SCOPE 68
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MALAGHAN INSTITUTE OF MEDICAL RESEARCH

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Building a better future

From pipettes to high-powered microscopes, from petri dishes to million-dollar cell sorters – technology is the foundation that underpins all scientific programmes at the Malaghan Institute.

But technology evolves at an often staggering pace. What is state-of-the art equipment today may be redundant five years from now. Take genetic sequencing. Once, it cost hundreds of thousands of dollars and a score of scientists to decipher a single genetic code. Today, it takes one person and an instrument the size of a stapler 20 minutes to do the same task.

The need for better, faster, more sophisticated technology has never been more important if we are to make meaningful, lasting improvements to human health and wellbeing says Malaghan Institute director Prof Le Gros.

"To continue our track record of breakthrough discoveries in immunology and immunotherapy, it is essential the Institute continues building on our existing technological capability."

Thanks to philanthropic support, the Malaghan Institute has a number of ambitious projects underway to cement its position as leader in science technology and ensure that the Institute has the tools it needs to stay at the forefront of biomedical research and discovery.

"Where the Malaghan Institute has achieved its greatest successes has been in building high technology platforms to investigate the most fundamental processes of biology and the immune system."

- PROFESSOR GRAHAM LE GROS

Cover image: Samantha Small prepares the BD Influx cell sorter for an upcoming experiment, carefully aligning each laser to its optimal setting.

From the Director

The philanthropic support the Malaghan Institute has received over the past months has been fantastic recognition of the work and passion of our scientists to improve our understanding of the immune system and its relationship to human disease.

It is the collective commitment and generosity of our community that positions us to make a long and lasting impact on health outcomes in New Zealand. We are owned by New Zealand, for the benefit of all New Zealanders.

I would also like to acknowledge the amazing generosity of spirit and the value of community we have seen across Aotearoa since the tragic events in Christchurch last month. These are difficult and trying times, but the value of human life has never been so clear.

Prof Graham Le Gros
CNZM FRSNZ FRCPA (Hon)
Director

Cont'd from Building a better future

A world-class cytometry centre

Paramount to biomedical research is the technology that allows scientists to study and analyse individual cells at a microscopic level. Cytometry is one of the best tools available for this, and thanks to significant investment from the Hugh Green Foundation, the Malaghan Institute is set to be world-leading with this technology through the creation of the Hugh Green Cytometry Centre.

"Although the cost of biomedical technology is high, it's vital for discovery," says Prof Le Gros. "The technology and expertise in the Hugh Green Cytometry Centre – including across cytometry, microscopy, histology and software – will continue to enable the Malaghan Institute's immunology research, and create for New Zealand a globally-recognised biomedical research centre that will improve human health."

"Spectral cytometry enables us to deeply interrogate which cell populations are present and what these cells are doing in the context of the diseases we study. With advances in this technology we'll be getting unprecedented amount of information from each precious sample"

- KYLIE PRICE, HEAD OF RESEARCH TECHNOLOGY

Setting the stage for the future of clinical research in New Zealand

Clinical trials are an essential step in translating fundamental research discoveries into treatments and therapies that improve the health of New Zealanders. Clinical programmes require a significant investment in technology and resources to ensure they meet strict safety, sterility and ethical requirements. Immunotherapeutic clinical programmes at the Malaghan Institute, such as the Freemasons CAR T-cell Research Programme, require specialised laboratories that meet 'good manufacturing practice' (GMP) standards.

These GMP laboratories are more sterile than an operating theatre and have been a core component of the Institute's clinical developments, including the recently completed melanoma vaccine trial and the upcoming CAR T-cell therapy clinical trial.

"Freemasons donate extensively to medical research like the Freemasons CAR T-cell Research Programme because it is a promising and effective way that we can do something tangible to help New Zealanders"

– MARK WINGER, FREEMASONS NEW ZEALAND GRAND MASTER

Allergy research honours in Burnet Oration

Professor Franca Ronchese has been recognised for her long and distinguished career in the field of immunology, presenting the prestigious Burnet Oration at the annual meeting of the Australasian Society for Immunology in Perth late last year.

The oration is named after the Nobel prize-winning Australian immunologist Sir Frank Macfarlane Burnet, and is the highest honour awarded by the Society. Speakers are chosen in recognition of their impact in advancing the field of immunology over the course of their career. We are immensely proud of Prof Ronchese and the journey that brought her to the Malaghan Institute.

Prof Ronchese first trained at the University of Padova, Italy before taking a postdoctoral fellow position in the Laboratory of Ron Germain at the National Institutes of Health in Bethesda, USA. After her postdoctoral studies, Prof Ronchese joined the Basel Institute for Immunology in Switzerland, becoming interested in antigen presentation by dendritic cells in vivo. Since 1994 she has led the immune cell biology group at the Malaghan Institute. Recently, Prof Ronchese has published in *Cell Systems* in collaboration with the Weizmann Institute in Israel, research that has made significant strides in tracking the allergic response on a cell-by-cell level, teasing out the incredible rare but important activity that results in allergic disease.

Bottom: Prof Franca Ronchese presenting the Burnet Oration

The final leg of the Great New Zealand Trek

Fourteen years, 2,613 kilometres and over $380,000 raised towards multiple sclerosis research. The Great New Zealand Trek reached its furthest and final destination in the southern region of Slope Point in late March with over 240 trekkers and 90 volunteers participating in the last leg of this monumental journey.

"It has been such a phenomenal and transformative experience," says Professor Anne La Flamme, whose multiple sclerosis research programme has been supported by funds raised by the Great New Zealand Trek for the past 10 years.

"The support from the Trek, its board members, the volunteers and the attendants has been a vital component of our MS research programme, underpinning many of our scientific achievements and discoveries. I would like to personally thank Kitty and the rest of the Great New Zealand Trek Charitable Trust for everything they have done for MS research."

Left: Trekkers on the final leg of the Great New Zealand Trek

Cancer discovery fundamentally changes understanding of mitochondria

New finding suggests cancer cells require mitochondria not for energy, but to make new DNA – a discovery that could fundamentally change our approach to treating cancer.

Traditionally, mitochondria – the part of a cell responsible for generating energy needed for the cell to grow and divide – has been viewed almost exclusively as that: an internal cellular battery. However, the cancer cell biology team at the Malaghan Institute has recently published a finding that shakes this scientific dogma to its core.

While it's certainly true that mitochondria are important for their energy generating capabilities, Professor Mike Berridge and his team discovered that in terms of cancer, particularly aggressive cancers like glioblastoma (brain cancer), mitochondria are needed not to make energy, but to create new DNA.

"We found that in many cases, these cancer cells were able to survive off the minute amount of energy generated from other forms of production – without the presence of mitochondria," says Prof Berridge. "Mitochondria are important – not for generating energy, but for a protein located within in them that makes up an essential component for the manufacture of new genetic material."

Without the ability to create new genetic material, or DNA, these cancer cells are unable to repair themselves, grow, or – more importantly – divide, effectively halting the tumour-formation process in its tracks. Prof Berridge and his team are now working to better understand this novel mechanism and how to apply it in a therapeutic setting.

Above: Carole Grasso and Prof Mike Berridge

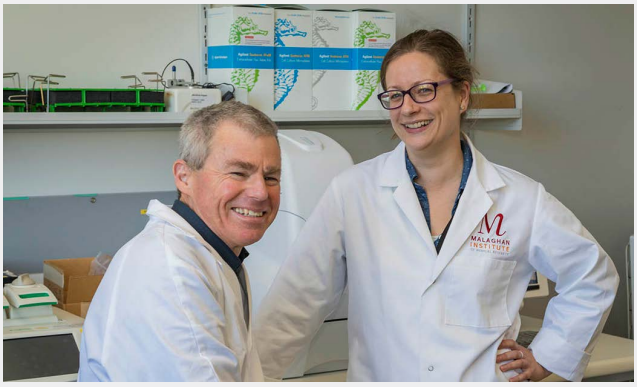
How worms can protect you from other worms

An unexpected find by the parasitic disease team provides more evidence of the potential human health benefits of certain species of parasitic worm.

Published in *Mucosal Immunology*, the research found that the presence of intestinal parasites provides long-lasting protection against infection from other species of parasites in other organs. The finding appears to contradict traditional understanding of parasitic worms as agents of dampening the immune system, which would predict weaker protection from later infections.

"We found that, quite unexpectedly, if you infect with a gut worm prior to infecting with a hookworm, which migrates through the lung, the gut worm protects against the hookworm infection," says Dr Kara Filbey, whose paper was the culmination of four years of research. "What's amazing is that this gut worm spends its whole life in the gut. It's not going anywhere near the lung, but it's inducing mechanisms in distant organs by manipulating the host's immune system to protect from certain diseases."

While there are many findings that suggest co-existing with worms provides a number of health benefits, Dr Filbey doesn't recommend uncontrolled ingesting of worms for good health. However, she does point out that this work highlights our complicated and not yet well understood relationship with human parasites and opens doors for exciting future areas of research.



Above: Prof Graham Le Gros and Dr. Kara Filbey

Celebrating a quarter of a century at the Malaghan Institute

This April marks 25 years since Institute Director Professor Graham Le Gros and Professor Franca Ronchese joined the Malaghan Institute, bringing a new focus on immunology. The occasion was marked with a special presentation by Board Chairman Graham Malaghan and the Prime Minister's Chief Science Advisor Professor Juliet Gerrard in front of trustees and staff.

Profs Le Gros and Ronchese were recruited to the Malaghan Institute in 1994 from research positions at Ciba-Geigy and the Basel Institute for Immunology, Switzerland, moving to New Zealand with their young family. They now spearhead the Institute's asthma and allergy research programmes, finding new ways to treat and cure allergic disease.

Mr Malaghan acknowledged the pivotal role the pair has played in the Institute's history, helping transform it into the world class centre for immunology that it is today.

"I would like to thank Graham and Franca for their hard work and dedication. They have not only made a significant contribution to research and discovery at the Institute, but to global understanding of the immune system to improve human health."

Above from left: Mr Graham Malaghan, Prof Juliet Gerrard, Prof Graham Le Gros, Prof Franca Ronchese and Prof Mike Berridge

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The Malaghan Institute wishes to acknowledge the support of Freemasons New Zealand for the Freemasons CAR T-cell research programme.

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Upcoming events 2019

WORLD IMMUNOLOGY DAY 29 APRIL

Rotary Club of Port Nicholson Auction and Dinner
Hotel Intercontinental, Wellington
3 May | 6.30pm

NZ Air Force Band – Waikanae Lions fundraiser in support of the Malaghan Institute
Southward Theatre, Paraparaumu
16 June | 1.30pm

Northern Club Winter Series with Prof Graham Le Gros and David Downs
The Northern Club, Auckland
26 June | 6.00pm

For more information about these events please contact Gay Keast, Development Operations Manager: gkeast@malaghan.org.nz | 04 499 6914

Recent grants Oct 2018 - Apr 2019

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MALAGHAN INSTITUTE OF MEDICAL RESEARCH

Research is our journey. Cure is our destination.

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