SCOPE 53
A MALAGHAN INSTITUTE PUBLICATION

MALAGHAN INSTITUTE OF MEDICAL RESEARCH

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Why we do what we do

In this issue of Scope, we wanted to share why we're here and our vision for the future.

Thanks to your support, we've received heightened interest in our immunology research from people in New Zealand and throughout the world.

There is an urgent need for new preventative health treatments. New Zealanders aged over 65 are projected to increase from 587,000 in 2011 to 921,000 in 2026. With almost a million of us enjoying our later years by 2026, the need for health treatments that keep us active and healthy has never been greater.

All of us at the Malaghan Institute know the pain and heartache caused by diseases like cancer, asthma and allergy, arthritis and multiple sclerosis. We believe the key to beating these diseases lies in harnessing our immune system. We're working hard to develop new treatments for our generation and the next.

Thanks to continually evolving immunology research at the Institute and around the world, we're discovering new ways to tap into the immune system's inherent disease-fighting power to give us the upper hand. The most exciting part? The painful side effects of traditional treatments are far less likely with immunotherapies.

There is a constant race to develop biological insights into lifesaving treatments. However, there's a lesson in immunotherapy's recent successes - they emerged from careful decoding of basic biology over many years. The support we have received over the past 30 years from people like you has enabled our scientists to unravel secrets of the immune system, helping us launch new cancer vaccine clinical trials in recent years.

The march of medical progress against disease is a test of our commitment and ability, and we thank you for joining us on this journey of discovery.

OUR RESEARCH
Using immunotherapy to treat disease

OUR PEOPLE
Professor Franca Ronchese

RUN FOR RESEARCH
Every step makes a difference

From the Director

In the last issue of Scope I indicated that the age of immunotherapy is coming.

The announcement by the leading scientific journal *Science* that cancer immunotherapy was the worldwide scientific breakthrough of 2013, shows how close we are getting. This optimism is shared by us at the Institute when considering the speed of progress we're making.

Whilst I am excited about this wave of good news, there are clear challenges ahead of us. Every disease is unique, and our quest for effective immunotherapies requires expert knowledge of the complexities of our immune systems and the idiosyncrasies of the cancers and allergic diseases we are trying to eliminate.

Another challenge is that as we age, the ability of our immune system to fight infection and respond to vaccines lessens. Approaches that rejuvenate the ageing immune system would significantly help decrease healthcare costs for society, making it a priority research area globally.

Your support drives our discoveries from the laboratory into the community, bridging the divide between theory and care for our friends and family. This has always been my goal for the Malaghan Institute - to understand disease, not for the sake of it, but to control it.

Professor Graham Le Gros

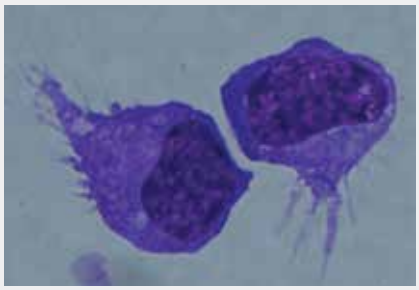
Immunotherapy

Developing ways to harness our immune system for optimal health and prevention of disease.

The field of immunotherapy – using the immune system to treat disease – was born over a hundred years ago. Its origins lie in the early observations of Dr William Coley that his patients' tumours would shrink occasionally if they were infected with a mixture of bacteria (called Coley's Toxins) to stimulate an immune response. This led to the idea that the body's immune system does so much more than simply fighting viruses and bacteria.

Immunotherapy is not just for cancer – it can be applied to any disease caused by an improperly functioning immune system, including asthma, allergy, arthritis, multiple sclerosis and inflammatory bowel disease.

Encouraged by the success of Edward Jenner's smallpox vaccine, doctors went on to make 'cancer vaccines' by injecting patients with crude extracts of tumours from other cancer patients. While these treatments were largely ineffective at the time, with a growing understanding of the immune system in recent decades, the huge potential of immunotherapy is now starting to be realised. The Malaghan Institute is proud to be a part of this movement with our own Phase 1 clinical trial of a therapeutic vaccine for melanoma now underway.



In this issue of Scope we mention two specific immune cell types used in our immunotherapy research. The first are dendritic cells (pictured above) – rare immune cells that guide the development and direction of an immune response. The second are T cells – white blood cells that are activated by dendritic cells to perform a particular task. Image courtesy of Dr Lisa Connor.

Immunotherapy is not just for cancer - it can be applied to any disease caused by an improperly functioning immune system, including asthma, allergy, arthritis, multiple sclerosis and inflammatory bowel disease. Our researchers are using their extensive knowledge of the immune system to develop targeted immunotherapies such as vaccines that rehabilitate the immune system for the treatment of these diseases.

We are also exploring a new initiative in immunotherapy that uses nutrition to improve the functioning of the immune system, which you can read about in this issue of Scope.

This is an incredibly exciting time for the Malaghan Institute. We hope you are as proud as we are of the progress we are making into unravelling the intricacies of our immune system, and applying this knowledge to the treatment of disease.

Turning an obstacle into an opportunity

As often happens in science, a stumbling block in one area of research can present a solution for another.

The collective insight and creative thinking of our researchers has turned a potential bottleneck in cancer immunotherapy into a new way of treating diseases such as asthma and allergy.

The dendritic cell vaccines we use in our cancer research are designed to drive powerful immune responses against a growing tumour. The critical 'cancer-killing' cells activated by the vaccine are specialised white blood cells called cytotoxic T lymphocytes (CTL). What Professor Franca Ronchese's and Associate Professor Ian Hermans' research revealed however, is that the activated CTLs not only attack tumours, they can also kill the dendritic cells in the vaccine itself!

Although this presented somewhat of a problem for the cancer vaccine, it raised the possibility that dendritic cell killing could be used to advantage in diseases where we want to shut down an overactive immune response – such as asthma and allergy.

At the time of this research, the scientific literature was reporting that in addition to the known abilities of CTLs to kill cancer cells, or cells infected with viruses, they could also reduce the symptoms of asthma in experimental models – the scientists just didn't know how or why. It was Professor Ronchese's team, specifically Dr Noriyuki Enomoto and PhD student Naomi Daniels, that provided the possible answer – CTLs can also kill dendritic cells in the airways and in doing so, change the outcome of the asthmatic immune response.

This discovery has opened the doors to the development of a vaccine treatment for asthma that manipulates dendritic cell survival, by specifically targeting CTL activation. We will update you on the progress of this promising new research in a future issue of Scope.

THE SCIENTIST BEHIND THE RESEARCH

Professor Franca Ronchese

Driven by her passion for immunology and unwavering positive spirit, Professor Franca Ronchese was responsible for establishing New Zealand's first cancer immunotherapy programme here at the Malaghan Institute in the early 1990s.

Her pivotal observation at the time that she could programme the immune systems of mice to target tumours using specific dendritic cell vaccines, garnered the interests of scientists and clinicians alike. Since then Franca has led the Immune Cell Biology programme at the Malaghan Institute, investigating the basic biology of dendritic cells and how they can be used to best advantage in immunotherapies for cancer and allergic disease.

When Franca first started on this journey two decades ago, she had a goal and the intellectual know-how to see it realised, but securing research funding, establishing the necessary experimental techniques and engaging clinicians willing to trial immunotherapies, were all major obstacles she had to overcome along the way.

With the US Food and Drug Administration approving the world's first cancer vaccine in 2010, with several others since and more in the development pipeline, it is poignant to note that through Franca's vision, New Zealand can count itself alongside the forerunners of this groundbreaking new form of cancer treatment.

Professor Franca Ronchese.

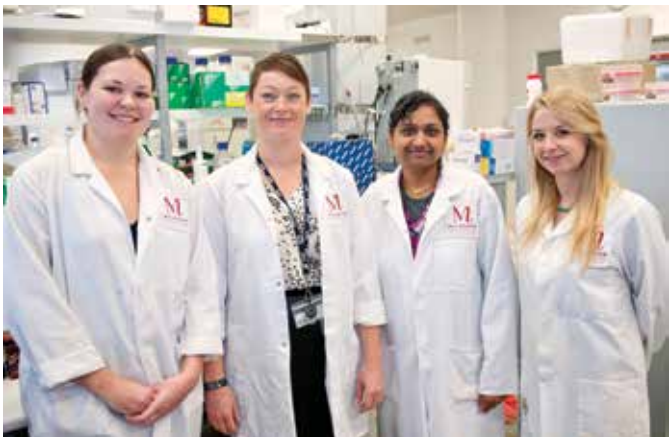
Good nutrition vital for a healthy immune system

An optimal immune system is crucial to human health. Feed it well and it will take care of you for life.

Next to vaccination, nutrition is one of the most accessible, cost-effective and underrated ways of supporting the immune system. Starve it through malnutrition and the immune system is unable to work as well, leading to an increased susceptibility to infection. Conversely, over-nutrition and obesity are widely accepted as being associated with a state of chronic inflammation (excess immune activity).

So what is the link? Overwhelming evidence suggests it is the trillions of bacteria living in our gut – the so-called gut microbiota. The foods we eat not only support the growth and development of our own cells and tissues, they also impact on the microbiota in our gut. These microbiota in turn play crucial roles in regulating nutrient absorption by our intestinal cells, in metabolism and in immunity.

The Gut Inflammation Team at the Malaghan Institute, led by Dr Elizabeth Forbes-Blom, is taking a new look at health by suggesting that we are what our gut microbiota eat! Most importantly, this paradigm may play a crucial role right from the very start of life.



Some of our Gut Inflammation Team – Catherine Plunkett, Dr Elizabeth Forbes-Blom, Karmella Naidoo, Dr Hazel Poyntz.

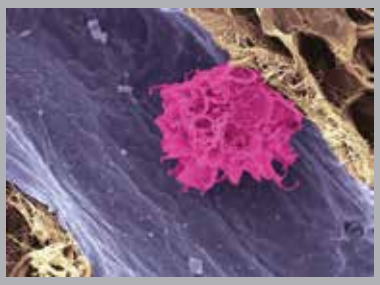
Evolutionary biologists propose that lactation evolved over 200 million years ago to provide infants with both immune and nutritional support. Yet many of the sugars in breast milk known to be important for infant health, cannot be digested by the infants themselves – they instead pass undigested to the lower part of the intestinal tract, where they are consumed by the gut microbiota.

Dr Forbes-Blom's research is investigating whether we can nutritionally target the gut microbiota to reduce the risk of inflammatory disease and maximise the chance for a healthy life.

Know your immune system

Our immune system is a very important component of early development and ongoing health.

It consists of a network of cells, tissues and organs that work together to promote wellness, prevent illness and fight disease.



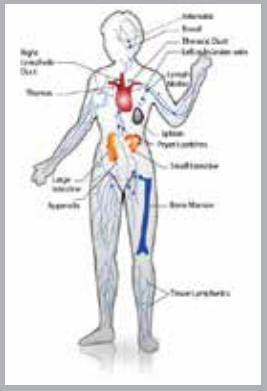
An immune cell in a lymph vessel.

Immunotherapy is the treatment of disease by inducing, enhancing, or suppressing an immune response. It is essentially a reinforcement of the body's own defence mechanisms.

Top tips for a healthy immune system

Here are our three top tips for a healthy immune system:

Vaccination – The best thing we can do for our immune system to provide it with all the information it needs to protect us against disease.



Good nutrition and a healthy lifestyle – The foods we eat play an important role in shaping our overall health. Sunlight through vitamin D also helps our immune system perform at its best.

Reducing stress – Our immune system is suppressed when we are 'stressed', so alleviate stress where possible. Simple, but so important!

Every step makes a difference

While many were enjoying a Sunday sleep-in, a record 14,000 people turned out at Wellington's waterfront on Sunday 23rd February to take part in the iconic AMI Round the Bays fun run.

This year marked the Malaghan Institute's third year as the Official Charity of this much loved community event and we were proud to see more than 300 people come together to show their support of our Run for Research fundraiser.

Thanks to everyone who got behind the Run for Research, over an incredible $49,000 was raised!

People of all ages from three to 83, from all walks of life and all fitness levels took part in the Run for Research, united by their motivation to join our scientists on the journey to find better treatments and cures for diseases that affect our friends, family and community.

Our runners were inspired by the enthusiasm of Newstalk ZB Radio DJ Jason Pine and athletic expertise of world-renowned runner Melissa Moon, our wonderful Ambassadors. An extra-special thanks goes to principal supporter AMI Insurance and AMI Round the Bays event organiser Sport Wellington.

Congratulations and thank you to everyone involved in making the 2014 Run for Research the most successful ever!

You can join the fun!

Keen to help support our scientists? You can walk, run, cycle, dance, or even juggle to make a difference any time of the year! Please call Victoria Hale on 04 499 6914 ext. 821 to find out more.

Every step is a gift - Darci Thompson

Darci took part in the Run for Research this year in memory of her father, who died a mere nine months after being diagnosed with a brain tumour. Darci was also running in memory of her partner of 12 years, Keith, who passed away from cancer just two months and 18 days from diagnosis.

"I have spent a lot of time in cancer wards. Cancer can touch everybody, everyone thinks it can't but it can. A lot of people leave too soon – and so I do my bit."

"I run because I can where others can't. Even when it's hard and it hurts, I'm thankful I can do it. Every step is a gift."

Darci says she chose to support the Malaghan Institute because "the researchers are top notch, are doing some cutting-edge work, and getting the word out about their research."

"Malaghan is very close to my heart."

Thank you to the following organisations for their amazing support of the 2014 Run for Research:

principal supporter ami insurance

sport Wellington

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LEXUS OF WELLINGTON

Z ENERGY

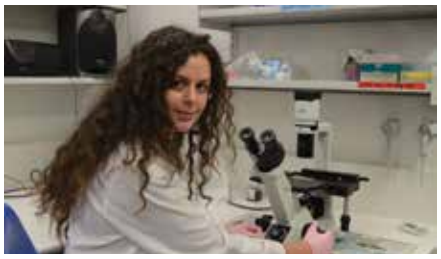
News under the microscope

New Chair of Auckland Friends

This year we welcome Greg Shepherd as the new Chairman of the Auckland Friends Committee. Greg has been a member of the Auckland Friends since 2012, helping coordinate the Charity Golf Tournaments and aiding in raising sponsorship and awareness of the Institute. As Chairman, Greg says he sees an opportunity to apply his professional skills as a project manager to help drive and build on the success of the committee's previous activities. We would also like to take this opportunity to thank outgoing Chair Matthew Malaghan for his tireless dedication to the Auckland Friends over the past few years.

A summer of science

When you think of Kiwi holiday spots, windowless laboratories do not immediately spring to mind. Yet for Otago postgraduate student Isabelle Stewart, the Malaghan Institute was the only place to be this summer. Under the supervision of Associate Professor Ian Hermans and Dr Robert Weinkove, Isabelle undertook laboratory-based cancer immunotherapy research during her study break. Isabelle said she gained a lot of practical skills during her summer studentship and was inspired by the problem-solving abilities of her supervisors. Isabelle will draw on this experience as she embarks on her Honours degree this year.



Become a Friend

Our incredible Friends of the Malaghan Institute power our leading edge research. Some give us a few hours to help out with fundraising and events planning, or even suggesting local groups to present our science to. Others give their time as Chairs in their local community, helping build our connections throughout New Zealand. Whatever your skills and interests, and no matter how much time you have to spare, contact Jenny Sim on 04 499 6914 ext. 811 or jsim@malaghan.org.nz to find out if volunteering for us, works for you. Pictured: our Wellington Friends Committee.

Recent Grants (Nov 2013 - Mar 2014)

Our sincere thanks to the following Trusts and Foundations for their recent support:

Dr Marjorie Barclay Charitable Trust, Glenpark Foundation, Infinity Foundation, Nikau Foundation, Roy & Joan Watson Trust, Springhill Charitable Trust / Frimley Foundation, The Margaret Neave Charitable Trust, The Southern Trust, Watson Joseph Trust.

Professor Graham Le Gros awarded Honorary Fellowship

We are very proud to share the news that our Director, Professor Graham Le Gros has been awarded an Honorary Fellowship from The Royal College of Pathologists of Australasia (RCPA). The RCPA council stated that it was a unanimous decision to confer the Honorary Fellowship on Professor Le Gros, in recognition of his "work as an outstanding researcher in immunology, [his] efforts for postgraduate training and contributions to pathology via [his] position on the committees of various organisations." Professor Le Gros received his award at the College's Annual Admission of New Fellows and Awards ceremony in Melbourne Australia on 22 February 2014.

Join us on our journey

We're proud that New Zealand has a wonderful reputation as a country that leads the world in innovation. The Malaghan Institute is part of this story and our research has the potential to benefit people in New Zealand and around the world. There are several ways you can join us.

To find out more, contact Victoria Hale on 04 499 6914 x 821 or email vhale@malaghan.org.nz alternatively, visit our website www.malaghan.org.nz

1. MAKE A DONATION
2. SET UP AN AUTOMATIC PAYMENT
3. LEAVE A BEQUEST IN YOUR WILL
4. BE A SPONSOR (corporate or individual)
5. JOIN A VOLUNTEER FRIENDS GROUP
6. LIKE US ON FACEBOOK
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MALAGHAN INSTITUTE OF MEDICAL RESEARCH

Research is our journey. Cure is our destination.

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