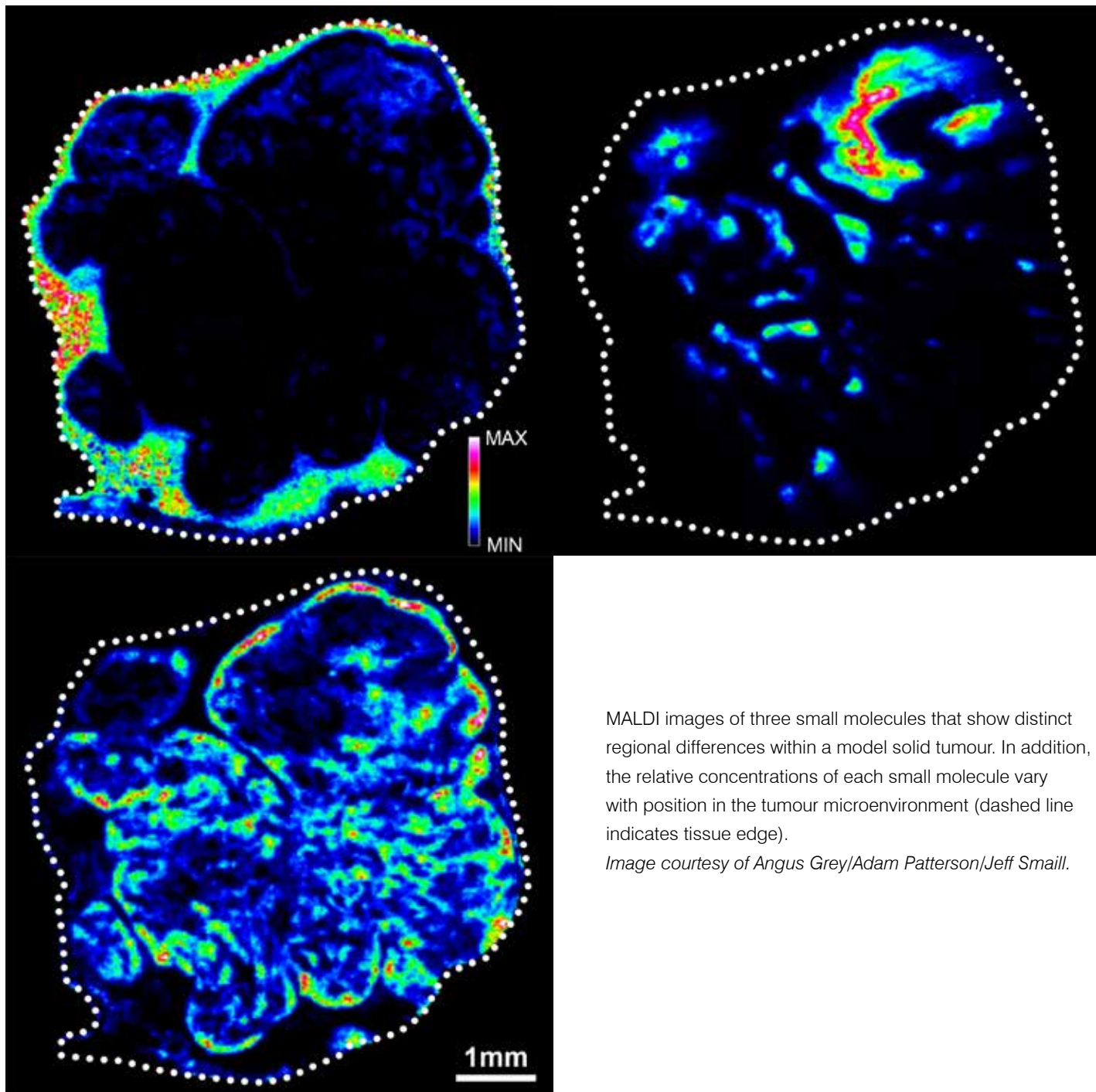
## Strategic outcomes

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.







MALDI images of three small molecules that show distinct regional differences within a model solid tumour. In addition, the relative concentrations of each small molecule vary with position in the tumour microenvironment (dashed line indicates tissue edge).

*Image courtesy of Angus Grey/Adam Patterson/Jeff Smail.*



# Highlights

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## Cancer drug advances to phase II clinical trials

*A New Zealand cancer drug developed by two Maurice Wilkins Centre investigators has reached the second phase of clinical trials with patients.*

Associate Professor Adam Patterson and Dr Jeff Smaill from the Auckland Cancer Society Research Centre and Maurice Wilkins Centre have collaborated with leading American biotechnology company Threshold Pharmaceuticals to advance a new cancer drug to phase II clinical trials.

"The phase II clinical trials of TH-4000 are a culmination of over ten years of research and development," says Adam. "It's exciting to see a New Zealand developed cancer drug advance to this stage."

The scientists have cleverly exploited an abnormality of tumours to make a drug that can discriminate between cancer and healthy tissue, potentially minimising the side effects of treatment. Administered in inactive 'prodrug' form, TH-4000 transforms into a cancer drug only in the abnormally low-oxygen (hypoxic) conditions found in most solid tumours. The treatment is known as a hypoxia-activated EGFR-TKI therapy.

Adam explains: "The drug targets the human epidermal growth factor receptor (EGFR) which is mutated or overactive in many cancers. Once active in the hypoxic zone, the drug inhibits the EGFR enzyme at its active site preventing it from sending signals that prompt a cancer cell to divide and grow."

Current EGFR-TKI therapies have demonstrated significant clinical activity in non-small cell lung cancer that expresses mutant forms of EGFR. They have proven less effective in cancers expressing high levels of wild type EGFR, likely due to insufficient therapeutic index with dose-limiting toxicities causing side effects such as rashes or diarrhoea.

"TH-4000 is a molecularly-targeted, hypoxia-activated irreversible EGFR-TKI," says co-inventor Jeff Smaill. "The drug is therefore expected to deliver greater efficacy with fewer side effects than available treatments."

TH-4000 has shown positive results in limiting tumour growth in experimental models of non-small cell lung cancer (NSCLC) and head and neck cancers. Lung cancer is New Zealand's leading cause of cancer deaths for men, and the second most common for women. NSCLC is the most common form and makes up approximately 80 per cent of lung cancers.

Both Adam and Jeff paid tribute to their talented drug development team. "It's exciting for us to be working on this next generation approach of combining molecular and hypoxia targeting in a single drug candidate. We were particularly pleased to see the first two U.S. patents protecting TH-4000 issued by the U.S. Patent Office in 2015," says Jeff.





2015 award recipients from clockwise top: Distinguished Professor Margaret Brimble (right) - Distinguished Women in Chemistry/Chemical Engineering; Professor Debbie Hay - Australian Peptide Association's 2015 Tregear Award; Dr Htin Lin Aung (middle) - Myanmar recipient of the NZ Association of Southeast Asian Nations (ASEAN) 40th Anniversary Awards; Dr Francis Hunter - a member of the winning team in the 5th Merck Serono Innovation Cup programme.

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## International recognition for MWC investigators

*In 2015 Maurice Wilkins Centre investigators received a number of international awards that recognised their achievements in research and community service.*

Distinguished Professor Margaret Brimble, a principal investigator with the Maurice Wilkins Centre, is no stranger to accolades, but in 2015 her achievements reached new heights when the International Union of Pure and Applied Chemistry (IUPAC) named her one of the year's 12 Distinguished Women in Chemistry/Chemical Engineering. "I am delighted to accept this award as the first ever New Zealander to be selected," says Margaret.

The award acknowledges and promotes the work of female chemists and chemical engineers. Awardees are selected based on excellence in basic or applied research, accomplishments in teaching or education, or demonstrated leadership and managerial excellence in the chemical sciences. The award also recognises women who have shown leadership and community service during their careers.

Also receiving international recognition were investigators Professor Debbie Hay and Dr Htin Lin Aung. Debbie won the Australian Peptide Association's 2015 Tregear Award for outstanding research in the field of peptide chemistry and biology and underpinning technologies. Debbie's research aims to contribute to the development of medicines to treat migraine, cancer, lymphatic insufficiency, cardiovascular disease, obesity and diabetes, while revealing fundamental mechanisms of cell signalling.

Affiliate Investigator Dr Htin Lin Aung was a Myanmar recipient of the NZ Association of Southeast Asian Nations (ASEAN) 40th Anniversary Awards. Last year, ASEAN and New Zealand celebrated the 40th anniversary of the formal partnership. The awards honoured forty people who had significantly contributed to New Zealand's deepening relationship with the region. Htin received the award in recognition of his commitment to Myanmar – New Zealand relations and his work to build collaborations between the University of Otago and the Myanmar health sector. Htin is part of a research programme to develop a new generation of diagnostic techniques for drug-resistant tuberculosis (see story page 17).

Early career researchers affiliated with the Maurice Wilkins Centre were also recognised internationally in 2015. Affiliate Investigator Dr Francis Hunter, a postdoctoral fellow at the Auckland Cancer Society Research Centre, was a member of the winning team in the 5th Merck Serono Innovation Cup programme. The programme encourages early career researchers to work in teams to generate new innovative ideas for therapeutics and, with support from industry coaches, turn these ideas into business plans that are judged by a panel of experts. Francis was one of only 31 early career researchers selected for the programme from over 800 applicants worldwide. The idea for a novel cancer therapeutic proposed by Francis was selected as the €20,000 grand prize winner and is currently being implemented by Merck Serono.





A *Phlebotomus papatasi* sand fly - one of the species responsible for the spread of the vector-borne parasitic disease Leishmaniasis.

Image courtesy CDC/Frank Collins, photo by James Gathany.



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## NZ chemists tackle neglected disease

*For Maurice Wilkins Centre associated chemists at the Auckland Cancer Society Research Centre, what started as the development of an anti-TB drug has morphed into the discovery of a compound with the potential to tackle a parasitic disease that affects up to 1.3 million people per year.*

“Chemistry is chemistry,” says Distinguished Professor Bill Denny, an MWC principal investigator and co-director of the Auckland Cancer Society Research Centre (ACSRC). It’s a short statement that goes a long way to explaining how MWC associated chemists at the ACSRC came to work with the New York-based Global Alliance for TB Drug Development (known as the TB Alliance) and the Geneva-based Drugs for Neglected Diseases initiative (DNDi). “Our work with the TB Alliance came about in the mid-2000s because we had expertise in the particular chemistry behind an anti-TB drug they were developing called PA-824” says Bill.

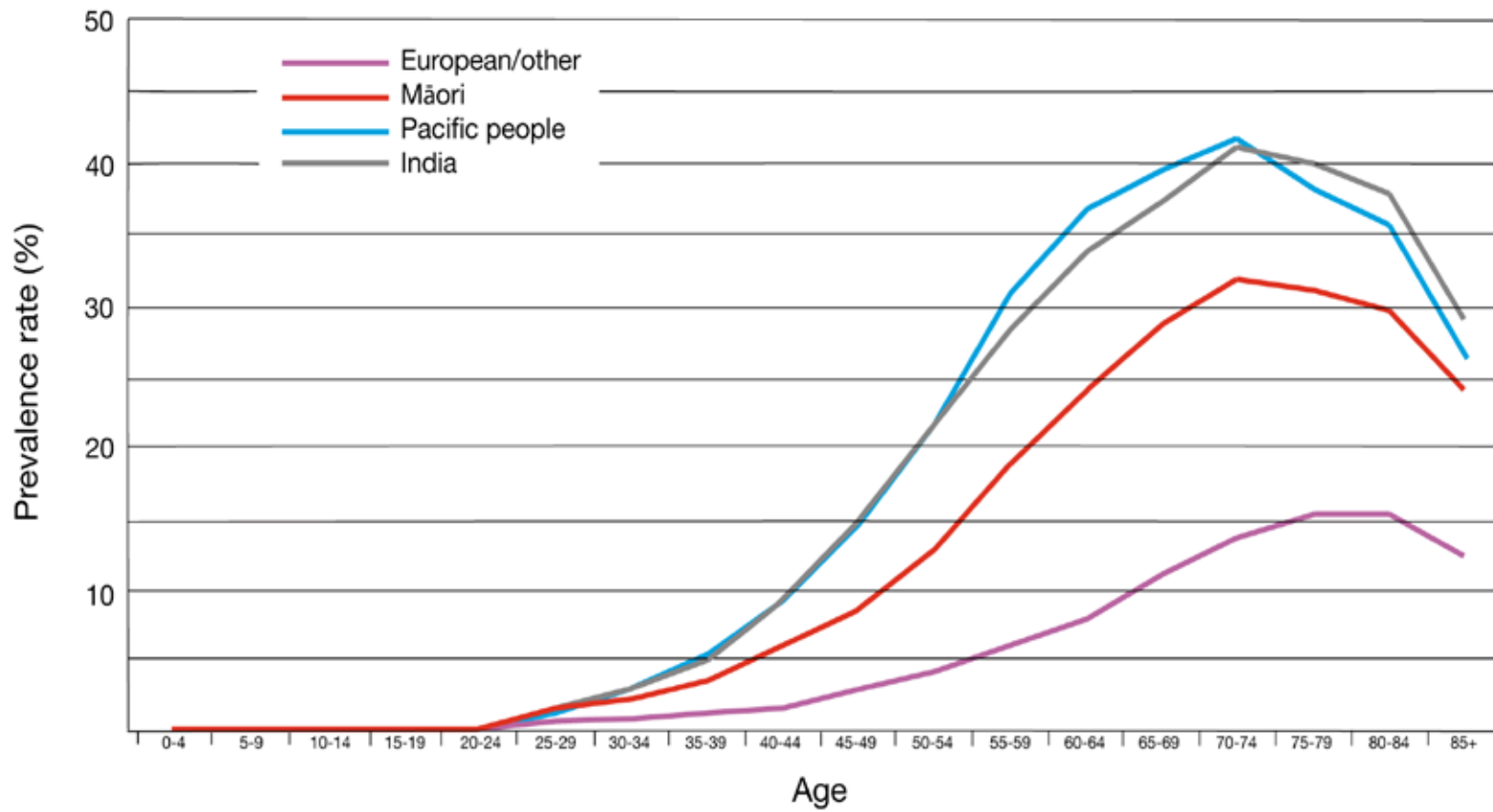
The TB Alliance drew upon the world-leading medicinal chemistry skills of Bill and five of his ACSRC colleagues, including Associate Professor Brian Palmer and Dr Andrew Thompson, to optimise each part of the drug through the design and synthesis of a further 1000 compounds. When fellow not-for-profit drug developer DNDi approached the TB Alliance in 2007 and asked if it had any possible drug candidates to tackle leishmaniasis, a parasitic disease, the TB Alliance put DNDi in touch with the Auckland researchers to provide a selection of the new compounds for screening.

Leishmaniasis is transmitted by female sandflies and affects some of the world’s poorest populations. An estimated 1.3 million new cases occur each year with the most serious form, visceral leishmaniasis (VL), resulting in approximately 35,000 deaths annually. Few treatment options are available and all existing VL drugs suffer from significant drawbacks which limit their use.

“Initially DNDi investigated the efficacy of a compound called VL-2098,” explains Andrew. “VL-2098 showed great promise as a pre-clinical lead to treat visceral leishmaniasis but was ultimately found to be unsuitable for clinical development.” While these tests were occurring, however, Andrew and another ACSRC chemist, Dr Patrick O’Connor, entered into a 3-year collaboration with DNDi to investigate a slightly different chemical series in an effort to identify a potential back-up should VL-2098 prove unsuccessful. “We ended up making over 300 different compounds, mostly from this second series, and out of that work DNDi have selected a new candidate – DNDI-0690,” says Andrew. In September 2015, DNDi decided to take DNDI-0690 forward for pre-clinical development on the basis of its excellent efficacy against VL in animal models and its better safety profile than VL-2098.

As Bill notes, the serendipitous events that brought all parties together are a win for everyone, including New Zealand researchers who continue to work with DNDi and the TB Alliance. “We learn so much from our partners. If we can apply our chemistry expertise to help fight infectious diseases, particularly tropical diseases where it’s a neglected area, we’re happy to do so.”





Type-2 diabetes prevalence rates in New Zealand 2010: graph demonstrates a higher prevalence of Type-2 diabetes in older people and the differences in prevalence of Type-2 diabetes between different ethnic populations in New Zealand.

Source: New Zealand Virtual Diabetes Registry data

## Genetic study challenges popular opinion

*A new Maurice Wilkins Centre study is bringing together researchers from across the country to investigate the genetic factors that predispose some New Zealanders to a greater risk of obesity or diabetes. The study is already challenging popular opinions about New Zealand's rising obesity rates.*

You are what you eat, right? Not if you ask Professor Peter Shepherd, Deputy Director of the Maurice Wilkins Centre and one of four co-directors of a new \$1 million study analysing up to 500 genes suspected of affecting individuals' appetite and/or the way they control their energy metabolism.

"Popular opinion frequently cites poor diet or lack of exercise as the major cause of obesity," says Peter, but he is quick to point out that while this is in principle true, it doesn't explain why individuals are affected in different ways by similar degrees of bad diet and lack of exercise.

Peter is working with fellow Maurice Wilkins Centre investigators Dr Rinki Murphy, Professors Dave Grattan and Tony Merriman, and Dr Donia McCartney-Coxon on a landmark programme to study those genes in a New Zealand context. Once results are in, MWC researchers will use their combined skills to determine how the information can be used to develop targeted therapeutic strategies or rationally designed prevention programmes.

"No one has done these studies in New Zealand populations," says Rinki, the study's clinical co-director. "If we can identify genes that play a role in this we will be better placed to successfully tackle these major diseases."

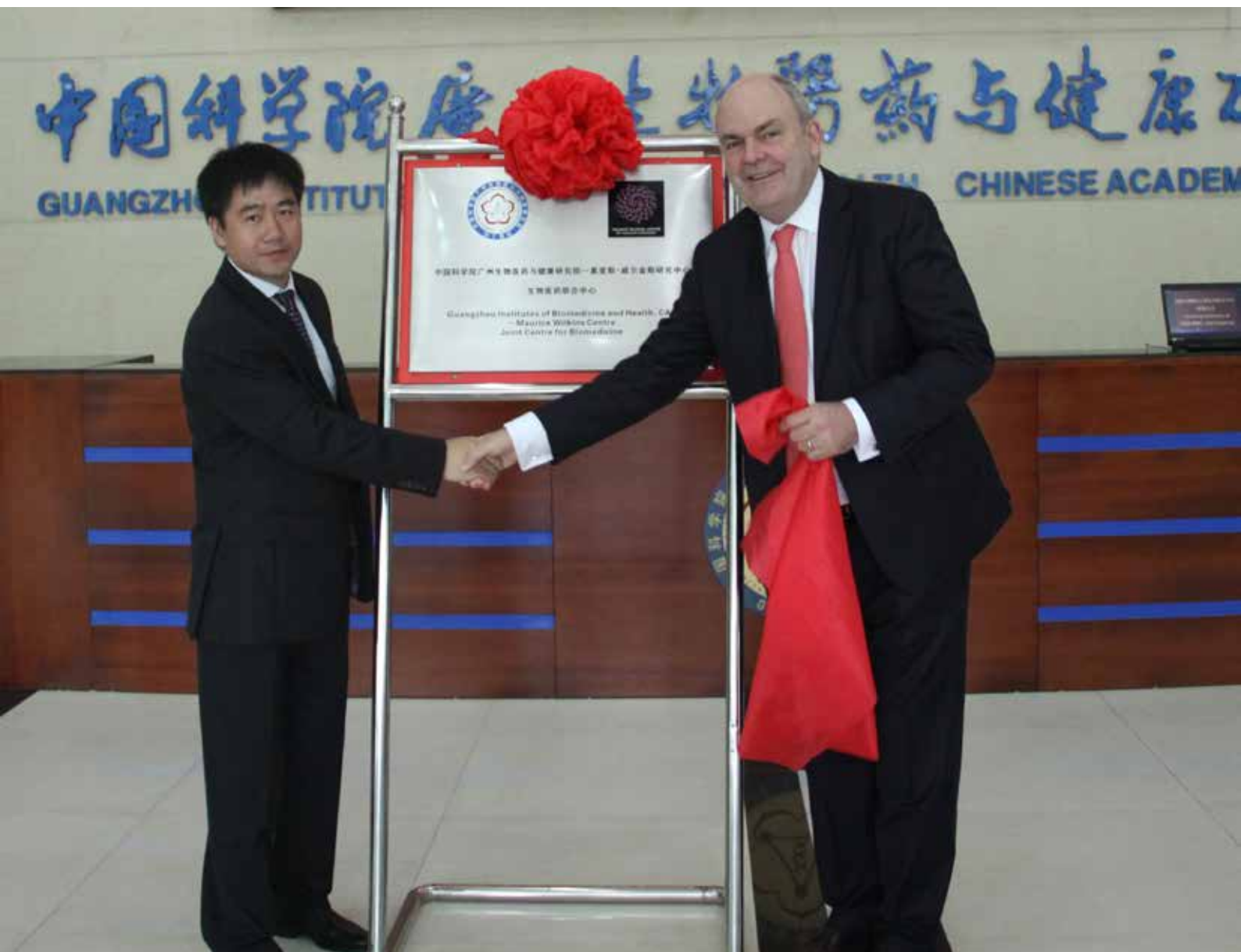
Professor Grattan from the University of Otago points to overseas studies showing there are a number of genes that influence weight or a person's risk of developing Type 2 diabetes. "The evidence is actually overwhelming that there are biological differences between individuals that regulate all the things that make us different," he says. "It shouldn't be surprising that these also cover processes regulating appetite, metabolism and accumulation of fat."

Professor Tony Merriman is co-director responsible for the genetic analysis that will use samples from 600 New Zealanders. Tony and his University of Otago team built up considerable experience in the techniques required when they conducted a gout study looking for genetic variance between New Zealand populations. "The technology is really shooting away to allow us to zero in on specific genes." Tony also notes the results can give the team a continual source of things to follow-up on: "It's a really valuable data set and can be very useful in the public health context or in developing new and better interventions."

By bringing together geneticists, clinicians, neuroscientists and biochemists from across the country, the Maurice Wilkins Centre study is also breaking down institutional and disciplinary barriers to deliver exciting new approaches to one of New Zealand's biggest health issues.







Mr. Chen Guanghao, Party Secretary and Deputy Director General of the Guangzhou Institutes of Biomedicine and Health (GIBH), with the Hon Steven Joyce, New Zealand Minister for Science and Innovation, at the unveiling ceremony of the Joint Centre for Biomedicine between GIBH and the Maurice Wilkins Centre.

*Image courtesy GIBH*

## China collaborations go from strength to strength

*The Maurice Wilkins Centre continues to lead the way in establishing biomedical research ties between New Zealand and China. 2015 marked important developments in relations that will deliver significant health and economic benefits for both countries.*

Since 2012 the Maurice Wilkins Centre has worked closely with Chinese counterparts to build strong biomedical research collaborations and strategic links. In 2015, those ties culminated in the establishment of a Joint Centre for Biomedicine, as well as agreements designed to stimulate and support innovation. “We are very excited about the new opportunities these agreements will generate and delighted that the Maurice Wilkins Centre has been able to foster these relationships,” says MWC Director Professor Rod Dunbar.

In mid-November, the establishment of a joint centre for medical research between the Maurice Wilkins Centre and the Guangzhou Institutes of Biomedicine and Health was marked by a Chinese delegation visiting the University of Auckland, the Centre's host institution. The Chinese delegation was led by Professor Yaping Zhang, Vice President of Chinese Academy of Sciences, who unveiled a plaque celebrating the Chinese government's accreditation of the Joint Centre for Biomedicine. The joint centre is the first of its kind between New Zealand and China and will focus on leading-edge medical science to seek new treatments for diseases such as cancer.

During the visit, Professor Zhang also signed a joint agreement regarding development of intellectual property. The signing formally recognises the ongoing collaboration between Professor Ke Ding from the Guangzhou Institutes of Biomedicine and Health and Maurice Wilkins Centre Associate Investigator Dr Jeff Smaill and Principal Investigator Associate Professor Adam Patterson, both from the Auckland Cancer Society Research Centre. “We are delighted to be working together with our colleagues in China in such a close collaboration. The New Zealand-China relationship has deepened throughout the process of this agreement and we see many, many valuable opportunities ahead,” Adam says.

Cross-cultural research and economic relations were further strengthened in December 2015 when a delegation from the University of Auckland travelled to China to sign a Memorandum of Understanding (MOU) with the Guangdong Provincial Science & Technology Department. The scope of biomedical research covered by the MOU includes stem cell therapy and regenerative medicine, metabolic disease, immune therapy for cancer, as well as drug discovery.

“A key focus under the partnership with Guangdong is innovation that will lead to new therapies for human disease,” says MWC Deputy Director Professor Peter Shepherd. “Part of the agreement with the Guangzhou Institutes of Biomedicine and Health is to develop these therapies jointly, enabling both countries to benefit from accelerated progress from the laboratory to the clinic.”





From left to right: MWC Principal Investigator Professor Greg Cook, Professor Phillip Hill from the Centre for International Health, and MWC Affiliate Investigator Dr Htin Lin Aung.  
*Image courtesy of University of Otago/Sharron Bennett*

## New Zealand TB research tackles international problem

*A 2014 pilot study funded by the Maurice Wilkins Centre's Flexible Research Programme has led to a larger investigation into the genetics of drug-resistant tuberculosis (TB) in Indonesia and Myanmar.*

In 2014 an estimated 9.6 million people fell ill with tuberculosis worldwide, and 1.5 million of those people were killed by the disease. Compounding the problem are drug-resistant strains of TB which threaten the global control and elimination of the disease. Worldwide, an estimated 3.3 per cent of new TB cases and 20 per cent of previously treated cases are multidrug-resistant.

Maurice Wilkins Centre investigators Professor Greg Cook and Dr Htin Lin Aung of the University of Otago's Department of Microbiology & Immunology are tackling the problem head on. Alongside Professor Phillip Hill from the Centre for International Health, Greg and Htin aim to identify the genetic basis for TB drug resistance in Indonesia and Myanmar. The team has received \$450,000 for the study through the e-ASIA Joint Research Programme with New Zealand's Health Research Council.

"Determining as soon as possible whether a patient has a drug resistant form of TB is vital for effective treatment of their disease," says Greg.

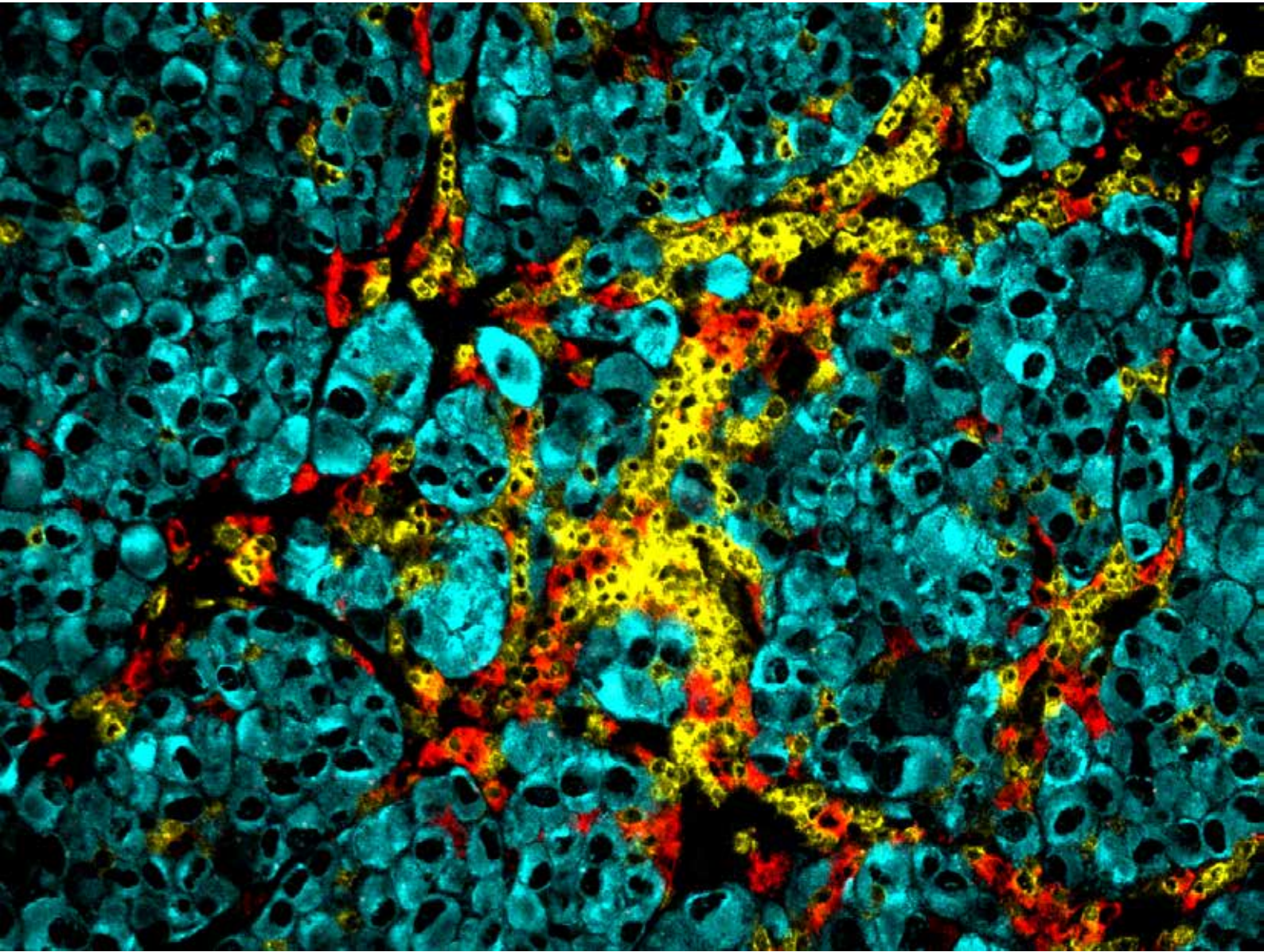
Greg explains that the traditional method for diagnosing drug-resistant TB is known as phenotypic drug susceptibility testing (DST). The process involves weeks of culturing a TB patient's pathogen, exposing the culture to drugs and noting how the culture reacts. Greg notes that the lengthy process means there is no way to identify if doctors are treating the patient with the right drugs or not until the drug susceptibility testing is complete.

A 2014 pilot study funded by the Maurice Wilkins Centre's Flexible Research Programme has led to a new study to clarify the potential of an alternative DST method known as whole genome sequencing (WGS). The study will compare phenotypic DST results with results from identification of known drug-resistant gene mutations by WGS. The research team will then investigate any unexplained discrepancies and identify whether WGS has potential as a replacement or complementary test. The alternative method has the potential to provide a rapid and routine tool for DST and TB strain identification in Myanmar and Indonesia. Indonesia has an estimated 6,800 cases of drug resistant TB each year while in Myanmar the number is much higher at 9,000 cases annually.

For Affiliate Investigator Htin Lin Aung, the study has a personal element. Htin is a Myanmar post-doctoral research fellow who trained as a Maurice Wilkins Centre supported PhD student at Otago. Htin says he is very honoured to be involved in this research project that could benefit his home country. "Myanmar and Indonesia are affected by drug-resistant TB and rapid diagnostic tests are required to combat this global threat," he says.







Staining of a human melanoma metastasis below the skin. The image shows immune cells such as T cells (stained yellow) and wound-healing macrophages (stained red) infiltrating a field of melanoma cells (cyan). By better understanding how T cell-macrophage interactions influence the ability of T cells to identify and kill melanoma cells, researchers can improve current melanoma therapies and identify novel targets for development of new therapies.

*Image courtesy Joanna Mathy*

## MWC leads cancer immune therapy conversation

*The Maurice Wilkins Centre continues to be part of an international drive to develop and improve immune therapy for cancer. In 2015 the Centre organised a symposium that brought together over 160 New Zealand scientists, clinicians, and medical and allied health professionals to discuss the latest research.*

“Immune therapy for cancer represents a paradigm shift in cancer care,” says Professor Rod Dunbar, Director of the Maurice Wilkins Centre.

Unlike traditional cancer treatment approaches that target cancer cells, immune therapy seeks to boost the body’s natural defences by helping immune cells attack cancer cells. MWC investigators are part of the global immune therapy research effort, and are currently developing new vaccines to stimulate immune attack on tumours as well as drugs to stop tumours from blocking that attack. MWC investigators also anticipate immune therapy will eventually be tailored to each individual, and are working on diagnostic techniques to determine which therapy is most appropriate for each patient.

For Rod and the MWC team, the enormous potential of immune therapy to improve cancer care makes it all the more important to discuss the science behind it with a wide audience. In November 2015, MWC organised a full-day symposium on immune therapy for cancer that drew together people from varying backgrounds. “It was wonderful to see such a wide constituency represented, from hospital staff and cancer care co-ordinators to patient support groups, underscoring the strong interest in this area for everyone concerned with cancer,” says Rod.

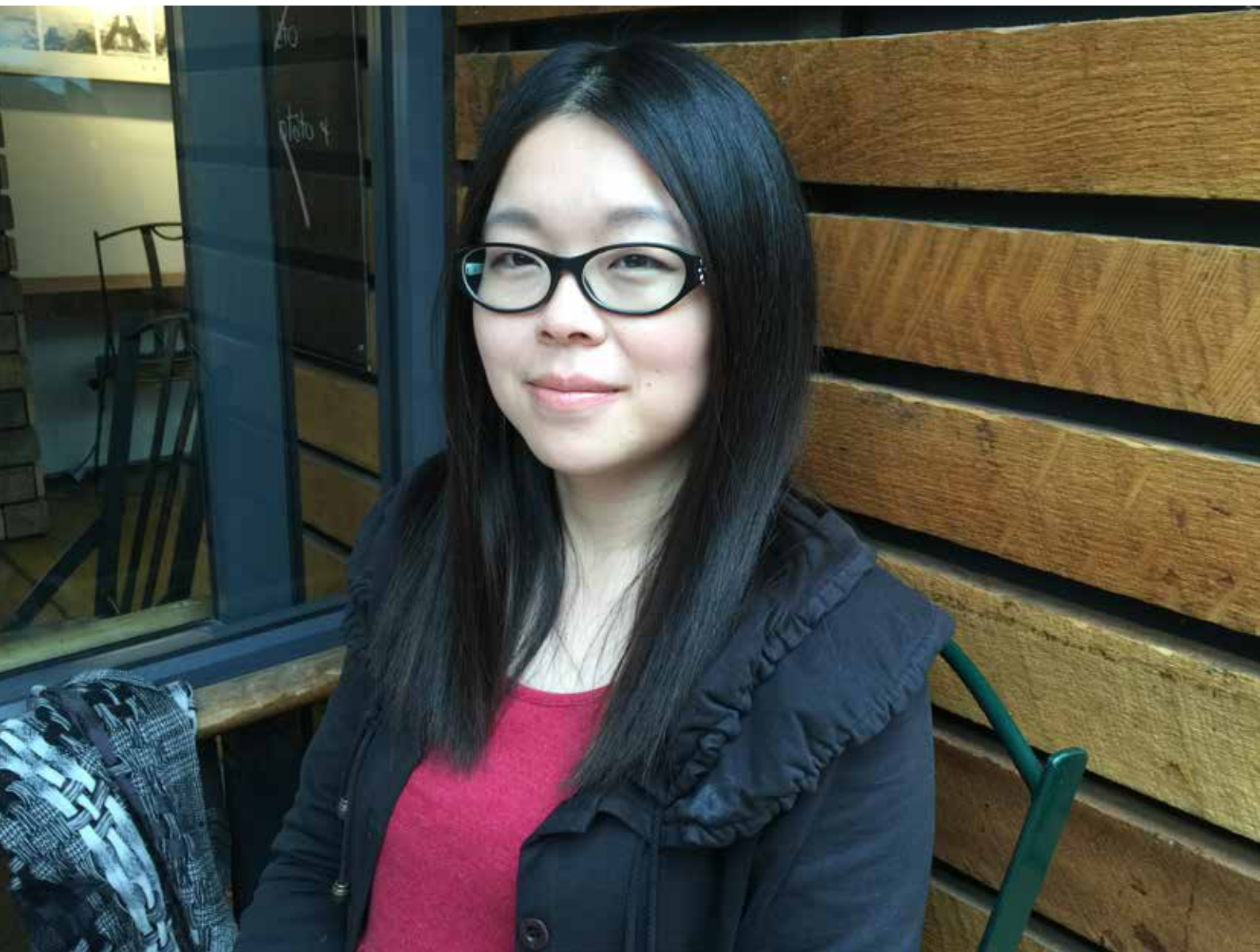
Symposium guest speakers included Dr Rosalie Fisher, an oncologist from Auckland, who spoke of the dramatic impact immune therapy can have on patients’ lives. Other speakers covered the scientific background to the changes in medical practice that immune therapy entails.

“This knowledge was simply not available when many of our current health professionals were training,” says Rod, “so it’s crucial to promote understanding of what is effectively a new and rapidly evolving discipline in medicine.” Feedback from the symposium supported this view, with many health professionals expressing their appreciation for the opportunity to further their awareness of the field, including the immune therapy research underway in the Maurice Wilkins Centre. Many of the symposium participants were also involved in public media commentary over the ensuing weeks.

“We are witnessing the start of a revolution in cancer treatment,” says Rod, “and we need to maintain a national conversation about how to ensure New Zealanders benefit.”







Dr Wanting Jiao

*Image courtesy Wanting Jiao*



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## Pursuing a dynamic research career

*A chance project as an undergraduate led early career researcher Dr Wanting Jiao to the world of computational modelling where she developed the skills needed by a number of Maurice Wilkins Centre research programmes.*

When Affiliate Investigator Dr Wanting Jiao undertook a summer project as a third year chemistry undergraduate at the University of Canterbury, there was no hint of where it would eventually lead her.

That summer Wanting was introduced to ligand docking – a molecular modelling technique used to investigate interactions between small molecules and their protein binding sites. “That’s how I started in the computational field,” explains Wanting.

The summer project also gave Wanting a taste of what computational methods can do, and she eventually went on to pursue a PhD with Professor Emily Parker, an MWC principal investigator. Under Emily’s mentoring, and with a desire to extend her skill set, Wanting learnt the computer-based methods to study the movements of atoms and molecules – “molecular dynamics simulations”. Wanting is applying these methods to study how the dynamic motions of an enzyme may contribute to its function and regulation.

Her knowledge and work in the field are already helping to explain results and guide some of the experiments being undertaken by colleagues in the Parker group and elsewhere within the Maurice Wilkins Centre.

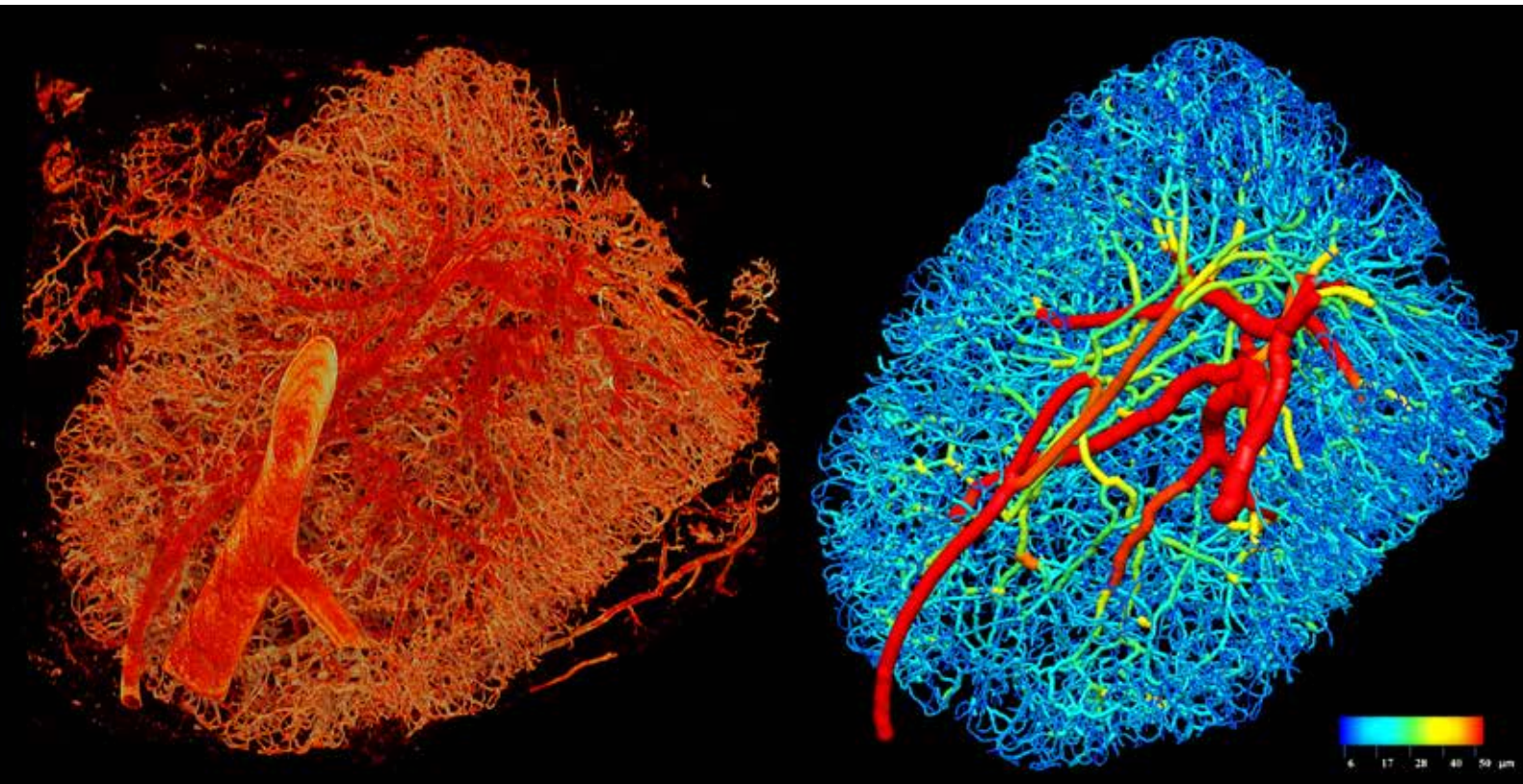
“The detail you obtain from a simulation is sometimes not accessible through experiments,” explains Wanting. “Computational methods and experiments combined together are a much more powerful approach for studying these enzyme systems.”

Wanting finished her PhD in 2011 and is now a post-doctoral research fellow in Emily Parker’s research group at the University of Canterbury’s Biomolecular Interaction Centre.

In 2015 Wanting attended the Early Careers Research Forum at the MWC Symposium where she presented on her contributions to projects under the MWC infectious disease research theme. The forum laid the foundation for more potential collaborations with MWC investigators.

“It’s a win-win situation,” says Wanting. “Computational simulations are helping researchers get more insights, and these collaborations are giving me more experience and helping me learn more about the technique.”





The 3D volume image of a mouse lymph node (left) was used to generate a 3D topology map of the continuous blood vessel system (right) and facilitated the quantification of vessel parameters. The display on the right shows colour-coded vessel diameters, whereby small vessels appear blue and the large vessels appear red.

*Image courtesy of Dr Inken Kelch*

## Mapping microscopic worlds

*Maurice Wilkins Centre researchers have used unique microscopic imaging techniques to peer into the three-dimensional structure of blood vessel networks – and new computational techniques to reveal how they are organised.*

Maurice Wilkins Centre scientists have provided an unprecedented glimpse into the microscopic networks of tubes that keep tissues alive – creating 3D maps of the 16,000 blood vessel segments that supply the oxygen and nutrients to an entire lymph node.

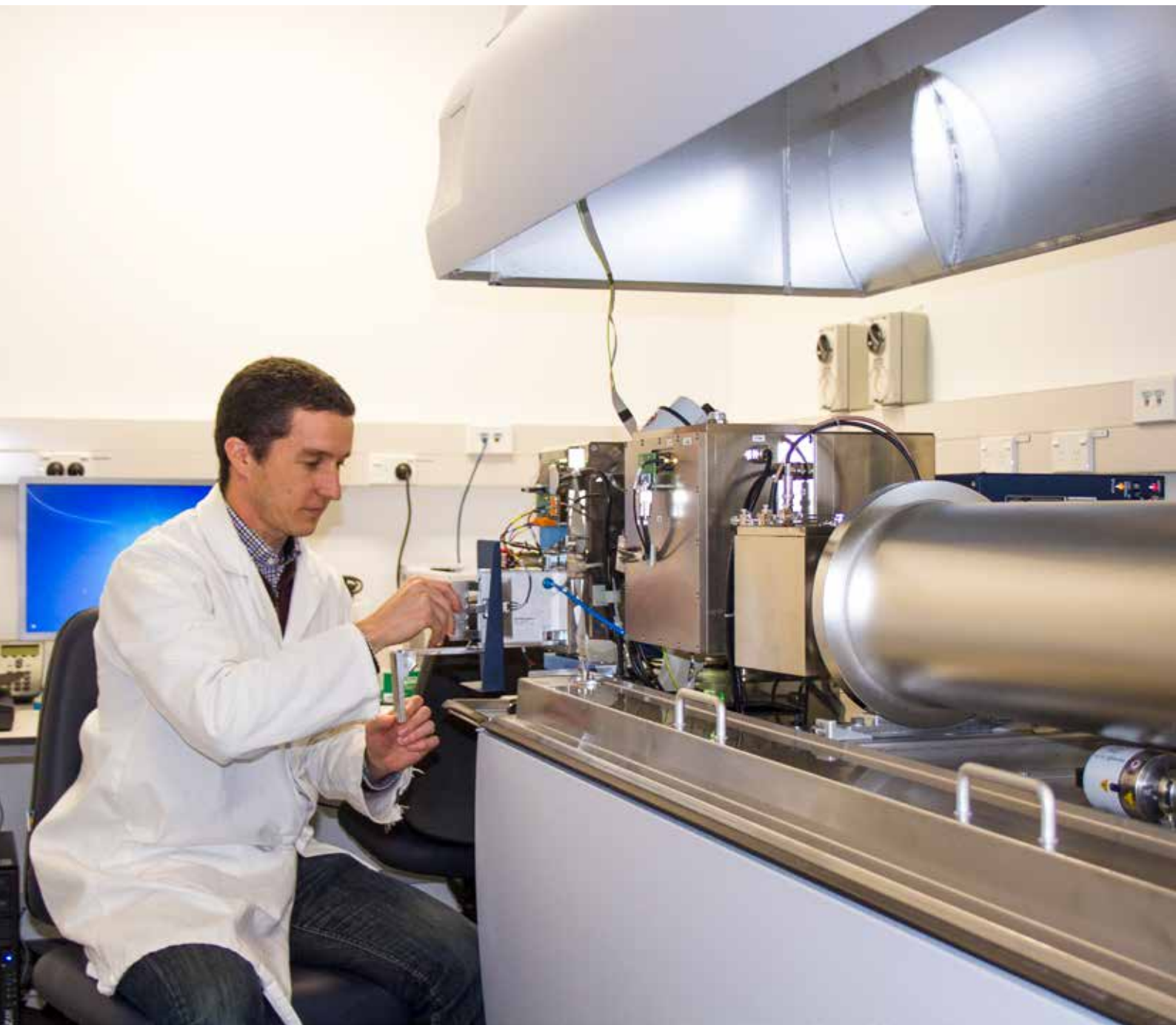
The highly detailed 3D images and videos they published reveal the dizzying hydroslide ride taken by blood cells as they journey through a labyrinth of twists, loops and turns inside an organ as small as a grain of rice. This intricate network of tubes comprises a single incoming artery and outgoing vein connected by branches that become smaller and smaller to finally feed capillaries so narrow only one blood cell can pass through at a time. The stunning detail on this complete set of blood vessels was only possible because of a unique microscope designed and built at the University of Auckland.

Affiliate Investigator, and former Maurice Wilkins Centre PhD student, Dr Inken Kelch says the research developed new imaging and computational techniques capable of mapping even the smallest blood vessels in the tissues. “The special microscope developed by Associate Professor Ian LeGrice and his team at the University of Auckland allowed us to take 63,706 high resolution images of a lymph node only millimetres wide.” The precise control within the microscopy system allowed all these images to be seamlessly combined into one large 3D image – a feat not feasible on previous systems.

Dr Gib Bogle from the Auckland Bioengineering Institute then developed image processing tools to analyse the images and measure how all the microscopic blood vessels are arranged. “With computer analysis we were able to take detailed measurements of the network, including each blood vessel’s diameter, distances between vessels, and the number of branches along each path.” The precise measurements enabled the team to colour-code specific structures and re-visualise the network using 3D computer models. These methods allow the researchers to view the blood network from different angles, zoom into regions of interest, and compare structures.

Professor Rod Dunbar, Director of the Maurice Wilkins Centre, says the work is a completely new and detailed view of a critical immune environment at a microscopic scale. “These maps help us understand how lymph nodes work – these small cell factories are crucial for generating immune attack on both infectious agents and cancer. But the new information about how blood vessel networks are constructed has much wider use – from understanding diseases where blood vessel networks are abnormal, to understanding how different drugs flow from the blood into the tissues.” The techniques established in this project have already been used to image the disordered blood vessels in tumours, and Inken is using similar methods to image other networks of tubes in immune tissues – with similarly spectacular results.





Dr Gus Grey inserts a sample into the Bruker MALDI-TOF/TOF mass spectrometer at the University of Auckland's Biomedical Imaging Research Unit.



## Making the most of New Zealand's resources

*The Maurice Wilkins Centre is facilitating access to specialised equipment and facilities across the nation with a new scheme that makes the most of New Zealand's research resources.*

"The ability to access New Zealand's best research equipment and facilities is crucial to advancing the research capabilities and outcomes of our investigators and collaborators," says Maurice Wilkins Centre Director Professor Rod Dunbar.

Prior to 2015, the Centre purchased its own research equipment and provided grants to researchers to cover usage charges. In 2015 the Maurice Wilkins Centre introduced a new scheme by establishing a central database of nationwide equipment from all its affiliated research institutions and introducing a new category of funding in its Flexible Research Programme.

The new programme enables all Maurice Wilkins Centre researchers to apply for assistance to cover usage charges, travel and accommodation to use any of the approved facilities and equipment on the Centre's online nationwide database. Priority is given to collaborative projects that advance the themes and sub-themes of the Centre's research programme and projects that are likely to seed more studies. "The new scheme is making the most of New Zealand's research resources by facilitating access to a much wider range of research equipment and expertise than is ordinarily available to investigators within their host departments," explains Rod.

Since its launch in September 2015, the Maurice Wilkins Centre's online database has accrued 75 listings of equipment, facilities and services from affiliated sites around New Zealand. A recent addition that is already contributing to the Centre's research is a new Imaging Mass Spectrometer from the University of Auckland's Biomedical Imaging Research Unit. Associate Investigator Dr Gus Grey is in charge of the facility: "MALDI imaging mass spectrometry allows us to build a two-dimensional ion intensity map, known as a MALDI image, that shows the distribution and relative quantity of biomolecules such as proteins, peptides, lipids or metabolites," explains Gus. "It's a very powerful technique that has the potential to contribute to a number of Maurice Wilkins Centre research projects." Fellow Maurice Wilkins Centre investigators Associate Professor Adam Patterson and Dr Jeff Smaill from the Auckland Cancer Society Research Centre have already taken advantage of the new facility. Adam and Jeff have been using MALDI Imaging to look for visual evidence of a hypoxia activated drug in hypoxic regions of tumours (see related story page 7).

"The MALDI imaging mass spectrometer is an excellent example of a newly available research facility that is advancing New Zealand science by providing our researchers with access to some of the latest technology," says Rod. "Improving access to such facilities, as well as improving researchers' vision of the high technology assets across New Zealand, is a very important role for a national Centre of Research Excellence like the Maurice Wilkins Centre."





## Research Programme

The MWC divides its research into four themes – three disease-based themes and a fourth that develops new technologies that can be applied in many disease contexts. A broad description of progress under each theme is set out below. Progress under each theme is tracked against milestones set by each of the research teams when they commence their projects, but these are not reported below, since 28 of 29 milestones set in our Strategic Plan were met in 2015 (with one deferred to 2016).

### Cancer

The MWC's main focus under the cancer theme has been the development of new therapeutics for cancer. Three major therapeutics programmes progressed particularly strongly in 2015:

- In 2015, Phase 2 clinical trials commenced in the USA of a novel drug, tarloxotinib bromide, discovered by MWC investigators, as noted in the Director's report. This drug has a new mechanism of action for a cancer drug, since it targets a wide range of molecules that drive tumour growth (the EGFR family) but it is only activated in the low-oxygen environment of tumours. Excellent progress was also made towards developing a new series of related drugs (this time targeting the FGFR family of cancer molecules), in close collaboration with the Prof Ke Ding in Guangzhou.
- The MWC's strengths in designing "kinase inhibitor" drugs was focused on an important molecule in the immune system ("CSF1R") that slows down the immune attack on cancer. Very potent compounds that inhibited this molecule were generated, with high selectivity over related molecules (namely other kinases).
- Cancer vaccines are molecules designed to stimulate immune cells called T cells to recognize and attack cancer. In 2015 MWC investigators developed and patented several new vaccines by tagging synthetic mimics of cancer cell molecules so that the immune system recognizes them as a threat. A new start-up company, Avalia Immunotherapeutics, was founded by A/Prof Ian Hermans from the Malaghan Institute and Prof Gavin Painter from the Ferrier Institute at Victoria University to develop some of these vaccines towards clinical trials in New Zealand cancer patients.
- In addition, MWC genomics and immunology specialists developed novel tools to accelerate the discovery of new cancer therapeutics, as well as their testing in clinical trials. These tools include a novel web-accessible melanoma genomic database, and novel methods for assessing cancer patients' immune status (using flow cytometry and immunofluorescence microscopy).

## Diabetes and metabolic disorders

The MWC is taking an integrated multidisciplinary approach to diabetes and metabolic disorders, from investigating new therapeutic approaches and their mechanisms of action, to understanding the genetics that drive biological differences in energy metabolism in humans. Major achievements in 2015 included:

- A novel signaling pathway in the brain that affects metabolism was characterized. This is an important step in understanding how energy balances are controlled in the body and gives clues about how to fight obesity.
- New analogues of the metabolic hormone amylin were synthesised, for potential for use in the treatment of pre-diabetes associated with obesity.
- The last group of patients were recruited for a study of the genetic risk factors for type 2 diabetes and obesity in the Māori and Pacific populations, and an initial scan for genes linked to Body Mass Index (BMI) was completed (a Genome-Wide Association Study).
- Follow-up of a group of over 100 patients was completed, one year after their treatment with different forms of gastric bypass surgery in a randomised clinical trial. Analysis included metabolic measurements to see what changes in their metabolism were still present. A pilot analysis of gut microbiota changes in the first 14 patients from this study was also completed.

## Infectious disease

The two major targets in this theme in 2015 were TB, and Group A Streptococcal (GAS) infection causing Acute Rheumatic Fever (ARF) and Rheumatic Heart Disease (RHD). TB remains an international scourge, and cases of highly drug resistant TB have already arrived in New Zealand. Rates of ARF and RHD remain unacceptably high in New Zealand, especially amongst Māori and Polynesian peoples, although how these diseases develop after GAS infection is still unclear.

- MWC scientists led a joint New Zealand and Australian consortium to assess current experimental GAS vaccines as a long-term strategy to reduce the incidence of ARF and subsequent RHD in Māori, Pacific and Aboriginal children.
- A novel GAS vaccine being developed by MWC scientists reached a new level of sophistication with molecules from 12 different variants of the GAS bacterium being produced in the lab for use in the vaccine (specifically 12 different T-antigens). Broad coverage of the GAS variants in circulation in the community is important for any vaccine to be effective in reducing GAS infection. Other work explored the human immune response to GAS infection, and developed a new test system to compare the effectiveness of different vaccines in producing antibodies that can kill the bacteria.

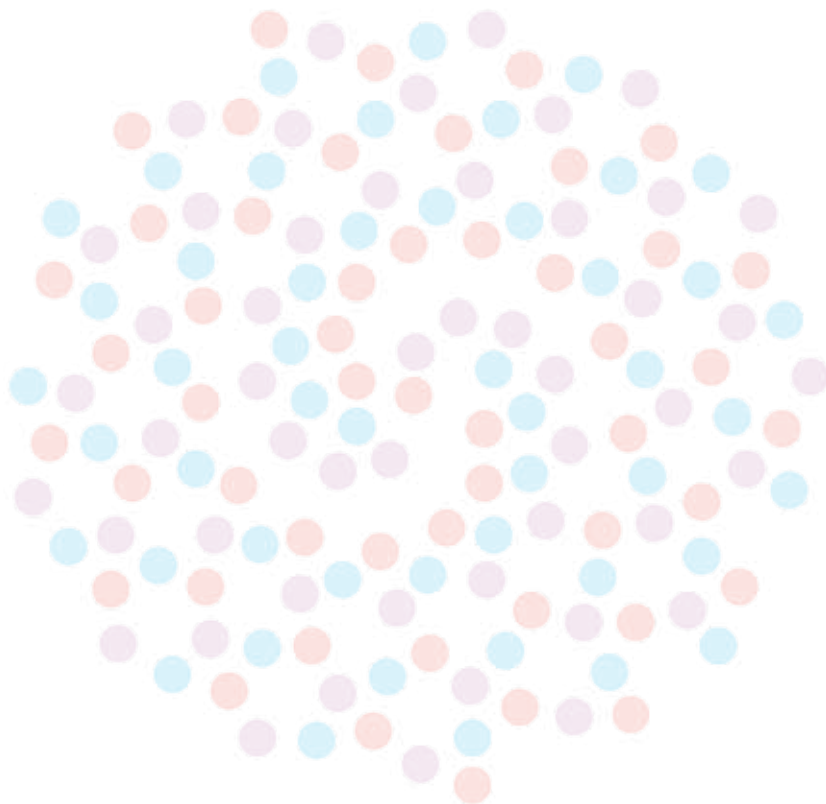




- Development of an improved 2nd generation analogue of bedaquiline for the treatment of drug-resistant TB, commissioned by The Global Alliance for Tuberculosis Drug Development, is nearing completion. Several candidate compounds are now in advanced evaluation prior to selection of a clinical candidate. This constitutes a major achievement for MWC investigators, placing New Zealand researchers at the centre of the global fight against TB.
- MWC investigators also targeted molecules involved in energy generation in TB (especially NDH-2 and MenD), since the bacteria are very dependent on these molecules even when in a dormant state. Several new molecules were discovered with anti-bacterial properties, and these are now being investigated as “lead” molecules for drug development.

## Innovative and integrative technologies

- Under this theme, the MWC is developing new techniques that can be broadly applied to discover new diagnostic tests and therapies. These are typically then applied to one of the MWC’s focus disease areas, but they are also useful in a wider context, for targeting other diseases and enabling other scientific breakthroughs. Advances in 2015 included:
  - The molecular toxin culicinin D was synthesised for the first time, ready to be joined to a therapeutic antibody. Toxin-armed antibodies are a new class of cancer drug that have had impressive impact in the clinic, but different toxins suitable for “conjugation” to antibodies are needed, such as culicinin D.
  - A highly sophisticated drug design technique called “transition state analysis” was implemented to target an enzyme (ATP-phosphoribosyl-transferase) present in the bacteria that cause TB and campylobacter food poisoning. This technique has previously been used in NZ researchers’ collaborations with Prof Vern Schramm at the Albert Einstein College of Medicine in New York, but this new project has enabled establishment of this highly specialized drug discovery platform in NZ.
  - Digital versions of chemical compounds were compiled and curated into virtual libraries for use by MWC investigators in “virtual screening”. This computer-based technique is designed to identify the rare chemicals that are likely to interact with a particular drug target – which is also represented in the computer as a digital 3D model. In related work, MWC teams used 3D computation to guide design of new drugs against targets in both cancer and infectious disease.
  - Novel computational techniques were developed by MWC scientists to process and visualise microscopy data in 3D. A unique microscope at the University of Auckland enables several cubic millimetres of tissue to be imaged in 3D at very high resolution, but new computational techniques were needed to analyse the very large-scale datasets it generates. The new computational techniques allow re-visualisation of the data from the microscope in unprecedented detail, revealing new features in the micro-anatomy of the tissue.





## Outreach

### International engagement

The Maurice Wilkins Centre 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 page 49), the Centre is building strategic relationships with institutions and government agencies at city, provincial and national level, in particular in the Asia-Pacific region.

#### China

The MWC continued its programme of engagement with China in 2015 by building on relationships initiated over 2012 to 2015:

- February: Associate Prof Adam Patterson, Dr Jeff Smaill and Mr Peter Lai travelled to Guangzhou to explore new collaborative projects with Guangzhou Institutes of Biomedicine and Health, Chinese Academy of Sciences (GIBH) and to work on an existing project with Professor Ke Ding, funded through the New Zealand - China Strategic Research Alliance. There was a repeat visit in May and in addition to the scientific meetings, the Consul General of New Zealand in Guangzhou, Ms Rebecca Needham, was briefed about the collaborative relationship. In August Professor Ke Ding visited the University of Auckland to finalise research plans for the remainder of the collaborative project.
- March: Dr Yunxian Chen, Vice Governor of Guangdong Province led a science and technology delegation that visited the Maurice Wilkins Centre and the University of Auckland. The purpose of the visit was to identify areas of potential future collaboration.
- March: a session of the Queenstown Molecular Biology Meeting was held in Shanghai. The meeting was jointly chaired by Maurice Wilkins Centre Deputy Director Professor Peter Shepherd and Professor Ming-Wei Wang, Director of the National Centre for Drug Screening at the Shanghai Institute of Materia Medica. Over 1000 delegates attended the joint meetings from many parts of China and around the world. In addition to Professor Shepherd, the MWC enabled two of its investigators, Associate Professor Debbie Hay, and Dr Jack Flanagan to attend the meeting to speak about their research.

- April: Prof Garth Cooper and Mr Peter Lai travelled to Guangzhou to engage with key GIBH personnel working in the area of metabolic diseases. This was followed up in July where Professor Garth Cooper and Mr Peter Lai travelled to Guangzhou again to engage with key GIBH personnel and update progress on their project with Professor Donghai Wu, funded by the Guangdong Province Science and Technology Department.
- April: Maurice Wilkins Centre was appointed by MBIE to run a 'Non-communicable disease' workshop in Auckland in association with the 2015 China- New Zealand Joint Commission meeting. The workshop involved major collaborators from Guangzhou Institutes of Biomedicine and Health, Professor Guanghao Chen, Professor Duanqing Pei, Professor Donghai Wu; Maurice Wilkins Centre Deputy Director Professor Peter Shepherd and Mr Peter Lai; with Professor Kathryn McPherson from the Health Research Council; Professor Nikola Kasabov from Auckland University of Technology and Professor Ming Wei Wang from the National Chinese Compound Library.
- May: Dr Teresa Holms and Ms Betty Shih attended an iPS Cell workshop, hosted by Guangzhou Institutes of Biomedicine and Health. During the visit Dr Teresa Holms discussed collaborative projects with key scientists in the Institute. See page 51 for more details of the workshop.
- August: Minister Steven Joyce visited the Guangzhou Institutes of Biomedicine and Health, Chinese Academy of Science to open the "Maurice Wilkins Centre - Guangzhou Institutes of Biomedicine and Health, CAS Joint Centre for Biomedicine", the first joint centre of biomedicine between China and New Zealand. An MWC delegation of Professor Rod Dunbar, Professor Peter Shepherd, Dr Jeff Smaill and Mr Peter Lai accompanied the Minister during this visit.
- October: Professor Ian Hermans and Mr Peter Lai travelled to Guangzhou to discuss future collaborations with Professor Peng Li and the potential for collaboration in immunotherapy between the centres.
- November: MWC hosted a delegation from the Chinese Academy of Sciences, led by the Vice President, Professor Yaping Zhang. During the visit they witnessed the signing of the first joint IP development agreement between UniServices and Guangzhou Institutes of Biomedicine and Health as well as unveiling a plaque to acknowledge the opening of the "Maurice Wilkins Centre - Guangzhou Institutes of Biomedicine and Health, CAS Joint Centre for Biomedicine" in Guangzhou in August.
- December: Professor Rod Dunbar, Professor Peter Shepherd and Mr Peter Lai travelled to Guangzhou to progress discussions on future collaborations and to sign an agreement of co-operation between the MWC and GIBH. During their visit they met key leaders of the GIBH including: Professor Duanqing Pei, Professor and Director General, Professor Guanghao Chen, Party Secretary and Deputy Director General, Professor Hong Ming Hou, Deputy Director and Deputy Party Secretary to GIBH, Professor Lai Liangxue, Director South China Institute for Stem Cells and Regeneration Medicine, and Professor Pan Guangjin, Assistant Director General.



- December: MWC Investigator Associate Professor Alan Davidson delivered a keynote lecture at the “8th International Conference on Stem Cell and Regenerative Medicine” in Guangzhou, China.
- December: University of Auckland Vice Chancellor Professor Stuart McCutcheon and an MWC delegation of Professor Rod Dunbar, Professor Peter Shepherd, Dr Jeff Smaill and Mr Peter Lai attended the “International Cooperation Week for Guangdong Province” hosted by Dongguan City. During this visit Professor McCutcheon was a signatory to a memorandum of understanding between the Guangdong Province Science and Technology Department and the University of Auckland that will enable future co-operative projects in China.

### **Tripartite Economic Alliance**

In 2014, the Mayors of Auckland, Guangzhou and Los Angeles signed a world-first Tripartite Economic Alliance agreement with the aim being to set a new standard for how modern cities can engage and collaborate in the 21st Century. Over 2015 the Maurice Wilkins Centre has been assisting with aspects of this alliance relating to biomedical science:

- The inaugural Tripartite Economic Summit was held in Los Angeles in June and MWC Deputy Director Professor Peter Shepherd joined the Auckland City delegation that attended this summit.
- A ‘Tripartite workshop’ focused on biomedicine was held in Dongguan City, China, in December which was attended by representatives from China, New Zealand and the United States of America:

#### **China**

Guangzhou City officials – Foreign Affairs Office of Guangzhou Municipal Government; Qingchun Zeng, Deputy Director and Yang Zhang, Deputy Director of Division. Guangzhou Science Technology and Innovation Commission; Yin Chen, Deputy Director of Division.

Guangzhou Institute of Biomedicine and Health, Chinese Academy of Science; Professor Duanqing Pei, Director General, Hongming Hou, Deputy Director, Professor Guangjin Pan, Professor Yinxiang Li, Professor Ke Ding, Professor Donghai Wu, Professor Peng Li, Professor Xiao Zhang and Professor Cunjian Zhang.

#### **New Zealand**

Ms Rebecca Needham, Consul General of New Zealand in Guangzhou; Mr Al Ross, Science Councillor, Ministry of Business Innovation and Employment; Professor Stuart McCutcheon, Vice Chancellor of the University of Auckland, Professor Rod Dunbar, Professor Peter Shepherd, Dr Jeff Smaill and Mr Peter Lai.

#### **United States of America**

Professor Ke Shuai and Professor Genhong Cheng, University of California, Los Angeles.

## 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 72.

In 2015 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 Dr 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 2015 Maurice Wilkins Centre investigators Professor Rod Dunbar, Dr Anna Brooks and Dr Vaughan Feisst continued to work with Auckland Clinical Studies, providing analytical services 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 Associate Professor Ian Hermans from the Malaghan Institute of Medical Research have patented a new cancer immunotherapy technology and will be working with Avalia Immunotherapies to further advance the technology and progress it to clinical trials.
- **Comvita:** Comvita New Zealand is an international natural health products company with offices across Asia, the USA and UK. Comvita are working with investigators Distinguished Professor Margaret Brimble and Dr 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 toxin 1080.
- **Genentech, Inc.:** Genentech, headquartered in San Francisco, is a leading biotechnology company that discovers, develops, manufactures and commercialises medicines to treat patients with serious or life-threatening medical conditions. Maurice Wilkins Centre Investigators Distinguished Professor Bill Denny, Dr Moana Tercel and colleagues have been working with Genentech from 2010 to mid-2015 on the development of antibody-drug conjugates for cancer therapy. Two patents have been filed on this work.



- **Janssen Research & Development:** Janssen Research and Development is a division of Johnson & Johnson Pharmaceutical Research and Development. Janssen focuses on the research and development of treatments for infectious diseases. Maurice Wilkins Centre investigators Distinguished Professor Bill Denny, Associate Professor Brian Palmer and colleagues have been working with Janssen, through the Global Alliance for TB, from 2011 to the present on the development of new drugs for resistant tuberculosis. A patent is in the process of being filed on this work.
- **L2 Diagnostics, Ltd.:** L2 Diagnostics is a biotechnical research company based in Connecticut, USA. L2 Diagnostics is collaborating with Associate Investigator Professor Kurt Krause to identify and confirm inhibitors to alanine racemase in pathogenic organisms.
- **Metavention:** Metavention is a medical device company based in Minneapolis, USA, developing interventional therapies for type 2 diabetes. In 2015, Principal Investigator Dr Rinki Murphy undertook contracted research and provided clinical expertise for Metavention regarding first in human hepatic denervation for type 2 diabetes in New Zealand.
- **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, MWC associate investigators, are working with New Zealand Pharmaceuticals Ltd on bile acid chemistry.
- **Phylogica:** Phylogica, a West Australian based company, is a peptide drug discovery company that utilises proprietary Phylomer peptide libraries and screening methodologies to identify unique peptide drug candidates for its pharmaceutical and biotechnology partners. Distinguished Professor Margaret Brimble is helping Phylogica establish bioconjugation ethnology for their proprietary anticancer peptide drug candidates.
- **Threshold Pharmaceuticals, Inc.:** This NASDAQ listed biotechnology company, based in south San Francisco, USA, is focussed on discovery and development of drugs targeting tumour hypoxia. Investigators Associate Professor Patterson and Dr Smaill from the Auckland Cancer Society Research Centre are paid scientific consultants of Threshold Pharmaceuticals and have received a UniServices Commercial Research Contract from Threshold Pharmaceuticals to undertake particular pre-clinical studies relating to TH-4000. See story page 7.

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 (see page 72).



## 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 2015 Maurice Wilkins Centre investigators were involved in a number science education initiatives including;

- **Biology Teacher Professional Development days:**

In 2015 the Centre ran eight Biology Teacher Professional Development days as part of a successful programme started in 2012. Professor Peter Shepherd, Maurice Wilkins Centre Deputy Director, and Ms Rachel Heeney, Head of Biology at Epsom Girls Grammar School, led events in Nelson, Christchurch, Timaru, Dunedin, Wellington, Napier, Auckland and Whangarei.

The eight days featured presentations from scientists on key topics relevant to the NCEA Level 3 curriculum and were attended by over 300 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.

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

In 2015 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 2015, the sixth year of the programme, were Dawn Ross from Long Bay High School, Auckland, Andrew Whitmore from Te Puke High School, Bay of Plenty, Kirsten Hinz from Waitara High School, Taranaki and Helen Webber from Epsom Girls Grammar, Auckland.

- **BioliveChemEd2015 Conference:**

In 2015 the Biology Educators Association of New Zealand and the New Zealand Institute of Chemistry held their biennial conferences in tandem for the very first time, with the theme 'Moving forward: pathways and partnerships for biology and chemistry learning'.

The event was attended by over 300 primary, secondary and tertiary biology and chemistry educators and held in Wellington from Sunday 5 July until Wednesday 8 July. The MWC provided sponsorship for the conference.



- **Other science education initiatives:**

Over 2015 MWC investigators were involved in science education initiatives and programmes led by other organisations including the LENSscience 'Meet a scientist' sessions, the Rotary National Science and Technology Forum, the Eureka Trust and the L'Oreal-UNESCO Girls into Science Forum Auckland, as well as many school visits and presentations to students and teachers.

## 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. Over 2015, 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 2015 MWC investigators were involved in national and regional media coverage on a variety of scientific topics. Examples include:

- The progress of anti-cancer drug TH-4000 or Tarloxotinib (previously known as PR610), invented by Associate Professor Adam Patterson and Dr Jeff Smaill of the Auckland Cancer Society Research Centre and the Maurice Wilkins Centre, was reported in the New Zealand Herald on April 23, and by Scoop, TVNZ, Radio New Zealand and NewsTalkZB. This drug has been the subject of numerous US media releases from the US based company Threshold Pharmaceuticals and progress was reported on many international websites.
- The Listener magazine cover story 'The first real hope' appeared in the 2 July 2015 issue and detailed 'revolutionary' cancer immunotherapy drugs. The article featured MWC Director Professor Rod Dunbar. Professor Dunbar was also interviewed on Radio New Zealand's Nine to Noon programme about cancer immunotherapy drugs on February 23 and December 3.
- The National Business Review featured an article 'Investors sought for Auckland University's Sapvax cancer vaccine spin-out' in its July 6 issue. The research behind this spin-out is led by Professors Margaret Brimble and Rod Dunbar.
- The development of new technology enabling skin to be grown from a patient's own skin cells, led by Professor Rod Dunbar and Dr Vaughan Feisst, was reported in the New Zealand Herald on the 1st August.
- The founding of the Joint Centre for Biomedicine between the University of Auckland hosted Maurice Wilkins Centre and the Guangzhou Institutes of Biomedicine and Health was reported in the National Business Review on November 16. The centre formally recognises the collaboration between Professor Ke Ding of the Guangzhou Institutes of Biomedicine and Health, and Auckland Cancer Society Research Centre and MWC researchers Dr Jeff Smaill and Associate Professor Adam Patterson.

- Professor Peter Shepherd was co-organiser of a weeklong public science festival in Queenstown called Question It, held in association with the Queenstown Research Week. Over 1500 people came to the 12 events held during the week and Professor Shepherd gave public lectures entitled 'Sugar, sugar everywhere, but which one is safe to eat ?' in Queenstown on September 3 and Wanaka on September 4. MWC Investigator Dr Siouxsie Wiles also gave a presentation 'Ebola and beyond – how bugs kill us' and new MWC investigator Professor Brian Hyland gave a presentation on 'The Brain on Drugs – drug addiction as a disturbance of reward' at Question It.
- Distinguished Professor Margaret Brimble, a Maurice Wilkins Centre Principal Investigator from the University of Auckland, was named as one of the 2015 Distinguished Women in Chemistry or Chemical Engineering by the International Union of Pure and Applied Chemistry (IUPAC). The New Zealand Herald reported the award on May 20. Professor Brimble was also interviewed for a feature 'Celebrating a Woman's Voice in Science' as a 2014 Alumni of the 'Women of Influence' awards and this was published in the Manawatu Standard, the Southland Times and on the Stuff website on July 27. She was a finalist in the Science and Health category of the Next magazine 'Woman of the Year Awards' in October 2015.
- A study led by MWC investigators that aims to identify genes that predispose New Zealanders to obesity and type 2 diabetes was announced on the 1st September and reported in the Otago Daily Times, the New Zealand Herald and on the Scoop and Stuff websites. Three leaders of the genetic study, Associate Professor Tony Merriman, Dr Rinki Murphy and Professor Peter Shepherd, were interviewed on Radio New Zealand's National programme and Professor Shepherd was also interviewed on the NewstalkZB breakfast show.
- Dr Rinki Murphy featured in a video on the website AttitudeLive about the basics of type 2 diabetes in June 2015 and was interviewed on RadioLive on June 21 about diabetes research and cutting edge treatment, and on Radio New Zealand on December 10 about bariatric surgery and cardiovascular disease.
- Associate Professor Julia Horsfield was interviewed on 39 Dunedin Television on 'Congenital heart defects research aided by fish' on October 22.
- MWC investigator Dr Siouxsie Wiles, one of New Zealand's top science communicators, was involved in a numerous public engagement initiatives in 2015. She curated a science/art exhibition 'Biolumination II' for thinkScience Day at the Auckland Arts Festival in March 2015 and gave the public the opportunity to make their own glowing bacterial art. She was invited to give TEDx talks in Christchurch in April and in Auckland in May and gave a talk 'Illuminating new medicines' as part of the Royal Society of New Zealand Ten by Ten Luminaries series at Napier in November. Dr Wiles was a guest of Western Australia and Tasmania for Australia's National Science Week in August 2015. She gave numerous public presentations and demonstrations at schools and public spaces in Perth and Hobart as well as curating a science-art exhibition in Perth.



Dr Wiles also regularly comments on topical issues through television, radio, print and the internet and gave more than 20 talks to public groups in 2015

- MWC investigators also gave numerous public presentations about their research to public fora, schools and community groups throughout 2015.

## Supporting the New Zealand science community

### Thematic research symposia and workshops

During 2015 the Centre ran the following thematic research symposia and workshops:

- **Cancer Immunology Symposium**

The theme of the 2015 MWC Symposium was 'Cancer Immunotherapy'. The symposium was held on November 25 at the Auckland City Hospital Clinical Education Centre and attended by over 160 people. During the day speakers provided an update on the stunning impact of immune therapy on many advanced cancers, covering both the increasing role of immune therapy in clinical practice, and the mechanisms of action of the new immune drugs. Speakers also summarised current New Zealand research in this field, and highlighted new opportunities to re-think approaches to cancer research in the light of immune therapy's success in the clinic.

See the highlights story on page 19 for more details.

- **Maurice Wilkins Centre Flagship workshops**

During 2015 the Maurice Wilkins Centre held two 'flagship' workshops on specific research topics of relevance to the Centre. The aim of these workshops is to bring together New Zealand researchers in each 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;

- Natural Products and Medicinal Chemistry – April 14, Victoria University of Wellington
- Tuberculosis – November 27, University of Auckland

### Technology workshops

The Maurice Wilkins Centre ran a technology based webinar workshop '3D Visualization of Macromolecular Structures Using Electron Microscopy Methods' on December 15.

Topics covered included i) a short historical overview of EM in life sciences. ii) the basic principles of three dimensional reconstruction. iii) a description of the methods used

for preparing samples. iv) the techniques available at University of Otago for preparing samples, collecting data and image processing.

## The Maurice Wilkins Centre NZIC Prize for Excellence in Chemical Science

The New Zealand Institute of Chemistry awards The Maurice Wilkins Centre Prize for Excellence in Chemical Science annually and in 2015 the recipient was Associate Professor Shane G Telfer of Massey University.

Associate Professor Telfer is a recognized innovator and leader in his chosen fields of research, metal-organic frameworks and photoactive metal complexes. His research publications have appeared in the most prestigious journals in chemistry, have been heavily cited by other researchers, and have won praise in recent review articles. The quality of his work is also reflected by numerous awards, research grants, and invitations to speak at international meetings. Dr Telfer has also been heavily involved in the broader scientific community, outreach and chemical education.

## 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 2015 the Maurice Wilkins Centre provided support for:

- Queenstown Research Week 2015

This is the largest annual science event in New Zealand and in 2015 twelve individual scientific meetings were held over Queenstown Research Week. These included the Queenstown Molecular Biology Meeting and satellite meetings focussed on: infectious disease, gut biology, heart disease, genome structure and epigenetics, animal genomics, protein function and computational genomics. The scientific meetings attracted 1200 registrations from national and international delegates and speakers including a large number of Maurice Wilkins Centre investigators. The Centre is a premier academic sponsor for this event that provides an important opportunity for Centre investigators to meet and hear about some of the latest national and international research. The Centre also provides sponsorship for New Zealand secondary school teachers to attend the Queenstown Molecular Biology meeting (see page 35).

- Australasian Society of Immunology – New Zealand branch meeting

This meeting was held in Auckland from July 1-3 and was attended by 85 researchers and students from across New Zealand. The meeting includes presentations from invited international speakers and New Zealand based researchers and students. The MWC provided support for international speaker Professor Peng Li (South China Institute for Stem Cell Biology and Regenerative Medicine) to attend the meeting.



- 2015 Annual Scientific Meeting of the Australasian Society for Infectious Diseases

The 2015 Annual Scientific Meeting of the Australasian Society for Infectious Diseases was held in Auckland in March. This conference is the leading Australasian meeting for adult and paediatric infectious disease and clinical microbiology specialists and researchers. The 2015 programme featured presentations by several MWC investigators.

- 2nd International p53 isoforms workshop

This meeting was held in Montpellier, France, in September. The latest findings in animal models and experimental/clinical studies on p53 family protein isoforms were presented and discussed. MWC principal investigators Professor Antony Braithwaite and Professor Cristin Print gave presentations at the workshop as well as MWC affiliate investigator Ms Imogen Roth.

- Stem Cell Research Network.

This network, initiated in 2012, aims to foster a collegial and collaborative network among researchers with an interest in all aspects of stem cell research. In 2015 the MWC provided support for Associate Professor Meri Firpo from the University of Minnesota to speak at the annual meeting of the network.



## 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 2015 Maurice Wilkins Centre investigators served in advisory and governance roles in many New Zealand organisations including;

- AgResearch Ltd
- Asia Oceania Human Proteome Organisation
- Auckland Arts Festival
- 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)
- Callaghan Innovation
- Cancer Society of New Zealand
- Cancer Trials New Zealand
- Centre for Society, Governance and Science
- 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
- 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 & Enterprise
- Ministry of Health
- National Institute of Water & Atmospheric Research
- New Zealand Association of Scientists
- New Zealand Bioinformatics Institute
- New Zealand Chemical Education Trust
- New Zealand eScience Infrastructure
- New Zealand Genomics Ltd
- New Zealand Health Quality & Safety Commission
- New Zealand Institute for Cancer Research Trust
- 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
- NZ Monogenic diabetes testing guidelines committee
- OBodies Ltd
- Otago Medical Research Foundation
- Otago Postgraduate Medical Society
- Queenstown Molecular Biology Meetings Society
- Royal Society of New Zealand
- Tertiary Education Commission
- The Physiological Society of New Zealand

- Upstream Medical Technologies Limited
- Wellington Health and Biomedical Research Society

### International roles

In 2015 members of the Maurice Wilkins Centre served in more than 60 advisory, editorial and governance roles in international organisations based in the United States of America, Australia, the United Kingdom, the Netherlands, Canada, France, Germany, Sweden, Switzerland, Qatar and Romania.





## Organisation 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. An initial round of this programme was held in November 2014 and two rounds were held in 2015 in April/May and September/October.

#### 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.

Twenty-two projects were awarded funding in this category (project leader, host institution and student names in bold):

- Structural vaccinology of Group A Streptococcus pili; **Nikki Moreland**, Ted Baker, Thomas Proft, **University of Auckland**. PhD candidate **Jeremy Raynes**.
- Novel, Selective Amylin Agonists as Therapeutic Tools to Treat Obesity and Diabetes; **Margaret Brimble**, **University of Auckland**, Debbie Hay, University of Auckland, Antony Fairbanks, University of Canterbury. PhD candidate **Lauren Yule**.
- Genetic control of diabetes and obesity pathways in Maori and Pacific populations; **Tony Merriman**, Mik Black, **University of Otago**, Donia Macartney-Coxson, Institute of Environmental Science and Research. PhD candidate **Hannah Lumley**.
- Synthesis and Evaluation of Novel TLR2 Agonists as Potential Therapeutic Agents for the Treatment of Cancer; **Margaret Brimble**, Geoff Williams, Rod Dunbar, **University of Auckland**, Ian Hermans, Malaghan Institute of Medical Research. PhD candidate **Benjamin Lu**.
- Multi-modal studies of macrophages and myeloid cells in the microenvironment of melanoma metastases ("7M"); **Rod Dunbar**, Peter Shepherd, Cris Print, Anna Brooks, University of Auckland, Mik Black, **University of Otago**. PhD candidate **Joanna Mathy**.
- High-throughput screening for the recovery and characterisation of new bioactive compounds from metagenomic libraries; **David Ackerley**, Peter Northcote, **Victoria University of Wellington**. PhD candidate **Luke Stevenson**.
- Antigen loading in synthetic vaccines - is more better?; **Gavin Painter**, **Victoria University of Wellington**, Ian Hermans, Malaghan Institute of Medical Research, Margaret Brimble, Geoff Williams, Rod Dunbar, University of Auckland. PhD candidate **Taylor Cooney**.

- Novel hypothalamic pathways in the regulation of energy balance; **Dave Grattan**, Alex Tups, **University of Otago**, Peter Shepherd, University of Auckland. PhD candidate TBC.
- Local and International Origins of Tuberculosis in NZ; **Vic Arcus**, **University of Waikato**, Greg Cook, University of Otago, Sally Roberts, Auckland City Hospital. PhD candidate **Claire Mulholland**.
- Development of type II NADH dehydrogenase inhibitors as anti-tuberculosis drugs; **Mattie Timmer**, Bridget Stocker, **Victoria University of Wellington**, Greg Cook, University of Otago. PhD candidate **Kristiana Santoso**.
- Predictive biomarkers of sensitivity to a novel class of potent anti-cancer drugs; **Frederik Pruijn**, Cris Print, Moana Tercel, William Wilson, Francis Hunter, **University of Auckland**. Provisional\* PhD candidate **Nour Ghamri**.
- Probing a novel mechanism of irreversible FGFR1 inhibition; **Chris Squire**, Jeff Smaill, Adam Patterson, Chris Guise, **University of Auckland**. PhD Candidate **Maria Kalyukina**.
- Banishing tumour hypoxia to restore immunotherapy responsiveness; **Adam Patterson**, Jeff Smaill, Angus Grey, **University of Auckland**, Gavin Painter, Victoria University of Wellington, Ian Hermans, Malaghan Institute of Medical Research. PhD candidate **Zhe (Regan) Fu**.
- Structure-guided discovery of a natural product-based kinase inhibitor; **Joanne Harvey**, Paul Teesdale-Spittle, **Victoria University of Wellington**, Peter Shepherd, Jack Flanagan, University of Auckland. PhD candidate TBC.
- Regulation of the p53 pathway in melanoma cell lines; **Antony Braithwaite**, Mike Eccles, **University of Otago**, Cris Print, Peter Shepherd, University of Auckland. PhD candidate **Luke Henderson**.
- Exploring a new target in the fight against cancer - the Gcn2 protein kinase domain; **Evelyn Sattlegger**, Jane Allison, **Massey University**, Peter Shepherd, Jack Flanagan, University of Auckland. PhD candidate **Hayley Prescott**.
- GccF: an antimicrobial enigma; **Gillian Norris**, **Massey University**, Greg Cook, University of Otago, Margaret Brimble, University of Auckland. PhD candidate **Sean Bisset**.
- Development of CGRP peptide receptor antagonists to increase energy expenditure in obesity; **Kerry Loomes**, Debbie Hay, Margaret Brimble, **University of Auckland**. PhD candidate **Aqfan Jamaluddin**.
- Development of beta-cell models from human induced pluripotent stem cells to study gene SNPs that increase risk of Type-2 diabetes; **Alan Davidson**, Peter Shepherd, Teresa Holm, Rinki Murphy, **University of Auckland**. PhD candidate TBC.
- Designing new agents for the peloruside binding site; **Paul Teesdale-Spittle**, Joanne Harvey, Peter Tyler, John Miller, Peter Northcote, **Victoria University of Wellington**, Jack Flanagan, University of Auckland. PhD Candidate **Ethan Woolly**.
- New chemistry for probing the interface of GPCR and PI3K signalling systems; **Jack Flanagan**, Peter Shepherd, Chris Squire, Dan Furkert, Michelle Glass, **University of Auckland**. PhD candidate **Danielle Patterson**.



- Comparative gut hormone, gut bacteria and metabolic changes in patients with type 2 diabetes undergoing sleeve gastrectomy or gastric bypass surgery; **Rinki Murphy**, Michael Booth, Peter Shepherd, Justin O'Sullivan, **University of Auckland**, David Grattan, University of Otago. PhD candidate **Naomi Davies**.

## New initiatives involving post-graduate students

In addition to the fully funded PhD projects, the Maurice Wilkins Centre also 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.

Eight projects were awarded working expenses (project leader, host institution and student names are in bold):

- Intrinsic cell fate, p53, cell death and therapy; **Antony Braithwaite**, Margaret Baird, **University of Otago**. MSc candidate **Liam Roth**.
- Development of fluorescent probes to elucidate Cannabinoid Type 2 receptor (CB2R) role in cancer immunotherapy; **Sarah Hook**, Joel Tyndall, **University of Otago**, Michelle Glass, University of Auckland. PhD candidate **Anna Cooper**.
- Development of new therapies for *Pseudomonas aeruginosa* infections; **Emily Parker**, Wanting Jiao, **University of Canterbury**, Geoff Jameson, Massey University, Monica Gerth, University of Otago. PhD candidate **Oliver Sterritt**.
- Engineering novel enzymes to prevent biofilm formation; **Monica Gerth**, **University of Otago**, Gary Evans, Victoria University of Wellington, Vic Arcus, University of Waikato. PhD candidate **Thomas Wiggins**.
- RNase HI: A tractable novel TB drug target with species specificity; **Shaun Lott**, Bill Denny, Stephanie Dawes, **University of Auckland**, PhD candidate TBC.
- Novel nanorod-based antigen conjugates for improved cancer immunotherapy; **Jasna Rakonjac**, **Massey University**, Ian Hermans, Malaghan Institute of Medical Research, Gavin Painter, Victoria University of Wellington. PhD candidate **Marina Rajic**.
- Development of high-throughput screening methodology for small molecule-protein interactions using mass spectrometry; **Jo Perry**, Martin Middleditch, Jack Flanagan, Michael Hay, Ries Langley, **University of Auckland**. MSc student **Anindita Das**. BSc (Hons) student TBC.
- Screening NZ fungi for new antibiotics against Mycobacteria; **Siouxie Wiles**, Brent Copp, James Dalton, **University of Auckland**. MSc student **Cleo Hall-Strom**.



## Access to specialised equipment & facilities

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 60 facilities and items of equipment were registered initially in 2015 and the number will be increased in 2016. 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. In 2015 eleven applications to this scheme were approved;

- Chemical synthesis of an CGRP antagonist for the treatment of obesity; **Kerry Loomes**, Paul Harris, Margaret Brimble, Debbie Hay, Aqfan Jamaluddin, **University of Auckland**.
- Chemical Synthesis and Evaluation of Novel Cyclic Peptides to Treat *Mycobacterium tuberculosis*; **Greg Cook**, **University of Otago**, Paul Harris, Margaret Brimble, University of Auckland.
- Transcriptome Analyses of Immune Response Microenvironments in Human Melanoma Metastases; **Joanna Mathy**, Rod Dunbar, Cris Print, **University of Auckland**.
- Characterisation of human T cell signalling pathways during co-stimulation and co-inhibition; **Alicia Didsbury**, Anna Brooks, Rod Dunbar, James Sneyd, **University of Auckland**.
- Optimisation of a multicolour flow cytometry panel to characterise mesenchymal cell subsets in normal and malignant human tissue; **Anna Brooks**, Vaughan Feisst, Rod Dunbar, Jennifer Eom, **University of Auckland**.
- RNA Sequencing of Human Head and Neck Squamous Cell Carcinoma Cell Lines; **Francis Hunter**, Cris Print, Bill Wilson, Frederik Puijn, Courtney Lynch, Yuanye Xu, **University of Auckland**.
- Synthetic analogues of the unique antimicrobial agent, Glycocin F; **Gill Norris**, **Massey University**, Paul Harris, Margaret Brimble, **University of Auckland**.
- Identification of Peroxiredoxin-1 signal peroxidase substrates; **Peter Mace**, Johannes Weijman, **University of Otago**.
- The analysis of Trim protein quaternary structure by analytical ultracentrifugation (Analytical Ultracentrifuge); **David Goldstone**, Jeremy Keown, Eugene Sun, Joy Yang, **University of Auckland**.
- A zebrafish model for diabetic kidney damage and repair; **Veronika Sander**, Alan Davidson, Justin O'Sullivan, **University of Auckland**.
- In vitro and in vivo characterisation of local TB strains; **Siouxie Wiles**, James Dalton, **University of Auckland**, Jo Kirman, University of Otago, Vic Arcus, Claire Mulholland, University of Waikato.



## New investigators

In 2015, the Maurice Wilkins Centre continued to strengthen its national network of investigators with 18 new associate investigators invited to join the Centre. In line with the MWC strategy of supporting future leaders, six of these new associate investigators were previously MWC affiliate investigators and on review in 2015 had developed their careers to the stage that they were approved for promotion to associate investigators:

- Dr Jane Allison, Institute of Natural and Mathematical Sciences, Massey University
- Associate Professor Bob Anderson, Auckland Cancer Society Research Centre, University of Auckland
- Dr Catherine Angel, School of Biological Sciences, University of Auckland
- Professor Chris Charles, Department of Medicine, University of Otago, Christchurch
- Professor Nicola Dalbeth, School Medicine, University of Auckland
- Dr Monica Gerth, Department of Biochemistry, University of Otago
- Associate Professor Michelle Glass, Department of Pharmacology, University of Auckland
- 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
- Professor Brian Hyland, Department of Physiology, University of Otago
- Dr Robert Keyzers, School of Chemical and Physical Sciences, Victoria University of Wellington
- Dr Elizabeth Ledgerwood, Department of Biochemistry, University of Otago
- Dr Pawel Olszewski, Faculty of Science and Engineering, University of Waikato
- Associate Professor Chris Pemberton, Department of Medicine, University of Otago, Christchurch
- Professor Dame Carol Robinson, School of Chemical Sciences, University of Auckland
- Dr Alex Tups, Department of Physiology, University of Otago
- Dr Phillip Wilcox, Department of Statistics, University of Otago

## Human capability

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 2015 the MWC provided direct financial support for 23 postgraduate students and 19 postgraduate students who received MWC support prior to 2015 completed their degrees in 2015.

In 2015 the MWC awarded 22 fully or partially funded PhD scholarships through Flexible Research Programme (Category 1). Ten of these scholarships were taken up in 2015 with nine scholarships approved for an early 2016 start. Recruitment of students is ongoing to fill the last three PhD scholarships in 2016.

The MWC also approved support for two fully funded PhD scholarships as part of the collaborative 'flagship' research programme. One of these scholarships was taken up in 2015 with the second currently in the recruitment phase and expected to be taken up in 2016.

In addition to the PhD scholarships awarded in 2015 the MWC also awarded co-funding support to projects involving a further 19 postgraduate students. Five of these projects were initiated in 2015 with the others to be initiated in early 2016.

### 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 fellows, many of whom are in the process of establishing their post-doctoral careers.

In 2015 the MWC provided full or partial salary support for 27 research fellows (9.37 FTE) at the University of Otago, the University of Canterbury, the Malaghan Institute of Medical Research and the University of Auckland.

A meeting of this cohort was held on the 27th November 2015 to encourage national collaboration within this group.

The MWC also provides support for two research technicians (0.57 FTE) to carry out specific roles in the core MWC research programme.

## Early Career Research Forum

In November, the MWC held an Early Career Researcher Forum to update young investigators associated with the Centre on the opportunities available to them through the MWC and provide a forum for them to present their research to the MWC community.

The forum featured a presentation from Dr Bridget Stocker, Senior Lecturer in Chemistry at Victoria University of Wellington, reflecting on her career to date.

The MWC Director Rod Dunbar then outlined opportunities for MWC early career researchers before nine affiliate investigators each gave a short talk highlighting their current research, how it fits within the wider framework of the MWC and any areas for collaboration or problem-solving.

The MWC thanks the affiliate investigators who assisted with the organization of the forum and by chairing sessions; Dr Adam Heikal, Dr Katherine Donovan, Dr George Chang, Ms Kristiana Santoso, Dr Kate Lee and Dr Aniruddha Chatterjee.

## 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 2015, four investigators were awarded funding through this scheme and they will undertake their travel in 2016:

- **Dr Htin Lin Aung (University of Otago)** – to visit the laboratory of Associate Professor Scott Beatson at the University of Queensland (Australia) to perform whole genome sequencing (WGS) using a single molecule, real-time sequencing technology platform.
- **Ms Waruni Dissanayake (University of Auckland)** – to visit the laboratory of Dr William Hughes, Garvan Institute of Medical Research (Sydney, Australia) to perform Total Internal Reflection (TIRF) microscopy experiments. Dissanayake, Shepherd, University of Auckland.
- **Dr Joseph Gingell (University of Auckland)** – to visit the laboratory of Professor Patrick Sexton, Monash University (Melbourne, Australia) to learn a new method of solubilising and purifying membrane proteins.

- **Ms Claire Mulholland (University of Waikato)** – to attend the 'Working with Pathogen Genomes' workshop at the Wellcome Genome Campus, (Cambridge, UK).

### **Stem cell workshop in Guangzhou**

The MWC provided support for Dr Teresa Holm and Ms Betty Shih to attend a 'Stem cell workshop' run by the Guangzhou Institute for Biomedicine and Health (GIBH) in China in May 2015. The workshop consisted of a two-day theory course, followed by a two-day practical course and was presented by GIBH researchers who are experts in stem cell technology. Teresa and Betty also had the opportunity for discuss the scientific field with senior scientists and students in between workshop sessions. They were able to bring their new knowledge back to New Zealand to help establish the technology here.

## **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 2015 this 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 2015:

- Dr Michael Berney, Albert Einstein College of Medicine of Yeshiva University, USA
- Dr Mark Brader, Biogen, USA
- Prof Dean Crick, University of Colorado, USA
- Prof Ke Ding, Guangzhou Institutes of Biomedicine and Health, Chinese Academy of Sciences, China
- Dr Meri Firpo, University of Minnesota, USA
- Prof Nick Hayward, QIMR Berghofer Medical Research Institute, Australia
- Professor Rod Hicks, Peter MacCallum Cancer Centre, Australia
- Prof Bill Jacobs, Albert Einstein College of Medicine of Yeshiva University, USA
- Prof Peng Li, Guangzhou Institutes of Biomedicine and Health, Chinese Academy of Sciences, China
- Dr Jill O'Donnell-Tormey, Cancer Research Institute, USA



- Prof Larry Overman, University of California, USA
- Prof Rick Pearson, Peter MacCallum Cancer Centre, Australia
- Prof Duanqing Pei, Guangzhou Institutes of Biomedicine and Health, Chinese Academy of Sciences, China
- Dr Thomas Pillow, Genentech, USA
- Dr Alex Shalek, Massachusetts Institute of Technology, USA
- Prof Richard Taylor, University of Notre Dame, USA
- Prof Roy Taylor, Newcastle University, UK
- Dr Richard Tothill, Peter MacCallum Cancer Centre, Australia
- Prof Ming-Wei Wang, Shanghai Institute of Materia Medica, China
- Prof Donghai Wu, Guangzhou Institutes of Biomedicine and Health, Chinese Academy of Sciences, China
- Professor Aimin Xu, The University of Hong Kong, China
- Dr Ishii Yasuyuki, RIKEN Centre for Integrative Medical Sciences, Japan
- Prof Giles Yeo, University of Cambridge, UK

### **International and national officials and delegations**

In 2015 Maurice Wilkins Centre investigators hosted or participated in visits by the following officials and delegations:

- *Guangdong Province Delegation, March 2015:*
  - Mr. Chen Yunxian, Vice Governor, The People's Government of Guangdong Province
  - Mr. Gong Guoping Deputy-Director-General, Department of Science and Technology of Guangdong Province
  - Mr. Zeng Lu, Director, Department of Science and Technology of Guangdong Province
  - Mr. Shen Guofei, Secretary (Deputy Director), General Office, The People's Government of Guangdong Province
  - Ms. Xu Zhe, Deputy Section Chief/Interpreter, Department of Science and Technology of Guangdong Province
- *Chinese Academy of Sciences (CAS) Delegation, November 2015:*
  - Professor Yaping Zhang, Vice President, CAS
  - Professor Jinhua Cao, Director-General, CAS



- Professor Jinghua Cao, Deputy Director General, Bureau of International Cooperation, CAS Professor Duanqing Pei, Director Guangzhou Institutes of Biomedicine and Health
- Dr Hui Sun, Director, Division of American and Oceanian Affairs, Bureau of International Cooperation, CAS
- Mr Bolun Ning, Project Manager, Oceanian Affairs, Bureau of International Cooperation, CAS

## 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 funding

In 2015 Maurice Wilkins Centre investigators were awarded new grants worth more than \$21 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 \$13 million from the Health Research Council of New Zealand and \$4.6 million from the Marsden Fund.

### International funding

In 2015 Maurice Wilkins Centre investigators secured new funding of over \$2 million from international sources to support future research.



## Governance and management

### Maurice Wilkins Centre Board

In early 2015 the members of the refreshed MWC Board were confirmed; Mr Bill Falconer (Chair), Professor Conan Fee (University of Canterbury), Professor Jane Harding (University of Auckland), Professor John Hosking (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 2015; May, August and October. The Board provided advice and direction to the management team on the implementation of the 2015 MWC plan and monitored the progress against the plan. This included reviewing and approving the strategy for the selection of eight large-scale collaborative 'flagship' projects and the allocation of resources to these projects. The Board reviewed and advised on strategy for the Flexible Research Programme as well as approving recommendations from the MWC Project Review Committee for allocation of resources to projects submitted for inclusion in this programme. The Board monitored progress of the MWC research programme through the year and its compliance with the funding mandate and budget.

Distinguished Professor Jane Harding's term with the Board ended in 2015. Professor Harding joined the Board in 2011 in the role of Deputy Vice Chancellor (Research) at the University of Auckland. During her five year term she provided significant support for the MWC and advised on numerous topics. The MWC gratefully acknowledges her contribution.

### Management Committee

The Maurice Wilkins Centre Management Committee membership changed in 2015 to incorporate five new principal investigators.

Existing principal investigators Professors Rod Dunbar (Director), Peter Shepherd (Deputy Director), Margaret Brimble, Bill Denny and John Fraser (University of Auckland) welcomed Professors Anthony Braithwaite, Greg Cook and Dave Grattan (University of Otago), Professor Emily Parker (University of Canterbury) and Associate Professor Ian Hermans (Malaghan Institute of Medical Research) to the Management Committee.

Professors Ted Baker, Garth Cooper and Peter Hunter moved to the role of Emeritus Principal Investigator from the start of 2015. All three were founding Principal Investigators of the Centre in 2002 and have made a valuable and significant contribution over their 13 year terms as members of the Management Committee, in particular Professor Ted Baker who was the founding Director of the MWC and served in this role until March 2009. They will continue to be involved in the MWC in their new role outside the Management Committee.

The Management Committee controls the operation of the Centre, under the guidance of the Governing Board and the Scientific and Clinical Advisory Boards. The Committee met six times during 2015 and its focus was on the implementation of the 2015-2017 MWC Plan. This included finalising strategy and co-ordinating the initiation of the research, training and outreach programmes.

### Non-management Principal Investigators

The MWC appointed a further six new Non-management Principal Investigators in 2015; Professor Vic Arcus (University of Waikato), Professor Mike Eccles (University of Otago), Associate Professor Shaun Lott, Dr Rinki Murphy, Associate Professor Adam Patterson and Professor Cris Print (University of Auckland). Their role includes leading specific areas of the research programme and potentially other initiatives of strategic importance.

### 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, was held in February 2015. The main item of business at this forum in 2015 was to plan the allocation of resources to the large-scale collaborative 'flagship' research projects to be submitted to the MWC Board for approval. The second forum, attended by principal and associate investigators, was held on November 26. The purpose of this forum was to update investigators on progress in 2015, identify areas of future strategic opportunity and address general items raised by investigators.

### Scientific Advisory Board and Clinical Advisory Board

The membership of the Scientific Advisory Board (SAB) for 2015 to 2017 has been confirmed; 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).

Membership of the Clinical Advisory Board (CAB) for 2015 to 2017 will be finalised in early 2016. Meetings of the SAB and CAB in 2015 have been deferred to 2016 due to delays in implementation of the research plan.

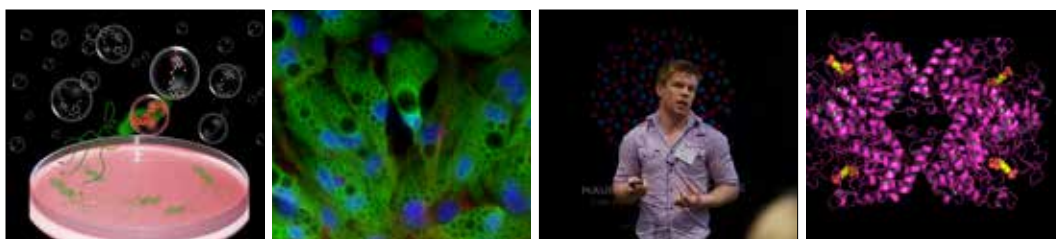
### Project Review Committee

The Project Review Committee was convened twice, in May and October 2015, to review applications submitted in 2015 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 6 principal and 4 associate investigators from the University of Otago, University of Canterbury, Victoria University of Wellington, Massey University and University of Auckland. They reviewed applications for Categories 1 and 2 of the Flexible Research Programme.

In October the Project Review Committee consisted of 5 principal and 6 associate investigators from the University of Otago, Massey University and University of Auckland. The committee reviewed applications for Categories 2, 3 and 4 of the Flexible Research Programme.





## Research Outputs Publications

In 2015 research outputs from Maurice Wilkins Centre investigators included more than 480 peer-reviewed scientific papers published in international journals, and numerous patents granted, published or filed. Maurice Wilkins Centre contributed support to the following 84 scientific papers and reviews and 9 patents awarded, published or filed.

### Papers and reviews

1. Ahmed, F. H., Carr, P. D., Lee, B. M., Afriat-Jurnou, L., Mohamed, A. E., Hong, N. S., Flanagan, J., Taylor, M. C., Greening, C., & Jackson, C. J. Sequence-Structure-Function Classification of a Catalytically Diverse Oxidoreductase Superfamily in Mycobacteria. *Journal of Molecular Biology* (2015) **427**(22): 3554-3571.
2. Anderson, R. J., Compton, B. J., Tang, C. W., Authier-Hall, A., Hayman, C. M., Swinerd, G. W., Kowalczyk, R., Harris, P., Brimble, M. A., Larsen, D. S., Gasser, O., Weinkove, R., Hermans, I. F., & Painter, G. F. NKT cell-dependent glycolipid-peptide vaccines with potent anti-tumour activity. *Chemical Science* (2015) **6**(9): 5120-5127.
3. Andrews, E. S. V., & Arcus, V. L. The mycobacterial PhoH2 proteins are type II toxin antitoxins coupled to RNA helicase domains. *Tuberculosis* (2015) **95**(4): 385-394.
4. Atkinson, D. J., & Brimble, M. A. Isolation, biological activity, biosynthesis and synthetic studies towards the rubromycin family of natural products. *Natural Product Reports* (2015) **32**(6): 811-840.
5. Aung, H. L., Dey, D., Janssen, P. H., Ronimus, R. S., & Cook, G. M. A high-throughput screening assay for identification of inhibitors of the A1AO-ATP synthase of the rumen methanogen *Methanobrevibacter ruminantium* M1. *Journal of Microbiological Methods* (2015) **110**: 15-17.
6. Aung, H. L., Dixon, L. L., Smith, L. J., Sweeney, N. P., Robson, J. R., Berney, M., Buxton, R. S., Green, J., & Cook, G. M. Novel regulatory roles of cAMP receptor proteins in fast-growing environmental mycobacteria. *Microbiology* (United Kingdom) (2015) **161**(3): 648-661.
7. Bashiri, G., & Baker, E. N. Production of recombinant proteins in *Mycobacterium smegmatis* for structural and functional studies. *Protein Science* (2015) **24**(1): 1-10.
8. Bashiri, G., Johnston, J. M., Evans, G. L., Bulloch, E. M. M., Goldstone, D. C., Jirgis, E.

- N. M., Kleinboelting, S., Castell, A., Ramsay, R. J., Manos-Turvey, A., Payne, R. J., Lott, J. S., & Baker, E. N. Structure and inhibition of subunit I of the anthranilate synthase complex of *Mycobacterium tuberculosis* and expression of the active complex. *Acta Crystallographica Section D: Biological Crystallography* (2015) **71**: 2297-2308.
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## Patents

### Patents awarded

1. Denny, W.A., Thompson, A.M., Blaser, A., Ma, Z., Palmer, B.D., Sutherland, H.S. Kmentova, I. Nitroimidazooxazines and their uses in anti-tubercular therapy. *US Patent 9,198,913*. 2015
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2. Brimble, M.A., Wright, Thomas, H., Dunbar, P.R., Williams, G.M. Amino acid and peptide conjugates and conjugation process. *International application WO2014207708A3*. 2015
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### Patents filed

1. Dunbar, R., Feisst, V.J., Oosterbeek, R.N., Simpson, M.C., Tong, Y.S. Tissue culture apparatus and method. *US Patent application 62/184,705*. 2015



## 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 2015. The presentations included invited lectures at conferences and seminars at academic institutions in Australia, Brazil, Canada, China, France, Germany, India, Ireland, Italy, Japan, Korea, Norway, Portugal, Russia, Singapore, Spain, Taiwan, 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 2015 include:

- Professor Bill Denny gave a plenary presentation titled “Design, synthesis and evaluation of novel toxins for antibody-drug companies” at the Taiwan Association of Antibody Drug Conjugate Companies 2015 meeting in Taipei, Taiwan. He also gave the lecture “Use of duocarmycin-like toxins for antibody-drug conjugates and hypoxia-activated prodrugs” at the Discovery Center for Biotechnology in Taipei, Taiwan.
- Professor Dave Grattan gave the plenary lecture “Identification and functional characterisation of prolactin-sensitive neurons” at the FASEB Science research conference on ‘GH and Prolactin Family’ in Colorado, USA.
- Professor Ted Baker gave the plenary presentation “Covalent crosslinks in the repetitive domains of cell-surface adhesins” at the Biochemical Society’s ‘Repetitive Non-Globular Proteins: Nature to Nanotechnology’ meeting, held in York, UK in 2015.
- Dr Frederik Pruijn presented the plenary lecture “A novel and fast method for sorting hypoxic cells from tumours” at the 14th International Workshop on the Tumor Microenvironment in Vancouver, Canada.



- Dr Anna Brooks was invited by Nature.com to present a webcast titled “Addressing the challenges of characterizing mesenchymal populations using multicolour flow cytometry”. The webcast attracted more than 420 pre-registrants and had over 100 live participants. The webcast can be viewed at: <http://bit.ly/1YR96vD>
- Professor Colin Green was invited to give a plenary lecture at the New Zealand Rehabilitation Medical Symposium, held in Auckland, entitled “Regulation of Connexin43 hemichannels as a treatment for spinal cord injury”. Professor Green also presented the plenary lecture “Gap Junctions and Implications for Treatment of Disabling Disease” to the combined meeting of the Royal Australasian College of Physicians, Australian Faculty of Rehabilitation Medicine, New Zealand Rehabilitation Association in Wellington, NZ.
- Professor Rod Dunbar gave plenary lectures entitled “The melanoma microenvironment” at the Inaugural Melanoma New Zealand Conference and Melanoma Summit in Auckland, and at the New Zealand Society for Oncology Annual Conference in Christchurch in 2015. He also gave a plenary lecture at the 14th International Conference on Natural and Unconventional Computing in Auckland titled “T cells as information processing units”. Professor Dunbar also presented the lecture “Mesenchymal cell populations in human tissues” to the 8th Annual Meeting of the Australasian Society for Stem Cell Research in the Hunter Valley, Australia.
- Prof Richard Furneaux gave three keynote addresses in 2015: “War Stories” at the IP and Commercialisation Forum at the NZBio Conference in Wellington; “Synthetic Cancer Vaccines” at Eurocarb18 in Moscow, Russia; and “Synthetic Immunotherapy Platform for Vaccine Development” at TechConnect in Washington DC, USA.
- Dr Jane Allison gave the plenary lecture “Supercalifragilisticexpialidocious: A magical approach to automated parameter optimisation” at the Molecular Graphics and Modelling Society 2015 meeting, in Singapore. She also presented the keynote address “Automated parameterisation of the world” at the Molecular Modelling 2015 meeting in Sydney, Australia.

## 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

- Arkansas State University (USA)
- Birmingham University (UK)
- Boston College (USA)
- Brown University (USA)
- Cambridge University (UK)
- Centenary Institute (Australia)
- Cleveland Clinic (USA)
- Cornell University (USA)
- Essex University (UK)
- European Bioinformatics Institute (UK)
- Flinders University (Australia)
- Francis Crick Research Institute (UK)
- French Institute of Health and Medical Research (France)
- Gadjah Mada University (Indonesia)
- Ghent University (Belgium)
- Goethe University (Germany)
- Heart Research Institute (Australia)
- Hudson Institute of Medical Research (Australia)



**MAURICE WILKINS CENTRE**  
FOR MOLECULAR BIODISCOVERY

- iHuman Institute, ShanghaiTech University (China)
- Innsbruck University (Austria)
- Institute for Molecular Bioscience (Australia)
- Institute of Complex Systems, Forschungszentrum Jülich (Germany)
- Jacobs University (Germany)
- John Innes Centre (UK)
- Julius Kühn-Institut (Germany)
- Kerckhoff Heart and Thorax Center (Germany)
- Korea Institute of Science & Technology (Korea)
- Latrobe University (Australia)
- Leiden University (Netherlands)
- Loughborough University (UK)
- MAASTRO clinic (Netherlands)
- Macquarie University (Australia)
- Max Planck Institute for Infection Biology (Germany)
- Medical College of Wisconsin (USA)
- Medical University of South Carolina (USA)
- Memorial Sloan-Kettering Cancer Center (USA)
- Methodist Medical Centre (USA)
- National University of Singapore (Singapore)
- Okinawa Institute for Science and Technology (Japan)
- Polytechnic Institute of Leiria (Portugal)
- Queen's University (Canada)
- Saarland University (Germany)
- Samsung Biomedical Research Institute (SBRI) (Korea)
- Seoul National University (Korea)
- South Australian Research and Development Institute (Australia)
- Telethon Kids Institute (Australia)
- Tokyo Institute of Technology (Japan)
- Université de Picardie Jules Verne (France)
- Université Pierre et Marie Curie Paris 6 (France)
- University College London (UK)
- University Medical Centre Utrecht (Netherlands)
- University of Aberdeen (UK)
- University of Bordeaux; (France)
- University of Cambridge (UK)
- University of Cardiff (UK)
- University of Chicago (USA)
- University of Colorado (USA)
- University of Eastern Finland (Finland)
- University of Hokkaido (Japan)
- University of Hong Kong (Hong Kong)
- University of Houston (USA)
- University of Huddersfield (UK)
- University of Illinois at Chicago (USA)
- University of Kassel (Germany)

- University of Lausanne (Switzerland)
- University of Leeds (UK)
- University of Lincoln (UK)
- University of Maastricht (Netherlands)
- University of Melbourne (Australia)
- University of Minho (Portugal)
- University of Minnesota (USA)
- University of Missouri (USA)
- University of Montreal (Canada)
- University of North Carolina (USA)
- University of Rochester School of Medicine and Dentistry (USA)
- University of Southampton (UK)
- University of Southern California (USA)
- University of Texas MD Anderson Cancer Center (USA)
- University of Toledo (USA)
- University of Virginia (USA)
- University of Wollongong (Australia)
- University of Wurzburg (Germany)
- Uppsala University (Sweden)
- Vilnius University (Lithuania)
- Virginia Tech (USA)
- Wake Forest University (USA)
- Weill Cornell Medical College (USA)
- York University (Canada)

Continuing academic collaborations

#### North America

- McGill University (Canada)
- University of British Columbia (Canada)
- Boston University (USA)
- Brandeis University (USA)
- Colorado State University (USA)
- Duke University (USA)
- Emory University (USA)
- Georgia Institute of Technology (USA)
- Global Alliance for TB Drug Development (USA)
- Harvard University (USA)
- Hendrix College (USA)
- Houston Methodist Research Institute (USA)
- Indiana University School of Medicine (USA)
- J Craig Venter Institute (USA)
- Johns Hopkins University (USA)
- La Jolla Institute for Allergy and Immunology (USA)
- Ludwig Institute for Cancer Research (USA)
- MD Anderson Cancer Center, University of Texas (USA)
- Mercer University (USA)
- Mt Sinai School of Medicine (USA)
- National Institutes of Health (USA)
- Robert Wood Johnson Medical School (USA)





- Rochester Institute of Technology (USA)
- Sanford Burnham Medical Research Institute (USA)
- Stanford University (USA)
- Stony Brook University (USA)
- The Rockefeller University (USA)
- University of Arizona (USA)
- University of California (USA)
- University of Massachusetts (USA)
- University of Michigan (USA)
- University of Oklahoma (USA)
- University of Pennsylvania (USA)
- University of Pittsburgh (USA)
- University of Tennessee (USA)
- University of Washington (USA)
- Vanderbilt University (USA)
- Western Kentucky University (USA)
- Yeshiva University (USA)
- Johannes Gutenberg University (Germany)
- Max Planck Institute for Molecular Genetics (Germany)
- RWTH Aachen University (Germany)
- Maastricht University (Netherlands)
- University of Bergen (Norway)
- Universidad Politécnica de Madrid (Spain)
- Karolinska Institute (Sweden)
- University of Gothenburg (Sweden)
- Swiss Federal Institute of Technology (ETH) (Switzerland)
- Aston University (UK)
- Imperial College London (UK)
- Manchester Metropolitan University (UK)
- MRC Laboratory of Molecular Biology (UK)
- MRC Mitochondrial Biology Unit (UK)
- Queen Mary University of London (UK)

### **South America**

- Federal University of Sao Paulo (Brazil)

### **UK and Europe**

- Vienna University of Technology (Austria)
- Pasteur Institute (France)
- Center for Free-Electron Laser Science (Germany)
- Charite Medical University (Germany)
- Hamburg University of Applied Sciences (Germany)
- University of Bristol (UK)
- University of Liverpool (UK)
- University of Manchester (UK)
- University of Nottingham (UK)
- University of Oxford (UK)
- University of Reading (UK)
- University of Sheffield (UK)
- University of St. Andrews (UK)

**Asia Pacific**

- Australian National University (Australia)
- Children's Medical Research Institute (Australia)
- Commonwealth Scientific and Industrial Research Organisation (CSIRO) (Australia)
- Griffith 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)
- Royal Melbourne Institute of Technology (Australia)
- University of Sydney (Australia)
- University New South Wales (Australia)
- University of New South Wales (Australia)
- University of Newcastle (Australia)
- University of Queensland (Australia)
- University of Sydney (Australia)
- University of Technology Sydney (Australia)
- Walter and Eliza Hall Institute (Australia)
- Fujian University of Traditional Chinese Medicine (China)
- Guangzhou Institute of Biomedicine and Health (China)
- Shanghai Institute of Ceramics (China)
- Shanghai Institute of Materia Medica (China)
- Tsinghua University (China)
- Delhi Technological University (India)
- Indian Institute of Science (India)
- National Centre for Biological Sciences (India)
- Hokkaido University (Japan)
- Kumamoto University (Japan)
- Kyushu University, Japan (Japan)
- A\*Star (Singapore)

**Middle East**

- Israel Oceanographic and Limnological Research (Israel)



## 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 33 of this report. The Centre's investigators also act as consultants for a number of national and international companies.

In 2015 the expertise of Maurice Wilkins Centre investigators was sought by:

- |                                      |   |
|--------------------------------------|---|
| • ADInstruments Ltd                  | • Canterbury Scientific Ltd                           |
| • Alder Biopharmaceuticals Inc (USA) | • CoDa Therapeutics, Inc. (USA)                       |
| • Allergan Pharmaceuticals (USA)     | • Comvita Ltd   |
| • Auckland Clinical Studies Limited  | • Connovation Ltd                                     |
| • Auckland UniServices Ltd           | • CTx (Australia)                                     |
| • Auramer Bio Ltd                    | • Dairy Goat Co-operative Ltd                         |
| • Avalia Immunotherapies Limited     | • Enztec Ltd  |
| • Bayer Animal Health Ltd (Germany)  | • Fonterra Co-operative Group Ltd                     |
| • Bayer Crop Science (Germany)       | • Genentech Inc (USA)                                 |
| • Biomatters Ltd                     | • GlycoSyn  |
| • Biotelliga Ltd                     | • Innate Therapeutics Ltd (Australia)                 |
| • BLIS Technologies Ltd              | • Izon Ltd  |
| • Boutiq Science Ltd                 | • Janssen Research & Development (France and Belgium) |
| • Caldera                            | • L2 Diagnostics LLC (USA)                            |
| • Callaghan Innovation               | • Landcare Research NZ Ltd                            |

- Max International
- Medtronic NZ Ltd
- Mesynthes Ltd
- Metavention (USA)
- National Institutes of Health (USA)
- New Zealand Genomics Limited
- New Zealand Leather and Shoe Research Association
- New Zealand Pharmaceuticals Ltd
- New Zealand Genomics Ltd
- Novartis Vaccines and Novartis Vaccines for Global Health (NVGH) (Italy)
- Oroboros Instruments (Austria)
- Ossis Ltd
- Phylogica (Australia)
- Plant and Food Research
- Seattle BioMed (USA)
- Threshold Pharmaceuticals (USA)

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 awarded to Maurice Wilkins Centre investigators, affiliates, and students in 2015:

### **International recognition in chemistry**

Distinguished Professor Margaret Brimble from the University of Auckland was named one of 2015's Distinguished Women in Chemistry or Chemical Engineering by the International Union of Pure and Applied Chemistry (IUPAC). The award acknowledges and promotes the work of female chemists and chemical engineers. Professor Brimble, a principal investigator, was also appointed a Senior Fellow to the International Society of Heterocyclic Chemistry. See story page 9.

### **Tregear Award**

Associate Professor Debbie Hay, an associate investigator from the University of Auckland, won the Australian Peptide Association's 2015 Tregear Award for outstanding research in the field of peptide chemistry and biology and underpinning technologies. See story page 9.

### **ASEAN Anniversary Awards**

Affiliate Investigator Dr Htin Lin Aung was an honorary Myanmar recipient of the 40th NZ Association of Southeast Asian Nations (ASEAN) Anniversary Awards. Htin received the award in recognition of his commitment to Myanmar – New Zealand relations and his work to build collaborations between the University of Otago and the Myanmar health sector. Dr Aung is part of a research programme to develop a new generation of diagnostic techniques for drug-resistant tuberculosis (see stories page 9 and 17).

### **Merck Serono Innovation Cup**

Affiliate Investigator Dr Francis Hunter, a postdoctoral fellow at the Auckland Cancer Society Research Centre, was a member of the winning team in the 5th Merck Serono Innovation Cup programme. The programme encourages early careers researchers to work in teams to generate new innovative ideas for therapeutics and, with support from industry coaches, turn these ideas into business plans that are judged by a panel of experts. See story page 9.

### **Rutherford Discovery Fellowships**

Maurice Wilkins Centre investigators Drs Jane Allison (Massey University) and Logan Walker (University of Otago) were each awarded a prestigious Rutherford Discovery Fellowship in 2015. The fellowships are designed to develop and foster New Zealand's future science sector leaders.

### **Castner Medal**

Associate Investigator Professor David Williams from the University of Auckland was awarded the Castner Medal from the Society of Chemical Industry, UK for applied electrochemistry and chemical sensors.

**Leadership and Teaching Awards**

Associate Investigator Dr Roslyn Kemp from the University of Otago received the Miriam Dell Award for Excellence in Mentoring from the Association for Women in the Sciences (AWIS) for her work inspiring female immunologists across Australasia. Dr Kemp was also recognised in the national Tertiary Teaching Excellence Awards administered by Ako Aotearoa.

**Illumina Emerging Researcher Award**

Affiliate Investigator Dr Aniruddha Chatterjee from the University of Otago received one of the top honours at the 2015 Queenstown Research Week – the Illumina Emerging Researcher Award. Dr Chatterjee, a postdoctoral fellow with Principal Investigator Professor Michael Eccles, is researching the processes involved in the spread of cancer in the body from a primary melanoma site.

**Student Achievements**

PhD student Tom Wiggins from the University of Otago took first place in the poster prize at the 2015 Queenstown Molecular Biology (QMB) protein satellite meeting, and University of Auckland PhD student Jeremy Raynes won the student poster award for the QMB microbes satellite.

The Maurice Wilkins Centre also congratulates the numerous investigators and students who received local and institutional honours throughout 2015.



## Summary data

Broad category	Detailed Category	Year 1
<b>FTEs by category</b>	Principal investigators	1.70*
	Associate investigators	2.09*
	Postdoctoral fellows	7.29*
	Research technicians	0.57*
	Administrative/support	2.81
	Research students	14.58
	<b>Total</b>	<b>29.04</b>
<b>Headcounts by category</b>	Principal investigators	19
	Associate investigators	145
	Postdoctoral fellows	20
	Research technicians	2
	Administrative/support	7
	Research students	23
	<b>Total</b>	<b>216</b>
<b>Peer reviewed research outputs by type</b>	Journal articles	84
	<b>Total</b>	<b>84</b>
<b>Value of external research contracts awarded by source</b>	Vote Science and Innovation contestable funds	2,831,000
	Domestic – other non-Govt	372,977
	Overseas	2,067,798
	Other	117,500
	<b>Total</b>	<b>5,389,275</b>
<b>Commercial activities</b>	Patent applications	4
	Patents granted	5
<b>Students studying at CoRE by level</b>	Doctoral degree	21
	Other	2
	<b>Total</b>	<b>23</b>
<b>Number of students completing qualifications by level</b>	Other	1
	<b>Total</b>	<b>1</b>
<b>Immediate post-study graduate destinations</b>	Employed in NZ	1
	<b>Total</b>	<b>1</b>

In addition to the directly funded FTE in the above table, Principal Investigators contributed an additional 1.01 FTE in time only and 0.65 FTE was co-funded; Associate Investigators contributed an additional 0.71 in time only and 4.75 FTE was co-funded; Postdoctoral fellows had 3.97 FTE co-funded; Research technicians had 1.25 FTE co-funded.

## Financial statement 2015

### Funding summary for the year ended 31 December 2015

	<b>Actuals</b>
	<b>\$000</b>
<b>Funding received</b>	
Tertiary Education Commission grant	7,203
<b>Total Funding received</b>	<b>7,203</b>
<b>Expenditure</b>	
Salaries and salary related costs	1,929
Overheads	2,034
Project Costs	543
Travel	223
Postgraduate students	184
<b>Total Expenditure</b>	<b>4,913</b>
<b>Net Surplus/(Deficit)</b>	<b>2,290</b>

This report covers the period from 1 January 2015 - 31 December 2015 and details funding received and funds distributed to collaborative partners of the CoRE.

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

The net surplus will be carried forward into 2016 to fund future expenditure of the CoRE.



# Directory

## MWC Board

Mr Bill Falconer (Chair)  
Prof Conan Fee  
Prof Jane Harding  
Prof John Hosking  
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

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## 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 Biological Sciences	University of Auckland
Prof Greg Cook	Department of 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 and Structural Biology	University of Otago
Assoc Prof Ian Hermans	Malaghan Institute of Medical Research	
Prof Emily Parker	Department of Chemistry	University of Canterbury

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## Principal investigators (non-management)

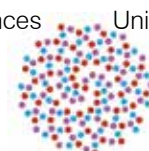
Prof Vic Arcus	Department of Biological Sciences	Waikato University
Prof Michael Eccles	Department of Pathology	University of Otago
Dr Rinki Murphy	Department of Medicine	University of Auckland
Assoc Prof Shaun Lott	School Of Biological Science	University of Auckland
Assoc Prof Adam Patterson	Auckland 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

Assoc Prof David Ackerley	School of Biological Sciences	Victoria University of Wellington
Assoc Prof Iain Anderson	Auckland Bioengineering Institute	University of Auckland
Prof Paul Atkinson	School of Biological Sciences	Victoria University of Wellington
Dist Prof Bruce Baguley	Auckland Cancer Society Research Centre	University of Auckland
Prof Margaret Baird	Department of Pathology	University of Otago
Prof Michael Baker	Department of Public Health	University of Otago, Wellington
Dr Adam Bartlett	Department of Surgery	University of Auckland
Prof Mike Berridge	Malaghan Institute of Medical Research	
Assoc Prof Mik Black	Department of Biochemistry	University of Otago
Dr Gib Bogle	Auckland Bioengineering Institute	University of Auckland
Mr Michael Booth	Waitemata Specialist Centre	Waitemata District Health Board
Dr Reuben Broom	Department of Medical Oncology	University of Auckland
Prof Peter Browett	Department of Molecular Medicine and Pathology	University of Auckland
Dr Christina Buchanan	Department of Molecular Medicine and Pathology	University of Auckland
Prof Vicky Cameron	Department of Medicine	University of Otago, Christchurch
Assoc Prof Lai-Ming Ching	Auckland Cancer Society Research Centre	University of Auckland
Dr Mike Cooling	Auckland Bioengineering Institute	University of Auckland
Assoc Prof Brent Copp	School of Chemical Sciences	University of Auckland
Prof Jillian Cornish	School of Medicine	University of Auckland
Assoc Prof Gabriele Dachs	Department of Pathology	University of Otago, Christchurch
Assoc Prof Alan Davidson	Department of Molecular Medicine and Pathology	University of Auckland
Prof Catherine Day	Department of Biochemistry	University of Otago
Dr Renwick Dobson	School of Biological Sciences	University of Canterbury



Prof Paul Donaldson	School of Medical Sciences	University of Auckland
Prof Rob Doughty	Department of Medicine	University of Auckland
Assoc Prof Richard Douglas	Department of Surgery	University of Auckland
Prof Gary Evans	Ferrier Research Institute	Victoria University of Wellington
Prof Antony Fairbanks	Department of Chemistry	University of Canterbury
Dr Jack Flanagan	Auckland Cancer Society Research Centre	University of Auckland
Prof Richard Furneaux	Ferrier Research Institute	Victoria University of Wellington
Prof Juliet Gerrard	School of Biological Sciences	University of Auckland
Dr David Goldstone	School of Biological Sciences	University of Auckland
Prof Colin Green	School of Medicine	University of Auckland
Assoc Prof Dave Greenwood	Plant and Food Research	
Dr Chris Hall	Department of Molecular Medicine and Pathology	University of Auckland
Prof Mark Hampton	Free Radical Research Group	University of Otago, Christchurch
Dr Paul Harris	School of Biological Sciences	University of Auckland
Dr Joanne Harvey	School of Chemical and Physical Sciences	Victoria University of Wellington
Assoc Prof Debbie Hay	School of Biological Sciences	University of Auckland
Assoc Prof Michael Hay	Auckland Cancer Society Research Centre	University of Auckland
Assoc Prof Nuala Helsby	Department of Molecular Medicine and Pathology	University of Auckland
Dr Tony Hickey	School of Biological Sciences	University of Auckland
Dr Kevin Hicks	Auckland Cancer Society Research Centre	University of Auckland
Prof Sarah Hook	School of Pharmacy	University of Otago
Assoc Prof Julia Horsfield	Department of Pathology	University of Otago
Prof Geoff Jameson	Institute of Fundamental Sciences	Massey University
Dr Stephen Jamieson	Auckland Cancer Society Research Centre	University of Auckland
Prof 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	Auckland Cancer Society Research Centre	University of Auckland
Prof Martin Kennedy	Department of Pathology	University of Otago, Christchurch
Dr Richard Kingston	School of Biological Sciences	University of Auckland

Dr Joanna Kirman	Department of Microbiology and Immunology	University of Otago
Prof Kurt Krause	Department of Biochemistry	University of Otago
Assoc Prof Jeremy Krebs	Department of Medicine	University of Otago
Assoc Prof Anne La Flamme	School of Biological Sciences	Victoria University of Wellington
Dr Goetz Laible	AgResearch	
Prof Dave Larsen	Department of Chemistry	University of Otago
Dr Ben Lawrence	School of Medical Sciences	University of Auckland
Prof Graham Le Gros	Malaghan Institute of Medical Research	
Dr David Long	Auckland Bioengineering Institute	University of Auckland
Assoc Prof 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
Prof John McCall	Department of Surgical Sciences	University of Otago
Dr Melanie McConnell	School of Biological Sciences	Victoria University of Wellington
Assoc Prof Sally McCormick	Department of Biochemistry	University of Otago
Prof Mark McKeage	Department of Pharmacology	University of Auckland
Prof Andrew Mercer	Department of Microbiology and Immunology	University of Otago
Assoc Prof Tony Merriman	Department of Biochemistry	University of Otago
Assoc Prof Peter Metcalf	School of Biological Sciences	University of Auckland
Prof John Miller	School of Biological Sciences	Victoria University of Wellington
Assoc Prof Alok Mitra	School of Biological Sciences	University of Auckland
Dr Nikki Moreland	School of Biological Sciences	University of Auckland
Dr Kathy Mountjoy	Department of Physiology	University of Auckland
Prof Martyn Nash	Auckland Bioengineering Institute	University of Auckland
Prof Richard Newcomb	Plant and Food Research	
Prof Poul Nielsen	Auckland Bioengineering Institute	University of Auckland
Assoc Prof Gillian Norris	Institute of Fundamental Sciences	Massey University
Assoc Prof Peter Northcote	School of Chemical and Physical Sciences	Victoria University of Wellington
Dr Justin O'Sullivan	Liggins Institute	University of Auckland
Dr Bjorn Oback	AgResearch	
Prof Gavin Painter	Ferrier Research Institute	Victoria University of Wellington
Assoc Prof Brian Palmer	Auckland Cancer Society Research Centre	University of Auckland
Dr Wayne Patrick	Department of Biochemistry	University of Otago





Dr Grant Pearce	School of Biological Sciences	University of Canterbury
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
Assoc Prof Thomas Proft	Department of Molecular Medicine and Pathology	University of Auckland
Dr Frederik Pruijn	Auckland Cancer Society Research Centre	University of Auckland
Assoc Prof Jasna Rakonjac	Institute of Fundamental Sciences	Massey University
Assoc Prof Gordon Rewcastle	Auckland Cancer Society Research Centre	University of Auckland
Dr Johannes Reynisson	School of Chemical Sciences	University of Auckland
Dr Sally Roberts	Auckland District Health Board	
Prof Franca Ronchese	Malaghan Institute of Medical Research	
Dr Evelyn Sattlegger	Institute of Natural and Mathematical Sciences	Massey University
Prof Andrew Shelling	School of Medicine	University of Auckland
Prof Bruce Smaill	Auckland Bioengineering Institute	University of Auckland
Dr Jeff Smaill	Auckland Cancer Society Research Centre	University of Auckland
Prof Rob Smith	Department of Chemistry	University of Otago
Prof Russell Snell	School of Biological Sciences	University of Auckland
Prof 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
Assoc Prof Paul Teesdale-Spittle	School of Biological Sciences	Victoria University of Wellington
Assoc Prof Matt Templeton	Plant and Food Research	
Dr Moana Tercel	Auckland Cancer Society Research Centre	University of Auckland
Dr Mattie Timmer	School of Chemical and Physical Sciences	Victoria University of Wellington
Prof Peter Tyler	Ferrier Research Institute	Victoria University of Wellington
Assoc Prof Joel Tyndall	School of Pharmacy	University of Otago
Dr Siouxsie Wiles	Department of Molecular Medicine and Pathology	University of Auckland
Prof David Williams	School of Chemical Sciences	University of Auckland

Dr Geoff Williams	School of Chemical Sciences	University of Auckland
Dr Debbie Williamson	Department of Pathology and Molecular Medicine	University of Otago Wellington
Prof William Wilson	Auckland Cancer Society Research Centre	University of Auckland
Prof John Windsor	Department of Surgery	University of Auckland
Dr Tim Woodfield	Department of Orthopaedic and Musculoskeletal Surgery Medicine	University of Otago, Christchurch
Assoc Prof Sarah Young	Department of Pathology	University of Otago
Dr Shaoping Zhang	School of Biological Sciences	University of Auckland

### Affiliate investigators

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
Dr Lindsay Ancelet	Malaghan Institute of Medical Research	
Dr Emma Andrews	Department of Biological Sciences	Waikato University
Dr Jonathan Astin	Department of Molecular Medicine and Pathology	University of Auckland
Mr Htin Aung	Department of Microbiology and Immunology	University of Otago
Mr Yu Bai	Department of Chemistry	University of Canterbury
Dr Ghader Bashiri	School of Biological Sciences	University of Auckland
Ms Nicola Blackmore	Department of Chemistry	University of Canterbury
Mr Sam Blanchett	Department of Molecular Medicine and Pathology	University of Auckland
Dr Adrian Blaser	Auckland Cancer Society Research Centre	University of Auckland
Dr Cherie Blenkiron	Department of Molecular Medicine and Pathology	University of Auckland
Dr Chris Booker	Department of Anatomy	University of Otago
Mr Rikus Botha	Department of Physiology	University of Auckland
Dr Anna Brooks	School of Biological Sciences	University of Auckland
Mr Matthew Bull	Auckland Cancer Society Research Centre	University of Auckland
Dr Esther Bulloch	School of Biological Sciences	University of Auckland
Mr Jason Busby	School of Biological Sciences	University of Auckland
Mr Colm Carraher	Plant & Food Research	
Dr George Chang	School of Biological Sciences	University of Auckland
Dr Anirrudha Chatterjee	Department of Pathology	University of Otago



Dr Ashika Chhana	Department of Medicine	University of Auckland
Mr Jeong (Jay) Choi	Department of Molecular Medicine and Pathology	University of Auckland
Dr Peter Choi	Auckland Cancer Society Research Centre	University of Auckland
Ms Fiona Clow	Department of Molecular Medicine and Pathology	University of Auckland
Dr Lisa Connor	Malaghan Institute of Medical Research	
Dr Daniel Conole	Department of Chemistry	University of Oxford
Dr James Dalton	Department of Molecular Medicine and Pathology	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 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
Ms Waruni Dissanayake	Department of Molecular Medicine and Pathology	University of Auckland
Dr Katherine Donovan	School of Biological Sciences	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
Ms Kayleigh Evans	Institute of Fundamental Sciences	Massey University
Ms Yifei (Effie) Fan	Department of Chemistry	University of Canterbury
Dr Vaughan Feisst	School of Biological Sciences	University of Auckland
Dr Peter Ferguson	Department of Anatomical Pathology	Wellington Hospital (CCDHB)
Mr Shaun Ferris	School of Chemical Sciences	University of Auckland
Dr Vyacheslav Filichev	Institute of Fundamental Sciences	Massey University
Dr Damien Fleetwood	School of Biological Sciences	University of Auckland
Dr Nicholas Fleming	Department of Pathology	University of Otago
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
Dr Olivier Gasser	Malaghan Institute of Medical Research	

Ms Connie Gilfillan	Malaghan Institute of Medical Research	
Mr Joseph Gingell	School of Biological Sciences	University of Auckland
Ms Grace (Qunqun) Gong	Auckland Cancer Society Research Centre	University of Auckland
Dr Angus Grey	Department of Physiology	University of Auckland
Dr Tracy Hale	Institute of Fundamental Sciences	Massey University
Dr Cyril Hamiaux	Plant and Food Research	
Dr Paulina Hanson-Manful	School of Biological Sciences	University of Auckland
Mr Liam Harold	Department of Microbiology and Immunology	University of Otago
Dr Adam Heikal	Department of Microbiology and Immunology	University of Otago
Mr Kimiora Henare	Auckland Cancer Society Research Centre	University of Auckland
Mr Mike Herbert	School of Biological Sciences	University of Auckland
Mr Logan Heyes	Biomolecular Interaction Centre	University of Canterbury
Ms Kerry Hilligan	Malaghan Institute of Medical Research	
Ms Ngoc Anh Thu (Thu) Ho	School of Biological Sciences	University of Auckland
Dr Jiwon Hong	School of Biological Sciences	University of Auckland
Mr Chris Horne	Biolecular Interaction Centre	University of Canterbury
Mr Lin Hou	Auckland Cancer Society Research Centre	University of Auckland
Ms Fengyun (Fiona) Hu	Department of Molecular Medicine and Pathology	University of Auckland
Mr Amadeus Huang	School of Biological Sciences	University of Auckland
Dr Kuo-yuan (Greg) Hung	School of Chemical Sciences	University of Auckland
Dr Francis Hunter	Auckland Cancer Society Research Centre	University of Auckland
Mr Ivan Ivanovic	School of Biological Sciences	University of Auckland
Ms Elsie Jacobson	Liggins Institute	University of Auckland
Dr Jagdish Kumar Jaiswal	Auckland Cancer Society Research Centre	University of Auckland
Dr Wanting Jiao	Biomolecular Interaction Centre, Chemistry Department	University of Canterbury
Dr Jodie Johnston	School of Biological Sciences	University of Auckland
Dr Nancy Jong	Department of Pharmacology and Clinical Pharmacology	University of Auckland
Dr Jiney Jose	Auckland Cancer Society Research Centre	University of Auckland
Dr Kan Kaneko	School of Pharmacy	University of Otago



Ms Harveen Kaur	School of Chemical Sciences	University of Auckland
Dr Iman Kavianinia	School of Chemical Sciences	University of Auckland
Dr 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
Dr Bronwyn Kivell	School of Biological Sciences	Victoria University of Wellington
Dr Renata Kowalczyk	School of Chemical Sciences	University of Auckland
Dr Andrew Kralicek	Plant and Food Research	
Dr Sharon Ladyman	Department of Anatomy	University of Otago
Dr Ries Langley	Department of Molecular Medicine and Pathology	University of Auckland
Dr Caroline Larsen	Department of Anatomy	University of Otago
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	School of Biological Sciences	University of Auckland
Dr Euphemia Leung	School of Medical Sciences	University of Auckland
Dr Lydia Liew	Auckland Cancer Society Research Centre	University of Auckland
Mr David Lim	Department of Chemistry	University of Canterbury
Mr Yi Chung Lim	Auckland Bioengineering Institute	University of Auckland
Dr Jacelyn Loh	Department of Molecular Medicine and Pathology	University of Auckland
Dr Natalie Lorenz	School of Biological Sciences	University of Auckland
Mr Ben Lu	School of Chemical Sciences	University of Auckland
Ms Hannah Lumley	Department of Biochemistry	University of Otago
Dr Joanna MacKichan	School of Biological Sciences	Victoria University of Wellington
Ms Joanna Mathy	School of Biological Sciences	University of Auckland
Dr Joanna McKenzie	Faculty of Science and Engineering	University of Waikato
Ms Karima Medini	School of Chemical Sciences	University of Auckland
Ms Sunali Yugesh Mehta	Department of Molecular Medicine and Pathology	University of Auckland
Ms Sarah Meidinger	School of Biological Sciences	University of Auckland
Mr Martin Middleditch	School of Biological Sciences	University of Auckland
Dr Christian Miller	Auckland Cancer Society Research Centre	University of Auckland
Dr Antonia Miller	Callaghan Innovation	
Mr Gert-Jan Moggre	Biomolecular Interaction Centre	University of Canterbury
Dr Alexandra Mowday	Auckland Cancer Society Research Centre	University of Auckland
Ms Claire Mulholland	Department of Biological Sciences	University of Waikato

Dr Andrew Munkacsi	School of Biological Sciences Wellington	Victoria University of
Dr Andrew Muscroft-Taylor	Biomolecular Interaction Centre	University of Canterbury
Dr David Musson	Department of Medicine	University of Auckland
Dr Maran Muthiah	School of Chemical Sciences	University of Auckland
Dr Anita Muthukaruppan	Department of Obstetrics and Gynaecology	University of Auckland
Dr Yoshio Nakatani	Department of Biochemistry	University of Otago
Dr Dorit Naot	Department of Medicine	University of Auckland
Dr Richard Naylor	Department of Molecular Medicine and Pathology	University of Auckland
Dr David Nickerson	Auckland Bioengineering Institute	University of Auckland
Dr Patrick O'Connor	Auckland Cancer Society Research Centre	University of Auckland
Ms Tiffany Oulavallickal	Department of Biological Sciences	Waikato University
Dr Saem Park	School of Biological Sciences	University of Auckland
Mr Michael Petridis	Department of Microbiology and Immunology	University of Otago
Dr Fiona Radcliff	Department of Molecular Medicine and Pathology	University of Auckland
Ms Marina Rajic	Institute of Fundamental Sciences	Massey University
Mr Jeremy Raynes	School of Biological Sciences	University of Auckland
Ms Hannah Read	Department of Molecular Medicine and Pathology	University of Auckland
Dr Suzanne Reid	School of Biological Sciences	University of Auckland
Mr Martin Rennie	School of Biological Sciences	University of Auckland
Dr Ali Reza Nazmi	Department of Chemistry	University of Canterbury
Dr Euan Rodger	Department of Pathology	University of Otago
Mr Liam Roth	Department of Pathology	University of Otago
Dr Gareth Rowlands	Institute of Fundamental Sciences	Massey University
Dr Ilva Rupenthal	Department of Ophthalmology	University of Auckland
Mr Soroush Safaei	Auckland Bioengineering Institute	University of Auckland
Dr Veronika Sander	Department of Molecular Medicine and Pathology	University of Auckland
Ms Kristiana Santoso	School of Chemical and Physical Sciences	Victoria University of Wellington
Dr Viji Sarojini	School of Chemical Sciences	University of Auckland
Dr Sebastian Schmeier	Institute of Natural and Mathematical Sciences	Massey University
Mr Vahid Seyfoddin	Department of Molecular Medicine and Pathology	University of Auckland
Dr Miriam Sharpe	Department of Biochemistry	University of Otago
Dr Hilary Sheppard	School of Biological Sciences	University of Auckland



Mr Shevan Silva	Auckland Cancer Society Research Centre	University of Auckland
Mr Denis Simonov	Department of Surgery and Department of Molecular Medicine and Pathology	University of Auckland
Dr Dean Singleton	Auckland Cancer Society Research Centre	University of Auckland
Ms Soo Jung (Aimee) Son	School of Chemical Sciences	University of Auckland
Dr Brie Sorrenson	Department of Molecular Medicine and Pathology	University of Auckland
Dr Jonathan Sperry	School of Chemical Sciences	University of Auckland
Mr Oliver Sterritt	Department of Chemistry	University of Canterbury
Mr Luke Stevenson	School of Biological Sciences	Victoria University of Wellington
Dr Louise Stubbing	School of Chemical Sciences	University of Auckland
Ms Bo Sun	Department of Physiology	University of Auckland
Mr Eugene Sun	School of Biological Sciences	University of Auckland
Dr Simon Swift	Department of Molecular Medicine and Pathology	University of Auckland
Mr Petr Tomek	Auckland Cancer Society Research Centre	University of Auckland
Dr Amy Tong	Auckland Cancer Society Research Centre	University of Auckland
Mr Khan Tran	Department of Molecular Medicine and Pathology	University of Auckland
Ms Catherine Trevarton	Department of Molecular Medicine and Pathology	University of Auckland
Kyle Van de Bittner	Department of Chemistry	University of Canterbury
Mr Dan Verdon	School of Biological Sciences	University of Auckland
Dr Andrea Vernall	School of Pharmacy	University of Otago
Ms Chelsea Vickers	Department of Biological Sciences	Waikato University
Dr Andrew Wadsworth	School of Chemical Sciences	University of Auckland
Mr Dasun Wagachchi	Department of Molecular Medicine and Pathology	University of Auckland
Dr Christopher Walker	School of Biological Sciences	University of Auckland
Dr Logan Walker	Department of Pathology	University of Otago, Christchurch
Dr Akshita Wason	Department of Chemistry	University of Canterbury
Ms Melissa Webby	School of Biological Sciences	University of Auckland
Mr Johannes Weijman	Department of Biochemistry	University of Otago
Dr Robert Weinkove	Malaghan Institute of Medical Research	
Mr Thomas Wiggins	Department of Biochemistry	University of Otago
Ms Elsie Williams	School of Biological Sciences	Victoria University of Wellington



Ms Jingshu Xu	School of Biological Sciences	University of Auckland
Mr Horace (Ho) Yeung	School of Chemical Sciences	University of Auckland
Ms Amy Yewdall	School of Biological Sciences	University of Canterbury
Dr Paul Young	School of Biological Sciences	University of Auckland
Ms Lauren Yule	School of Chemical Sciences	University of Auckland

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### CoRE funded research fellows

Dr Maria Abbattista	Auckland Uniservices Limited	University of Auckland
Dr Lindsay Ancelet	Malaghan Institute of Medical Research	
Dr Amir Ashoorzadeh	Auckland Uniservices Limited	University of Auckland
Dr Htin Lin Aung	Department of Microbiology and Immunology	University of Otago
Dr Ghader Bashiri	School of Biological Sciences	University of Auckland
Dr Anna Brooks	School of Biological Sciences	University of Auckland
Dr Matthew Bull	Auckland Uniservices Limited	University of Auckland
Dr Ofa Dewes	School of Population Health	University of Auckland
Dr Swarna Gamage	Auckland Cancer Society Research Centre	University of Auckland
Dr Paulina Hanson-Manful	Department of Molecular Medicine and Pathology	University of Auckland
Dr Adam Heikal	Department of Microbiology and Immunology	University of Otago
Dr Anower Jabed	Department of Molecular Medicine and Pathology	University of Auckland
Dr Wanting Jiao	Biomolecular Interaction Centre	University of Canterbury
Dr Jodie Johnston	School of Biological Sciences	University of Auckland
Dr Ries Langley	Department of Molecular Medicine and Pathology	University of Auckland
Dr Jacelyn Loh	Department of Molecular Medicine and Pathology	University of Auckland
Dr Sunali Mehta	Department of Pathology	University of Otago
Dr Yoshio Nakatani	Department of Biochemistry	University of Otago
Dr Mohammed Rizwan	Department of Anatomy	University of Otago
Dr Louise Stubbing	School of Chemical Sciences	University of Auckland



## CoRE funded research technicians

Reza Nemati	School of Biological Sciences	University of Auckland
Mr Bao Khanh Tran	Department of Molecular Medicine and Pathology	University of Auckland

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## CoRE funded postgraduate students

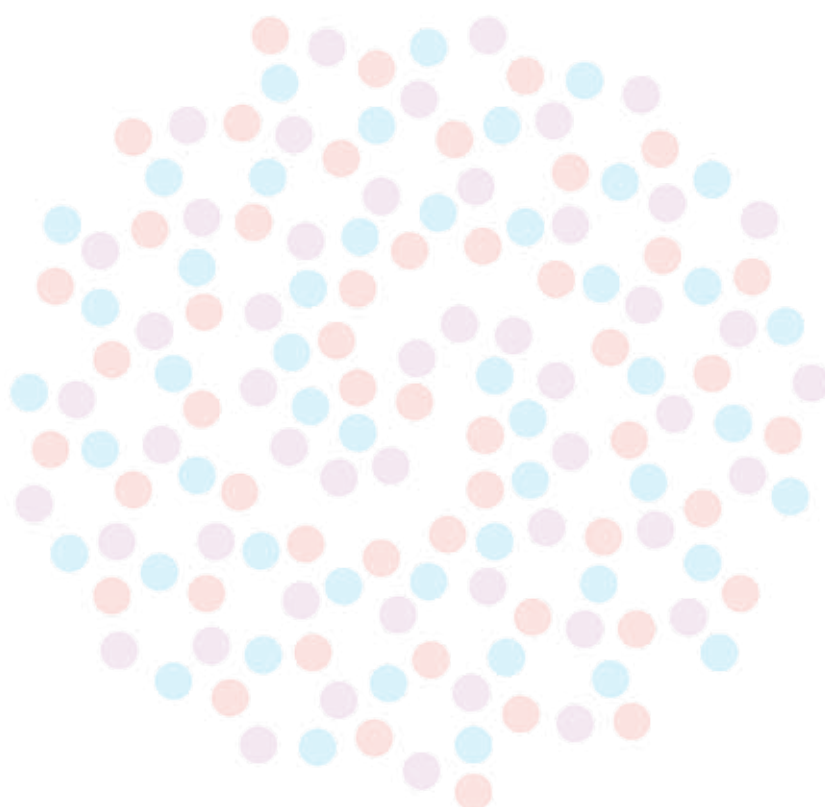
Ms Anna Cooper*	School of Pharmacy	University of Otago
Mr Elliott Dunn*	School of Biological Sciences	University of Auckland
Ms Jennifer Eom*	School of Biological Sciences	University of Auckland
Mr Shaun Ferris	School of Chemical Sciences	University of Auckland
Mr Zhe (Regan) Fu	Auckland Cancer Society Research Centre	University of Auckland
Mr Luke Henderson	School of Pathology	University of Otago
Ms Hannah Lumley	Department of Biochemistry	University of Otago
Ms Joanna Mathy	School of Biological Sciences	University of Auckland
Ms Sarah Meidinger*	School of Biological Sciences	University of Auckland
Mr Gert-Jan Moggre*	Biomolecular Interaction Centre	University of Canterbury
Ms Claire Mulholland	Department of Biological Sciences	University of Waikato
Ms Shereen Asha Murugayah*	Department of Biochemistry	University of Otago
Mr Jeremy Raynes*	School of Biological Sciences	University of Auckland
Mr Liam Roth*	Department of Pathology	University of Otago
Ms Kristiana Santoso	School of Chemical and Physical Sciences	Victoria University of Wellington
Mr Oliver Sterritt*	Department of Chemistry	University of Canterbury
Mr Luke Stevenson*	School of Biological Sciences	Victoria University of Wellington
Mr Bao Khanh Tran*	Department of Molecular Medicine and Pathology	University of Auckland
Ms Lauren Yule	School of Chemical Sciences	University of Auckland
Ms Alana Whitecombe	School of Biological Sciences	University of Auckland
Mr Thomas Wiggins*	Department of Biochemistry	University of Otago
Ms Jingshu Xu	School of Biological Sciences	University of Auckland

\*partial support provided by MWC.

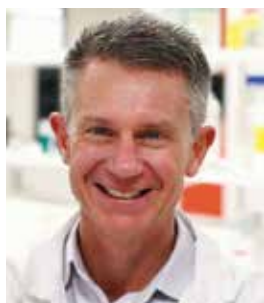
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## CoRE funded management

Ms Rachael Goldstone	Maurice Wilkins Centre	University of Auckland
Ms Danene Jones	Maurice Wilkins Centre	University of Auckland
Mr Peter Lai	Maurice Wilkins Centre	University of Auckland
Ms Anne Martin	Maurice Wilkins Centre	University of Auckland
Ms Karen Mumme	Maurice Wilkins Centre	University of Auckland
Ms Rochelle Ramsay	Maurice Wilkins Centre	University of Auckland
Ms Lorraine Scott	Maurice Wilkins Centre	University of Auckland



## Contact Details



### Director/Principal investigator

#### Professor Rod Dunbar

School of Biological Sciences  
Faculty of Science  
The University of Auckland  
Private Bag 92019  
Auckland 1142, New Zealand  
Phone: +64 9 923 5765  
Email: [r.dunbar@auckland.ac.nz](mailto:r.dunbar@auckland.ac.nz)



### Deputy Director/Principal investigator

#### Professor Peter Shepherd

Department of Molecular Medicine and Pathology  
Faculty of Medical and Health Sciences  
The University of Auckland  
Private Bag 92019  
Auckland 1142, New Zealand  
Phone: + 64 9 923 9891  
Email: [peter.shepherd@auckland.ac.nz](mailto:peter.shepherd@auckland.ac.nz)

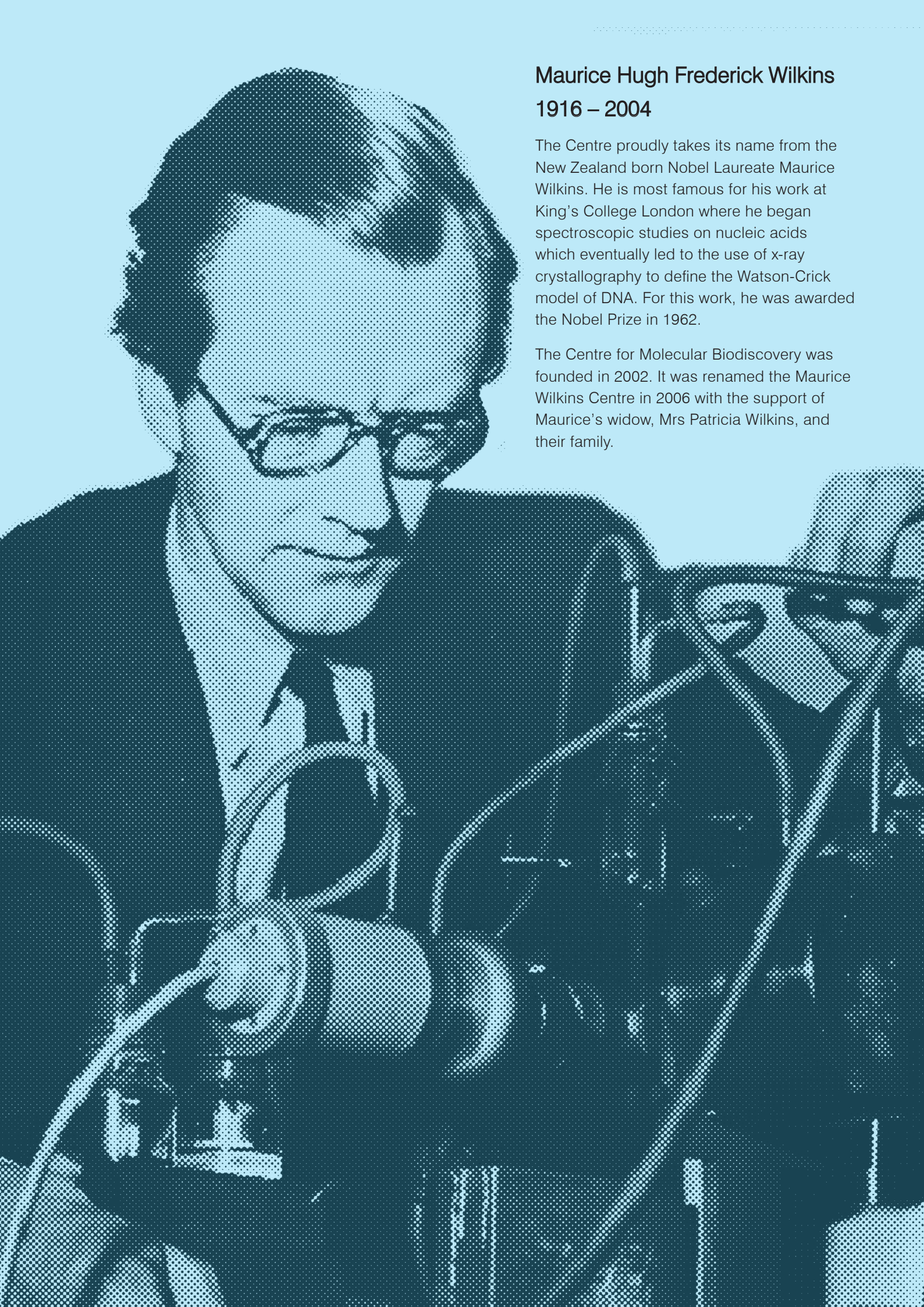


### Research Manager

#### Ms Rochelle Ramsay

Maurice Wilkins Centre  
c/o School of Biological Sciences  
Faculty of Science  
The University of Auckland  
Private Bag 92019  
Auckland 1142, New Zealand  
Phone: +64 9 923 5533  
Email: [rj.ramsay@auckland.ac.nz](mailto:rj.ramsay@auckland.ac.nz)





## 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.