Annual Report

2013

MALAGHAN INSTITUTE OF MEDICAL RESEARCH

This Annual Report covers the period 1 August 2012 – 31 July 2013.

 • Front Cover Image Professor Franca Ronchese, Dr Lisa Connor.

Contents

Malaghan Institute Staff, 2013.

About Us

The Malaghan Institute is New Zealand's leading independent medical research institute, with a proud history spanning over three decades.

Our work is recognised internationally and our pioneering research programmes are focused on finding better treatments and cures for diseases affecting New Zealanders – including cancer, asthma, allergy, arthritis, multiple sclerosis and infectious disease.

In addition to our drive for making medical discoveries that impact health for all New Zealanders, the Malaghan Institute is committed to the education and support of New Zealand scientists and clinicians. Our reputation as a cutting-edge medical research and training facility sees us hosting New Zealand's brightest and most creative scientists, postgraduate students and post-doctoral research fellows.

Our purpose-built facility on the Kelburn campus of Victoria University of Wellington is home to around 80 researchers and support staff. We also maintain close collaborative relationships with universities, Crown Research Institutes, hospitals and clinics throughout New Zealand and overseas. Working with worldwide organisations ensures that our scientists keep abreast of the latest developments in the international arena, thus maintaining our research at a world-class level.

We are a registered charity and to ensure that the vital research at the Institute continues, we rely on contestable grants, corporate sponsorship, trusts, bequests and donations. All funding contributes to the world-changing potential we strive for, and the belief that we will find, and actually make available, the cure for diseases affecting New Zealanders.

The Malaghan Institute aims to make a difference in people's lives. Our scientists believe that the key to making this difference lies in harnessing the immune system, the body's own natural defence against disease.

Chairman's Report

Change is something we are all involved with every day; sometimes minor and other times major and challenging.

So it has been with the Institute this year. In April the Trustees adopted a new five year Strategic Plan, which took aboard the recommendations of our previous independent Science Reviews. This plan tightens our focus around a core of immunology research, with specific application to cancer and to inflammatory/allergic diseases.

Our resources and focus will remain primarily directed towards support of these two research areas, which have been our major strengths over the last decade or more. By consolidating around our strengths, rather than spreading ourselves too thinly, we aim to build upon and exceed our previous achievements. We will also continue to accommodate some other research activities, at the Director's discretion.

These changes are very significant to the structure and operations of the Institute and have been challenging for the Director and his senior staff. As a result, some research activities and staff have moved from inside the Institute to Victoria University of Wellington, whilst retaining close associate relations with the Institute. These close research partnerships, with Victoria and others, are a key element of our strategy, and thereby allow us to apply our core strength in immunology to a number of pressing national research needs.

As the Director mentions, the Government this year announced ten National Science Challenges that have been identified as being the priorities for New Zealand research for the next decade. We are engaging closely with this process, which will involve us working with different scientific disciplines from across the country, but provides for some exciting opportunities.

This year the Director was successful in securing a major grant over a five-year period from the Health Research Council of New Zealand to support his research into allergy, a growing area of concern and an ever increasing health burden.

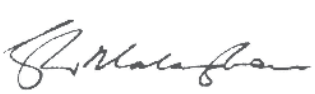
We also eagerly anticipate the opportunity to secure longer term funding for our core programmes from government, under their policy of supporting capability in appropriate Independent Research Organisations.

So this year we have experienced changes that we have driven internally, whilst we also have to face and engage with others being driven by government initiatives. We embrace this opportunity and look forward to taking on the challenges ahead of us.

Joining the Trustees in this effort is Dr Allan Freeth, who brings a wealth of both scientific and commercial experience. We welcome and look forward to working with Allan this year.

As always we as Trustees are indebted to you, our supporters and providers, for our ability to continue and to expand our research, led so ably by our Director Professor Graham Le Gros and his Deputy Director Associate Professor Ian Hermans.

Thank you all for joining us on this next stage of the Institute's journey; I have no doubt it will be both an exciting and a rewarding one.



Mr Graham Malaghan ONZM FCILT Hon DSc
CHAIRMAN

Director's Report

During the past year I believe we saw the coming of age of immune therapy.

The recently reported success of the immune activating agent anti-PD-1 clinical trial in particular is very exciting. These results, which promise a new treatment for those patients with few other options, provide a tremendous boost for all who work in the cancer research field. With our own clinical trial of an immune therapy against melanoma due to commence, such success stories are very encouraging to those involved in the treatment of cancer.

Despite the encouraging advances in many areas of medical research, these are times when unwavering resolve is needed in research. Tremendous strains on national science budgets, as seen with the National Institutes of Health (NIH) cuts in the US, are forcing governments to ask themselves what they are looking to achieve with their investment in scientific research. Increasingly, the trend is to focus on specific questions and outcomes, with more exploratory and fundamental work being significantly reduced or left to a few elite groups in the US, Europe and Asia.

Here in New Zealand we have just gone through a process aimed at identifying ten national science challenges, which have the ambition of uniting our diverse research community in pursuit of specific outcomes of relevance to New Zealand. These challenges will likely help define the major government research investment for the next decade. The theory goes that as a country, New Zealand can't do it all; we need to focus and define the areas we can have the greatest impact in.

This same principle holds true at an organisational level. The Malaghan Institute has been building over several years an expertise in immunology. By working with our network of national and international partners, we can bring this expertise to bear on a wide variety of areas and ensure we are always addressing questions that really matter to New Zealand. This network of clinicians, researchers, industry partners, and community representatives evolves as the needs of the community evolve.

These changing needs are reflected in our own research programmes. Cancer remains a national priority and we have a mature cancer vaccine programme founded on decades of experience. However, alongside this we have a rapidly developing programme in an area of emerging importance – gut health. It has been shown that the interaction between the immune system and the microbiome in the gut can have huge implications for a number of diseases, ranging from food allergy through to diabetes, obesity, and cardiovascular disease. This year we received $6.2m in research funding from the Health Research Council of New Zealand to investigate this further, in the hope of identifying some novel interventions or therapies that could reduce the disease burden on our society.

Fundamentally, it is our relevance to the community that supports us that matters most. This year we will welcome James Araci, our new National Development Manager, who will be tasked with strengthening our ties with the community. Regardless of changes to the funding landscape, the Malaghan Institute is resolved to use its expertise in immunology and its extensive network of research partners, to transform basic health discoveries into improved outcomes for New Zealand. And as the example of anti-PD-1 shows us, this is a real and tangible opportunity.

Professor Graham Le Gros FRSNZ
BSc, Dip Immunol, MPHIL, PhD
DIRECTOR

Trust Board Profiles

MR GRAHAM MALAGHAN,

ONZM, FCILT, Hon. DSc (VUW)
(Chairman)

Appointed Chairman of the Malaghan Institute Trust Board in 1990 (Chairs the Executive Sub-Committee and Malcorp Biodiscoveries Ltd a subsidiary of the Malaghan Institute). Commenced employment at General Foods Corp in 1967, and was appointed General Manager of Refrigerated Freight lines in 1970, acquiring the company in 1987. Was founding Chairman of Tasman Express Line and a member of the LTSA for six years. In 2009 was awarded an Honorary Doctorate of Science from Victoria University of Wellington for his key role in rebuilding the Malaghan Institute into the largest independent medical research organisation in New Zealand. Received the Sir Bob Owens award in 2010 for contributions to the transport, logistics industries and the community. Current directorships include several private companies.

MR JOHN BEATTIE

LLB (VUW)

Obtained a law degree from Victoria University (1975) and was a Fulbright Scholar to Cornell University (1979). Has been a Trustee of the Malaghan Institute since 1991 and is a Director of Malcorp Biodiscoveries Ltd. He is also Chairman of the NZ Diabetes Foundation and the NZ Sports Hall of Fame. He is a Trustee of the Wanaka Festival of Colour and has been a partner in national law firm Kensington Swan, General Manager of Brierley Investments Limited and was the co-founder of Genesis Research with Jim Watson, another Trustee of the Malaghan Institute.

PROFESSOR DAVID BIBBY

DSc (Loughborough University)

Appointed to the Malaghan Institute Trust Board in December 2004. Pro Vice-Chancellor & Dean of the Faculty of Science, Pro Vice-Chancellor of the Faculty of Engineering, and Pro Vice-Chancellor of the Faculty of Architecture and Design at Victoria University of Wellington 2003–2013. Holds a PhD in nuclear chemistry and was awarded a DSc in 1995 for his research into zeolites and catalysis. Moved to New Zealand in 1975 to join the DSIR Chemistry Division where he became Group Manager Research before joining Industrial Research Ltd in 1992, initially as General Manager of Communications, Electronics and IT and then as General Manager of Science Development.

ASSOCIATE PROFESSOR JOHN CARTER

BMedSc, MBChB(Otago), FRACP, FRCPA

Joined the Malaghan Institute Trust Board in 2003. Did postgraduate work at the Fred Hutchinson Cancer Research Centre and the University of Washington. Clinically practices as a haematologist with a focus on stem cell transplantation. Is the immediate past Chair of both the New Zealand Blood Service and Scots College, and is currently Medical Leader of the Wellington Blood and Cancer Centre and an Associate Professor of the University of Otago.

PROFESSOR PETER CRAMPTON

MBChB, PhD, FAFPHM, MRNZCGP

Appointed to the Malaghan Institute Trust Board in 2008. Is currently Pro-Vice-Chancellor of the Division of Health Sciences, and Dean of the Faculty of Medicine, for the University of Otago. Is a specialist in public health medicine with his research focused on social indicators and social epidemiology, health care policy, and health care organisation and funding.

DR ALLAN FREETH

PhD (ANU Canberra), MBA (Dist) (Canterbury), BSc (1st Class Hons) (Canterbury)

Joined the Malaghan Institute Trust Board in July 2013. Has extensive experience in management and board governance roles including as former CEO and Managing Director of TelstraClear and Wrightson's, senior executive roles in Trust Bank as well as a previous Chair/Director on the Boards of Genesis Research, GNS Science, Treasury Advisory Board, Save the Children and Queen Margaret College. He is currently a trustee of Crimestoppers, Deputy Chair of FilmNZ, and Chairman of Downstage Theatre.

MR BRYAN JOHNSON

BCA (VUW)

Appointed to the Malaghan Institute Trust Board in 1998. Obtained a commerce degree from Victoria University of Wellington in 1963. Was a senior partner in the Stockbroking company Jarden & Co for 25 years and became Chairman after the sale of the business

to Credit Suisse First Boston in 1991. Retired from CSFB in December 2000 to further develop his Marlborough winery and vineyard, Spy Valley. Has been a director of various corporations, such as Brierley Investments, Royal Sun Alliance and recently retired as Chairman of the Duke of Edinburgh's Award and was a Trustee of the Wellington Stadium Trust.

PROFESSOR GRAHAM LE GROS

FRSNZ, BSc(Massey), Dip Immunol(Otago), MPHIL (Auckland), PhD(Auckland)

Appointed to the Malaghan Institute Trust Board in 1995. Was awarded a Fogarty Fellowship at the NIH, Washington DC (1987-1989), then took a scientist position with Ciba-Geigy in Basel Switzerland for five years before returning to New Zealand to take up the appointment as Research Director of the Malaghan Institute in 1994. Is a Professor of the Department of Biological Sciences, Victoria University of Wellington, and has been elected as a Fellow of the Royal Society of New Zealand.

MR MATTHEW MALAGHAN

BCom

Appointed to the Malaghan Institute Trust Board in August 2008 (Chairman of the Development Sub Committee). Graduated from Otago University in 1994 with a Commerce degree. Subsequent employment with Refrigerated Freight Lines in Auckland and Melbourne, and Sea Containers Group in London, Madrid and Buenos Aires. Owns and operates property and mineral processing businesses in New Zealand and Australia. A Director of the Perlite Institute (USA). Member of the NZ Institute of Directors.

DR DAVID MOSSMAN,

QSM, BVSc, MRCVS, MNZIF

Appointed to the Malaghan Institute Trust Board in 2005. Attended Lincoln College and then graduated from the University of Queensland in 1965 with a Veterinary Degree. Awarded the Australian College of Veterinary Scientists college prize in 1978 and in 1984 the Coopers NZ Farm Management Award for significant innovative farm management in New Zealand. Keynote speaker at the World Angus and Hereford Conferences. A Member of the Lindisfarne College Board 1981-1985. Managing Director of private Farming, Forestry, Finance and Property Companies. Chairman of the Hawkes Bay Friends of the Malaghan Institute since 1999 and retired rural veterinarian since 2001.

MR GARY QUIRKE

BCA, CA, FCILT

Appointed to the Malaghan Institute Trust Board in 2001, when he was Managing Director of P&O Nedlloyd in New Zealand. Has an extensive background in the commercial sector both in New Zealand and overseas and is a member of the Institute of Chartered Accountants and Fellow of the Chartered Institute of Logistics and Transport. Is currently involved in business management consultancy roles in service industries and Chairs a number of community based Boards.

DR JIM WATSON

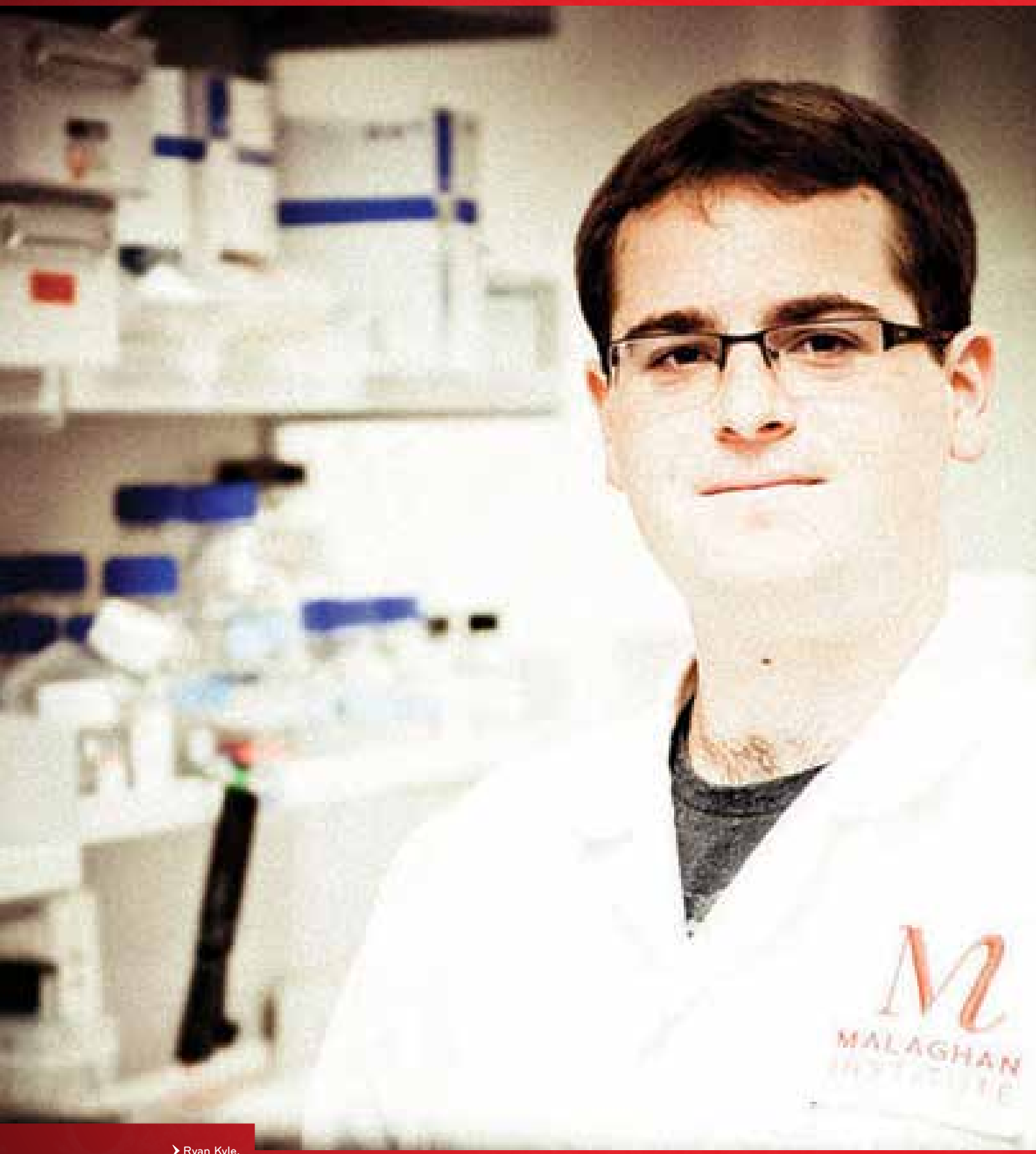
PhD (Auckland)

Appointed to the Malaghan Institute Trust Board in 1993. Has been the Chief Executive of Genesis Research (1997-2004), a company he co-founded in 1994. Has held Professorships at the University of California, Irvine (1976-1981) and the University of Auckland (1981-1993) serving as Head of the Department of Molecular Medicine (1983-1993). Was a Director of the Foundation for Research, Science and Technology (1999-2002), President of the Australasian Society of Immunology (2001), the President of the Royal Society of New Zealand (2003-2006) and a Member of the Government's Growth and Innovation Advisory Board (2001-2004). Is currently Chief Executive of Caldera Health Limited, a prostate cancer company.

MR C DAN WILLIAMS

CA

Appointed to the Malaghan Institute Trust Board in 2005 (Chairman of the Investment and Audit and Finance Sub Committee). Joined an antecedent firm of Deloitte in 1958 and following four years with the firm in London was admitted as a Partner in 1972, initially as the partner responsible for establishing the tax division and following that as a Business Advisory Partner. Retired in 2001 and is now a Consultant to the firm. Has a number of private company Directorships with emphasis on financial management.



› Ryan Kyle.

Research

The Malaghan Institute holds a unique place in the New Zealand health research sector.

Our scientists specialise in the fields of cellular immunology, haematology, cellular and molecular biology, carbohydrate chemistry, immune models of human disease and the development of immunotherapies and vaccines.

Our goal is to deliver medical research discoveries that provide tangible health benefits to the New Zealand community.

Cancer

The immune system has all the properties that are required to complement existing treatments and eradicate cancer. White blood cells called T cells can discriminate between normal and cancer cells, they have powerful cancer killing capability, and can move around the body to eliminate tumours that have spread to other tissues. What's more, immune cells retain a 'memory' for cancer – so can re-launch an attack should the tumour start to grow again.

An early 20th century surgeon, Dr William Coley, is often credited with first recognising the potential of the immune system for treating cancer. He showed that he could control the growth of some tumours by injecting his patients with killed bacterial infusions (Coley's Toxins) to stimulate an immune response. Although this was a rather crude approach to cancer treatment, the basic premise of cancer immunotherapy remains the same – to support the immune system in recognising cancer cells, and strengthen its response so that it can destroy them.

We now know that the immune system can be programmed to target cancer cells more precisely through the use of specific vaccines. Cancer vaccines can be created from a patient's own tumour cells, or from synthetic components made to look like a tumour. The aim is to make the tumour appear dangerous to the body in the same way that an infectious bacterium or virus would, leading to a strong immune response.

The Malaghan Institute is at the forefront of this research with an established international track record going back nearly two decades. We are continually improving our own vaccine technology through basic research in the laboratory, and have conducted clinical trials of different forms of the vaccine in cancer patients.

Leading this work is Associate Professor Ian Hermans, the Malaghan Institute's Deputy Director of Research. His team is about to undertake a clinical trial of a newly developed melanoma vaccine, in collaboration with Capital & Coast District Health Board, Callaghan Innovation, The University of Auckland and Cancer Trials New Zealand. One of the novel features of this vaccine is the inclusion of the synthetic glycolipid α-galactosylceramide (α-GalCer), which Associate Professor Hermans' basic research has shown induces significantly stronger anti-tumour immune responses than vaccines without it.

Complementing our clinical cancer work is an extensive basic research programme involving several of the Institute's research groups. Professor Franca Ronchese leads a team of immunologists focused on understanding the role of dendritic cells in driving anti-tumour immune responses. Professor Mike Berridge's research group is exploring how best to combine targeted drug therapies with immunotherapy, with particular emphasis on the new mutant BRAF melanoma drugs. Dr Bridget Stocker's Immunoglycomics team, now based at Victoria University of Wellington, are developing tailor-made immune 'modulators' to switch off unwanted tumour-promoting immune cells. Professor Berridge and Dr Melanie McConnell, now a Senior Lecturer in Genetics at Victoria University, are also utilising their expertise in cell and molecular biology, to investigate the different survival mechanisms used by these cells to withstand current cancer treatments.

By combining the disciplines of immunology, cell biology and drug discovery in translational research programmes that involve immunologists, biochemists, molecular biologists, chemists and clinicians, we believe our research has the potential to launch a new era in cancer treatment.

PRINCIPAL INVESTIGATORS

Professor Mike Berridge
Associate Professor Ian Hermans
Dr Melanie McConnell
Professor Franca Ronchese
Dr Bridget Stocker

CLINICAL HIGHLIGHT

NEW CLINICAL TRIAL TO EVALUATE PARACETAMOL USE DURING INFECTIONS AFTER CHEMOTHERAPY

Infections are common after strong chemotherapies and can be life threatening. The infections occur because chemotherapy temporarily weakens the immune system, causing neutropenia – a shortage of a type of white blood cell. Chemotherapy also damages the lining of the bowel, allowing bacteria to get from the gut into the bloodstream.

During the infection, and despite appropriate antibiotics, patients often have high fevers. Malaghan Institute Clinical Research Fellow Dr Robert Weinkove, a Consultant Haematologist at the Wellington Blood & Cancer Centre, says that the current practice is to use paracetamol to lower the temperatures of these patients.

"Paracetamol certainly makes people feel better in the short term, however there is some evidence that fever is an important part of the body's response to the infection," says Dr Weinkove.

The question of whether paracetamol should be used to treat these infections will soon be investigated in a clinical trial led by Dr Weinkove, involving Professor Richard Beasley from the Medical Research Institute of New Zealand, Capital & Coast District Health Board and the Institute of Environmental Science and Research.

"We will look at the rate of improvement of patients that receive paracetamol to treat infections that develop following chemotherapy, compared with patients that receive a placebo tablet," says Dr Weinkove. "Specifically we will measure how quickly the bacteria clear from their blood, how long they stay in hospital, how they feel, and how their immune system responds to the infection."

"Ultimately the knowledge gained from this work will help inform how we manage infections after chemotherapy in the future."

DEVELOPMENT OF SYNTHETIC VACCINES FOR CANCER

Conventional T cells are capable of eliminating tumours by recognising unique or mutated proteins in the tumour tissue. In contrast, some T cells recognise other molecular structures, such as lipids, carbohydrates and metabolites. These cells are often described as 'innate-like' T cells, because they are always in a partially activated state so that they can respond immediately to stimulation.

An example is iNKT cells (invariant natural killer T cells), which respond to glycolipids like α-GalCer.

"Over the years we have accumulated strong evidence that these cells can be exploited to enhance responses to vaccination," says Associate Professor Ian Hermans. "Together with collaborators at Callaghan Innovation Research Limited, led by Dr Gavin Painter, we have now used this information to generate completely synthetic vaccines, with the intention of making off-the-shelf treatments for cancer."

This work has been funded by the Ministry of Business, Innovation and Employment (MBIE), and has resulted in three NZ provisional patent applications and one PCT application.

Associate Professor Hermans says there is still more work to do to fully optimise the vaccines, but it is hoped that one day we will see them tested in patients in New Zealand.

Painter GF, Johnston K, Anderson RJ, Compton BJ, Hayman CM, Hermans IF, Larsen DS (2013) Sphingoglycolipid Analogues. NZ611741

Painter GF, Anderson RJ, Compton BJ, Hayman CM, Hermans IF, Larsen DS (2012) Conjugate Compounds. NZ604085

Painter GF, Anderson RJ, Compton BJ, Hayman CM, Hermans IF, Larsen DS (2012) Organic Compounds. NZ601473

RESEARCH HIGHLIGHT

MITOCHONDRIAL GENOME INVOLVEMENT IN CANCER DEVELOPMENT AND PROGRESSION

Professor Mike Berridge leads a research programme investigating the role of mitochondria – the energy powerhouses of our cells – in cancer and other diseases.

"Defective energy production for growth, brain function and movement contributes to numerous health problems," says Professor Berridge. "At least 200 human diseases are reported to be due to mitochondrial gene mutations."

Understanding the involvement of mitochondrial gene mutations in disease is difficult because there are currently no tools available to manipulate mitochondrial DNA in cells. To address this issue, Professor Berridge was awarded $150,000 from the Health Research Council of New Zealand to develop technology that will allow scientists to manipulate mitochondrial genomes. The ultimate goal is to replace mitochondrial genomes in cells with custom-designed synthetic genomes, thus opening the door to a new field of targeted mitochondrial genetics.

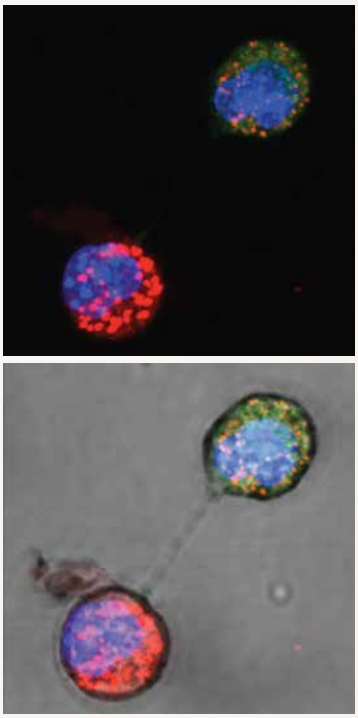
Underpinning this work is Professor Berridge's research investigating the involvement of the mitochondrial genome in tumourigenesis and metastasis.

"We have shown that mitochondrial energy production is essential for tumour formation and metastasis. Thus, highly metastatic melanoma and breast cancer cells lacking a mitochondrial genome are unable to form tumours, until they acquire a mitochondrial genome from cells in their local microenvironment."

Professor Berridge's group is also exploring a range of tumour models to determine the physiological mechanism(s) of intercellular mitochondrial genome transfer.

"We have developed stable cell lines from each stage of this metastatic progression including primary tumour, circulating tumour cells and lung metastasis, allowing us to explore the role of the microenvironment in driving metastatic progression."

These novel discoveries highlight the role of the tumour microenvironment in regulating tumour growth and metastasis.



Mitochondrial transfer between breast cancer cells in culture via a membrane nanotube. Breast cancer cells lacking mitochondrial DNA and parental cells were labelled with MitoTracker Red. Cells were co-cultured for 24 hours, counterstained with the nuclear stain, DAPI (blue) and viewed under a fluorescent microscope (top) and under bright field (bottom).

RESEARCH HIGHLIGHT

BOOSTING IMMUNE RESPONSES AGAINST LEUKAEMIA

In the first of its kind, a translational study undertaken at the Malaghan Institute has revealed that boosting the activity of a rare type of immune cell could be an effective way to vaccinate patients with chronic lymphocytic leukaemia (CLL) against their own cancer.

Bone marrow transplantation is the only curative treatment for CLL and involves replacing the immune system of patients with that of a matched donor. However, not all patients find a donor, patients are prone to infections for months or even years afterwards, and the treatment itself can be so toxic that it is not suitable for many patients.

To identify more targeted, low risk immune therapies, Haematologist Dr Robert Weinkove focused on a rare type of immune cell called invariant natural killer T (iNKT) cells.

Between 2008 and 2011, Dr Weinkove collected blood samples from 40 patients with CLL and from 30 healthy volunteers of a similar age, from the greater Wellington region. He then undertook a series of laboratory tests to compare the number and function of the iNKT cells from these individuals. This study, published in *Haematologica*, constitutes the first comprehensive investigation of iNKT cell numbers and function in patients with CLL.

"We found that we could detect and isolate iNKT cells from individuals with CLL, and that these cells were able to respond to α-GalCer," says Dr Weinkove. "This is important because it suggests that iNKT cells remain functional in these patients, and that targeting them with treatments like α-GalCer might be a way of enhancing their ability to drive anti-cancer immune responses."

Weinkove R, Brooks CR, Carter JM, Hermans IF, Ronchese F (2013) Functional invariant natural killer T cell and CD1d axis in chronic lymphocytic leukemia: implications for immunotherapy. Haematologica, 98:376-84

RESEARCH HIGHLIGHT

'AWAKENING' THE ANTI-TUMOUR IMMUNE RESPONSE

The immune system has all the properties that are required to detect cancer and control its progression. However, the immune system of a cancer patient can co-exist in equilibrium with their cancer for many years, without any signs of immune activation.

"We know that there are dendritic cells in the tumours of patients, but their function is limited," says Professor Franca Ronchese. "We wanted to find out whether we could make a cost-effective treatment that activates the dendritic cells that are already in the tumour, as this would be an easy therapy to use, even in small hospitals."

In an attempt to activate the non-responsive dendritic cells present inside tumours, Professor Ronchese and Dr Sabine Kuhn injected the tumours with compounds known to stimulate an immune response. These included bacterial products, viral products and monosodium urate (MSU) crystals – the causative agent of gouty arthritis.

"We discovered that the combination of MSU and *Mycobacterium smegmatis*, a non-pathogenic relative of the bacteria that cause tuberculosis, enhanced anti-tumour immune responses and delayed tumour growth," says Professor Ronchese. "Furthermore, we showed that simply activating the dendritic cells already present in the tumour was not enough. For this approach to work new dendritic cells need to traffic to the tumour."

"We postulate that combining current cancer treatments such as chemotherapy and radiotherapy, which reduce tumour burden and increase the availability of tumour antigen, with immune activating treatments such as those described here, will increase the likelihood of complete remission for many different cancers."

Kuhn S, Hyde EJ, Yang J, Rich FJ, Harper JL, Kirman JR, Ronchese F (2013) Increased numbers of monocyte-derived dendritic cells during successful tumor immunotherapy with immune-activating agents. J Immunol, 191:1984-92

RESEARCH HIGHLIGHT

A NEW VACCINE APPROACH FOR TREATING BRAIN CANCER

Immunotherapy has been explored as a potential treatment option for brain cancers for some time. Malaghan Institute Clinical Research Fellow Mr Martin Hunn – a Neurosurgeon based at Wellington Hospital – recently led a Phase I clinical trial investigating the feasibility of combining dendritic cell vaccination with temozolomide chemotherapy for the treatment of patients with recurrent glioblastoma multiforme (GBM), an aggressive brain tumour. The outcomes of which are currently being prepared for publication.

The problem however, is that some patients with GBM are so unwell it can be difficult to isolate enough dendritic cells from their blood to prepare a vaccine. Mr Hunn therefore undertook some laboratory-based research in parallel to his clinical work to see if he could simplify the approach by removing the need for dendritic cells to be present in the vaccine.

His research, published in *Clinical Cancer Research*, shows that a vaccine consisting of only tumour cells and the immune-boosting adjuvant α-GalCer is an effective treatment for brain tumours (gliomas) in a mouse model.

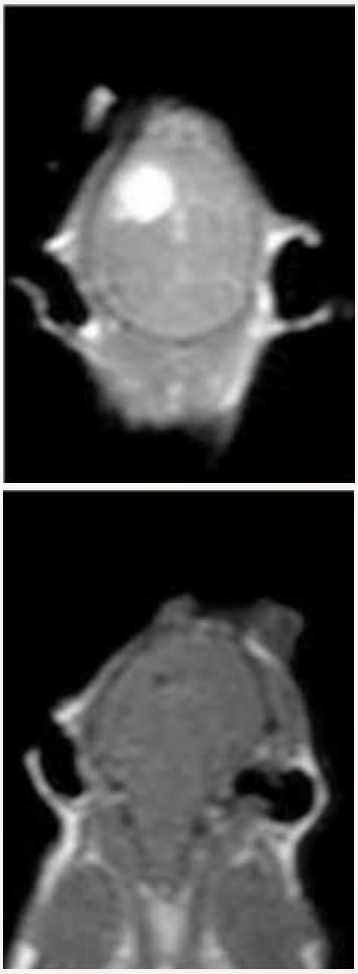
"Our research has shown that we can evoke a tumour-specific, long-lasting immune response that is strong enough to kill glioma tumours by targeting the activation of dendritic cells already present inside the mouse," says Mr Hunn.

"In some instances [see image] we saw the complete disappearance of tumour lesions as detected by magnetic resonance imaging."

"We believe our research has identified a simple vaccine that could be an effective treatment for a group of patients who currently face an extremely poor prognosis," says Mr Hunn.

Hunn MK, Farrand KJ, Broadley KW, Weinkove R, Ferguson P, Miller RJ, Field CS, Petersen T, McConnell MJ, Hermans IF (2012) Vaccination with irradiated tumor cells pulsed with an adjuvant that stimulates NKT cells is an effective treatment for glioma. Clin Cancer Res, 18:6446-59

Immunotherapy is emerging as a promising new approach to cancer treatment, with the potential to change people's lives.



Top image: MRI (magnetic resonance imaging) of a mouse brain, two weeks after receiving the cancer vaccine, showing a large white tumour. The bottom image is the same mouse, two months later.

SWITCHING OFF TUMOUR-PROMOTING IMMUNE CELLS TO DEVELOP NOVEL CANCER THERAPIES

At the Malaghan Institute we see ourselves as part of a wider network of research. We bring our expertise in immunology to partnerships with chemists, geneticists, microbiologists and all manner of other research areas, both here and across the globe.

One important partnership is with Dr Bridget Stocker, now a Senior Lecturer in Bio-medicinal Chemistry at Victoria University of Wellington. Since 2006, Dr Stocker's Immunoglycomics research group has been investigating the role of carbohydrates in controlling immune responses. Her team has developed novel molecular probes and tools that can then be used to understand the role of specific immune cells and enzymes in disease.

In 2012, Dr Stocker was awarded a Sir Charles Hercus Research Fellowship to address the issue of 'deleterious' immune suppressor cells in cancer prognosis and treatment.

"To date, much work in cancer immunotherapy has focused on making good immune cells work stronger and faster," says Dr Stocker. "The activation of certain immune suppressing cells, for example, can have a negative impact on disease progression. If we can remove these cells, or switch them to a more beneficial phenotype, better therapies can be developed. This is a research area that we are uniquely set-up to address."

"By combining our skills in chemistry and immunology, and using assays currently unprecedented in New Zealand, we will develop tailor-made immune modulators that switch 'bad' cells back to 'good'. Due to the selectivity of our approach, we anticipate that our strategies will be compatible with other immunotherapy and chemotherapy regimes." M

Stocker BL, Timmer MS (2013) Chemical tools for studying the biological function of glycolipids. Chembiochem, 14:1164-84 (Invited review)

Stephanie Chee.

Asthma & Allergy

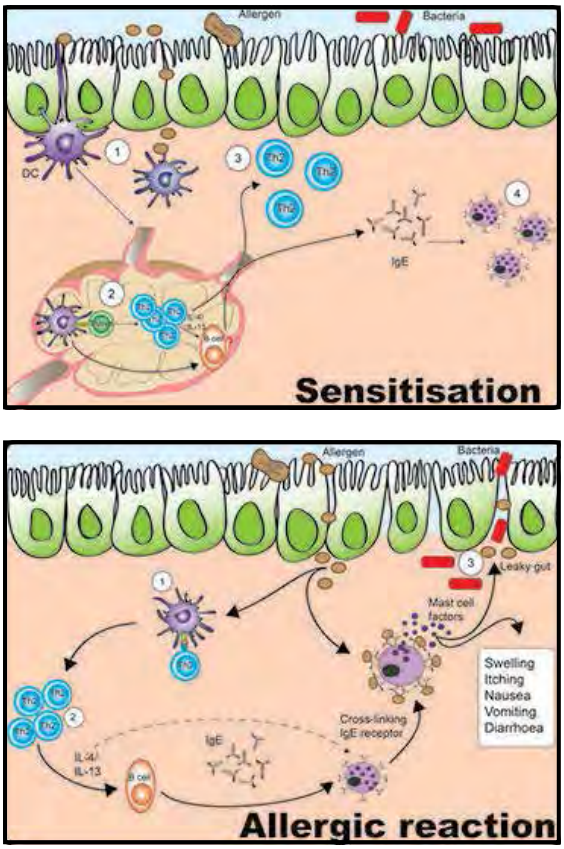
Global trends now identify allergic diseases as having the most important health and economic impact on both the developed and developing world.

Studies have shown that allergic diseases can progress from one form to another – a phenomenon termed the 'allergic march', which now affects 15-30% of children in Western countries. Skin allergy or eczema is usually the first sign of allergic disease in young infants and is often associated with an underlying food allergy. These children are then more likely to go on to develop respiratory allergies, such as asthma and hay fever.

Our inability to identify the causes of the global allergy epidemic is largely a consequence of our limited understanding of the early 'sensitisation' phase of the allergic immune response. It is now recognised that specialised immune cells called dendritic cells (DC) play a central role in this process (see diagram).

Dendritic cells are present in tissues such as the skin, nose, lungs and gut, so are one of the first cell types to encounter potential allergens such as house dust mites, pollens and food proteins. They respond to the allergens by activating naïve T cells to Th2 cells, though little is known about the mechanisms involved. The Th2 cells then proliferate and circulate throughout the body.

On re-encounter with the allergen, the Th2 cells invoke a cascade of events – including IgE antibody production and release of histamine from mast cells – which leads to the itching, swelling and wheezing we associate with an allergic response. The sensitisation phase occurs quite asymptomatically and the affected individual would not be aware that they had been sensitised, until they were exposed to the allergen again.



The key cells and molecules involved in the allergic immune response. The numbers indicate steps within the allergic pathway that our scientists are currently investigating. Image courtesy of Dr Lisa Connor and Dr Elizabeth Forbes-Blom.

Professor Graham Le Gros and Professor Franca Ronchese lead research programmes investigating the molecular and cellular changes that take place during allergic sensitisation, for the development of immunotherapies and vaccines that can be used to control these responses naturally. Dr Jacquie Harper's inflammation research team is also exploring the utility of harnessing the anti-inflammatory properties of New Zealand fruit crops to alleviate inflammation and restore lung function in individuals with chronic asthma. M

PRINCIPAL INVESTIGATORS

Dr Elizabeth Forbes-Blom
Dr Jacquie Harper
Professor Graham Le Gros
Professor Franca Ronchese

RESEARCH HIGHLIGHT

IMMUNE CELL DISCOVERY COULD EXPLAIN CAUSE OF SKIN ALLERGY

A trans-Tasman collaboration between researchers at the Malaghan Institute and the Centenary Institute in Sydney has led to the discovery of a unique type of immune cell, termed ILC2 cells, in the skin. The significance of which is the compelling evidence that these cells can drive the development of allergic skin disease.

Published in the prestigious journal *Nature Immunology*, this research forces a revision in our understanding of how allergic diseases arise.

"We have used the most cutting-edge cell analysis and transgenic reporter gene technologies currently available to identify these skin immune cells," says Professor Graham Le Gros, one of the lead investigators of the research.

"It is through the expertise of Professor Wolfgang Weninger and colleagues at the Centenary Institute, Sydney, Australia's leading dermatology researchers, that it was possible to see how the ILC2 cells move through the skin, what they interact with and for how long," he says. "This has been crucial in allowing us to build up a picture of what these cells are actually doing."

"Critically, we have been able to show that these ILC2 cells have the potential to cause skin allergy in experimental models, through their ability to modify the activities of mast cells. By being able to link this new cell type to skin allergy there is a greater possibility we can now find new ways to both prevent and treat allergic disease."

Roediger B, Kyle R, Ho Yip K, Sumaria N, Guy TV, Kim BS, Mitchell AJ, Tay SS, Jain R, Forbes-Blom E, Chen X, Tong PL, Bolton HA, Artis D, Paul WE, Fazekas de St Groth B, Grimbaldeston MA, Le Gros G, Weninger W (2013) Cutaneous immunosurveillance and regulation of inflammation by group 2 innate lymphoid cells. Nat Immunol, 14:564-73

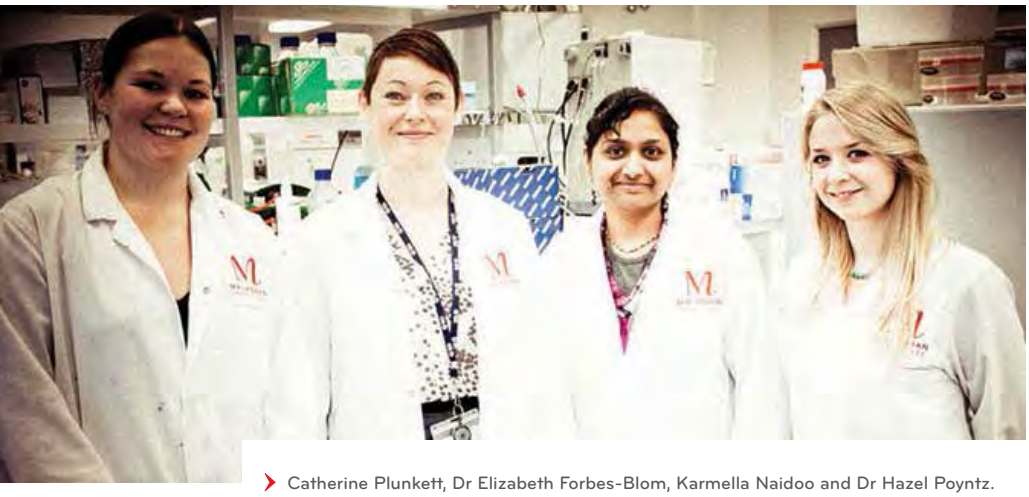
RESEARCH HIGHLIGHT

$6.2 MILLION INVESTMENT TO CURB NEW ZEALAND'S ALLERGY EPIDEMIC

In June 2013, the Health Research Council of New Zealand (HRC) announced their $6.2 million investment into allergy research being undertaken at the Malaghan Institute.

$5 million of the funding was awarded to Professor Graham Le Gros and colleagues over five years, to identify the cellular and molecular mechanisms that cause allergic diseases, and to use this knowledge for the development of improved therapies to treat them. This work is underpinned by that of Professor Franca Ronchese, whose $1.2 million HRC-funded research will focus specifically on the skin, the first line of exposure to potential allergy-causing agents, and dendritic cells, the immune cells that drive the development of the allergic immune response.

"We will use our HRC funding to build on pivotal research discoveries and create a core of allergic disease committed immunologists, molecular biologists, disease modelling experts, clinical specialists and community advisors here in New Zealand, supported by a world leading international scientific network," says Professor Le Gros. "The outcome of which will be the generation of critical knowledge, expertise and technologies to ensure the health and economic wellbeing of New Zealand in the future."



Catherine Plunkett, Dr Elizabeth Forbes-Blom, Karmella Naidoo and Dr Hazel Poyntz.

Gut Inflammation

The gut is normally viewed as a set of organs involved in digestion and water uptake, however, what is underappreciated is the gut's important role as an immunological organ.

The gut mucosa contains more immune cells than all other organs of the immune system combined. It is capable of driving powerful immune responses against invading viruses and pathogenic bacteria, while protecting the 100 trillion gut microbiota that support digestion, metabolism and immunity.

When the gut barrier becomes permeable, by way of disease, lifestyle or for genetic reasons, the internal contents of the gut can start to leak into the bloodstream. Since these components do not belong outside of the gut, the immune system views them as a threat and attacks them. It is these misdirected immune responses against gut bacteria and food proteins that are thought to contribute to the development of several inflammatory diseases including inflammatory bowel disease and food allergy.

Malaghan Institute gastrointestinal allergy and inflammation specialist Dr Elizabeth Forbes-Blom believes that management of the gut immune response is key to a healthy gut. She leads a team of researchers that are using experimental models of gut inflammation to dissect the mechanisms responsible for gut dysfunction.

Taken together these findings will provide therapeutic targets for the prevention and treatment of diseases linked to poor gut health, such as allergy, diabetes, heart disease, obesity and inflammatory bowel disease. Moreover, this research programme will build key basic research capability in an area with significant disease burden, for which we have a paucity of research expertise in New Zealand.

Our gut is our most important immunological organ.

RESEARCH HIGHLIGHT

FOODS FOR HEALTH

In August 2012, Science and Innovation Minister Steven Joyce announced that Malaghan Institute researchers Dr Elizabeth Forbes-Blom and Professor Graham Le Gros would receive $869,282 over two years from the Ministry of Business, Innovation and Employment's 2012 science investment round, to develop immune technologies for anti-allergy ingredients.

Central to this work is a novel food allergy sensitisation model developed by Dr Forbes-Blom, which she is using to reveal for the first time the earliest cellular and molecular events that take place during the development of the allergic immune response in the gut.

"This unique model doubles as a diagnostic tool that we can use to test future food concepts, such as improved infant formulas, to see if they activate the allergic immune response," says Dr Forbes-Blom. "In doing so we can rapidly and effectively screen for food products that have low allergenicity, while at the same time gain a greater understanding about which food proteins are more likely to activate the allergic immune response in susceptible individuals."

These investigations will address an important gap in food allergy research and will have clear application for developing improved hypoallergenic and anti-allergy functional foods from New Zealand's biological resources.

PRINCIPAL INVESTIGATORS

Dr Elizabeth Forbes-Blom
Professor Graham Le Gros

Parasitic Diseases

The role of gastrointestinal helminth parasites in regulating the immune regulatory functions mediated by the gut has become a focus of recent research attention. One interesting trend observed when communities are able to prevent helminth parasitism through improved sanitation, is that the incidence of allergies to harmless environmental allergens progressively begins to rise.

Professor Graham Le Gros and colleagues seek to discover the mechanisms by which helminth parasites can suppress the sensitisation phase of the allergic immune response, with a view to guiding the design of novel therapies for treating both allergic diseases and other chronic inflammatory conditions.

In parallel to this work is a parasitology research programme dedicated to the development of a vaccine against human hookworm infection – one of the great neglected tropical diseases that keeps a billion people worldwide in a state of poor health. Parasitology has a natural link with allergic diseases because they both use the same Th2 immune response pathways.

Since vaccination is currently viewed as the only long-term solution to preventing human hookworm infection, Professor Le Gros' research team has been working hard to identify putative targets both for vaccine design and for testing the vaccine's effectiveness in the field. To do this they are studying immune responses to a harmless rodent model of human hookworm called *Nippostrongylus brasiliensis* and have had their findings and methodologies published in several high impact scientific journals over the past year.

This research represents a significant contribution to the global vaccine initiative against human hookworm that New Zealanders can be proud of.

The immune system is exquisitely designed for defending the body from external infections ranging from the smallest viruses to very large parasitic worms.

PRINCIPAL INVESTIGATOR

Professor Graham Le Gros

RESEARCH HIGHLIGHT

DISSECTING THE Th2 IMMUNE RESPONSES TO NIPPOSTRONGYLUS BRASILIENSIS INFECTION

Of all the microbial infections relevant to mammals the relationship between parasitic worms and what constitutes and regulates a host protective immune response is perhaps the most complex and evolved. *Nippostrongylus brasiliensis* is a tissue migrating parasitic roundworm of rodents. Immune competent hosts respond to infection by *N. brasiliensis* with a rapid and selective development of a profound Th2 immune response that appears able to confer life long protective immunity against reinfection.

"Identification of the processes, cells and cytokines that regulate the Th2 responses to tissue parasites such as *N. brasiliensis* is proving exciting but controversial," says Professor Graham Le Gros. "There are increasing numbers of studies that seek to tease apart the specific components of this fascinating process."

"Our own research has identified the lung as a site of protective immunity against reinfection with *N. brasiliensis*," says Professor Le Gros. "Using the latest gene knockout and reporter mice technologies, we have been able to undertake a careful and thorough investigation of the cellular and molecular cues stimulated by the parasite to coordinate these Th2 immune responses."

The above research is summarised in context of what is known internationally in an invited review for *Frontiers in Immunology*.

Harvie M, Camberis M, Le Gros G (2013) Development of CD4 T cell dependent immunity against N. brasiliensis infection. Front Immunol, 4:74 (Invited review)

Arthritis & Inflammation

Recently there has been a significant escalation in inflammation-related conditions associated with the rise in obesity in developed countries. These conditions include gouty arthritis, Type II diabetes, and cardiovascular disease – commonly grouped under the term 'metabolic syndrome'.

A common feature of metabolic syndrome is high levels of uric acid in the blood (hyperuricaemia). Dr Jacquie Harper's Arthritis and Inflammation Research Group is looking at the differential effects of the crystalline and soluble forms of uric acid on human and murine immune cell function, to expand our understanding of the multifaceted role played by uric acid in the regulation of inflammation in disease.

Hyperuricaemia is regarded as a primary risk factor for gout, an intensely painful form of arthritis affecting many New Zealanders. A gout attack is triggered when uric acid crystallises in the joints, causing rapid and painful joint inflammation. Previous research from Dr Harper's team, collaborating with Wellington Rheumatologists Professor Andrew Harrison and Dr Rebecca Grainger, showed that hyperuricaemia may moderate the immune responses to inflammatory stimuli. Dr Harper is now examining this phenomenon more closely in a follow-up clinical study involving gout patients, in collaboration with Christchurch Rheumatologist Associate Professor Lisa Stamp and Professor Tony Kettle.

Hyperuricaemia is also observed in obesity. Research to date has focused on the inflammatory environment in adipose tissue and there is little information available on how diet-driven obesity affects other immune cell populations. To address this question, Dr Harper and colleagues are collaborating with Auckland Rheumatologist Associate Professor Nicola Dalbeth, to investigate how hyperuricaemia alters the inflammatory immune responses of obese and non-obese mice.

In other research, Dr Harper and colleagues are working with Dr Roger Hurst from Plant & Food Research to explore the feasibility of utilising the natural anti-inflammatory properties of New Zealand fruit crops to treat lung inflammation. Their basic research results have shown such great promise that candidate fruit extracts are now being trialled in asthma patients, in collaboration with Professor Richard Beasley from the Medical Research Institute of New Zealand.

Collectively these studies are providing important insights into new potential therapeutic options for the improved management of inflammatory diseases.

Lisa Shaw.

PRINCIPAL INVESTIGATOR
Dr Jacquie Harper

Inflammation is a common underlying feature of numerous diseases; including – arthritis, Type II diabetes and cardiovascular disease.

RESEARCH HIGHLIGHT

CELLULAR 'CANNIBALISM' – A NEW TARGET IN THE FIGHT AGAINST GOUT?

Neutrophils are one of the first inflammatory cells to respond to the uric acid crystals that trigger inflammation in gout. Previously thought to be primarily responsible for driving gout attacks, PhD student Stefanie Steiger has now shown that neutrophils could also be part of a cure – once they start 'eating' each other that is!

"We have known for some time that the spontaneous resolution of gout inflammation is associated with elevated levels of a protein called TGF-β1 in the synovial fluid of the affected joint," says Dr Jacquie Harper. "This protein is produced by many different cells, we were surprised to discover that neutrophils can produce it too."

Using a laboratory model of gout, Ms Steiger and Dr Harper showed that on contact with gout crystals, neutrophils release reactive oxygen species, and then die off. The dead neutrophils are then cleared by other neutrophils. This triggers the cells to produce TGF-β1, which shuts down inflammation.

"Our research has revealed a novel mechanism that contributes to the controlled resolution of gout," says Dr Harper. "We are now exploring different ways to target neutrophil 'cannibalism' in the joints, so we can switch off inflammation at the very early stages of a gout attack, thus minimising the pain it causes."

Steiger S, Harper JL (2013) Neutrophil cannibalism triggers transforming growth factor β1 production and self regulation of neutrophil inflammatory function in monosodium urate monohydrate crystal-induced inflammation in mice. Arthritis Rheum, 65:815-23

RESEARCH HIGHLIGHT

GOUT – A CLINICAL STUDY

Dr Jacquie Harper's team has shown previously that non-inflammatory monocytes recruited by the deposition of uric acid crystals in the joints, can develop into proinflammatory macrophages that exacerbate inflammation.

Monocyte trafficking is controlled by the chemokine CCL2. In collaboration with Wellington Rheumatologists Dr Rebecca Grainger and Professor Andrew Harrison, Dr Harper undertook a clinical study to investigate the effect of hyperuricaemia on the levels of serum CCL2 and circulating blood monocytes in people with gout.

Whole blood was collected from subjects with a history of acute or chronic gout but not currently experiencing an attack of gout, subjects with asymptomatic hyperuricaemia and healthy individuals with normal uric acid levels.

"We found that individuals with gout and asymptomatic hyperuricaemia had higher serum levels of CCL2 and showed an increase in the percentage of circulating monocytes compared with healthy controls," says Dr Harper.

"These findings indicate an important role for serum uric acid in the modulation of monocyte trafficking and function, and may be of particular importance in acute gout attacks, as well as other metabolic diseases such as cardiovascular disease, where monocytes are known to play an important role."

Grainger R, McLaughlin RJ, Harrison AA, Harper JL (2013) Hyperuricaemia elevates circulating CCL2 levels and primes monocyte trafficking in subjects with inter-critical gout. Rheumatology (Oxford), 52:1018-21

Multiple Sclerosis

Multiple sclerosis (MS) is a chronic inflammatory disease of the central nervous system. It is characterised by immune-mediated nerve degeneration, leading to impaired vision, coordination and paralysis. There is no cure, and while disease-modifying drugs are available, they are often effective in only a subset of individuals with MS.

Malaghan Institute Research Associate Dr Anne La Flamme, an Associate Professor in the School of Biological Sciences at Victoria University of Wellington, leads a research programme investigating different strategies for optimising currently available MS treatments, as well as the development of novel agents for future therapies.

One commonly prescribed agent is glatiramer acetate (GA, also known as Copaxone), which is used to treat relapsing-remitting MS. Recent work by Malaghan researchers and other MS research groups using murine models of MS, has shown that GA alters the activation state of monocytes, a type of white blood cell; and of microglia, a related immune cell found in the brain.

In collaboration with Dr Scott Harding and Dr David Abernathy from Wellington Hospital, PhD student Dr Delgersetseg Chuluundorj undertook a detailed analysis of the physiological effects of GA on the activation of monocytes from patients with MS, and from healthy volunteers. This information will help form the basis of a model that could be used to predict if a patient will respond to GA treatment.

Intravenous gammaglobulin is another immune-modifying therapy used to treat MS, albeit with limited success. Interestingly, Dr Chulunndorj's studies showed that many, but not all of the effects of intravenous gammaglobulin on monocyte activation were similar to those induced by GA. Moreover, she found that the two compounds worked well together. This finding has positive implications for patients who do not respond to either agent alone.

Complementing this work is that of Dr Jacquie Harper, who has continued immunosuppression research started by Associate Professor Thomas Bäckström, as part of her greater Arthritis and Inflammation research programme.

Collectively this research is providing significant insight into the aberrant immune responses that lead to MS, and the development of novel therapeutic treatments that can be used to delay or prevent its progression.

Multiple sclerosis affects 3,500 New Zealand families.

PRINCIPAL INVESTIGATORS

Dr Jacquie Harper
Associate Professor Anne La Flamme

Sarrabeth Stone.

RESEARCH HIGHLIGHT

MACROPHAGES – KEY MEDIATORS OF INFLAMMATION

Macrophages are multifunctional immune cells and are key mediators of the inflammatory process. As such, these cells are a significant focus of Associate Professor Anne La Flamme's MS research.

Macrophages can become activated by a variety of different products and signals. The type of activation signal they receive determines whether the macrophages release pro-inflammatory (Th1) or anti-inflammatory (Th2) mediators.

"Our previous work has shown that the type II activation state of macrophages is protective in experimental MS models, and this protection is dependent upon the Th2 cytokine IL-4," says Associate Professor La Flamme. "However, it was unknown how the Th2 environment promoted by type II activated macrophages is induced or how it affects macrophage function."

To address this question, Associate Professor La Flamme investigated if and how signalling through the major Th2 cytokine receptor IL-4Rα affected type II macrophage activation.

"Overall, our results are the first to indicate that type II activation induces production of low but significant levels of IL-4 by macrophages and that this production is common to all type II-inducing agents tested," says Associate Professor La Flamme. "This IL-4 in turn may play an important role in shaping adaptive immune responses and Th2 response development."

This work thus reveals another mechanism by which innate cells may direct and shape adaptive responses and opens up a new target for therapies designed to regulate the dysfunctional immune responses observed in diseases such as MS.

La Flamme AC, Kharkrang M, Stone S, Mirmoeini S, Chuluundorj D, Kyle R (2012) Type II-activated murine macrophages produce IL-4. PLoS ONE, 7:e46989

RESEARCH HIGHLIGHT

RESCUING SUPPRESSOR IMMUNE CELL FUNCTION FOR THE TREATMENT OF MS

Monocytes are a type of white blood cell that move quickly to sites of infection to stimulate inflammatory responses. They are also capable of suppressing inflammation in certain disease contexts.

Previously our researchers had demonstrated that the ability of blood monocytes to suppress inflammation and thus protect against the development of autoimmunity, is impaired in a murine model of human multiple sclerosis.

Their latest research now suggests that the solution to reactivating the suppressor function of these monocytes could lie in a modified superantigen, coupled to a myelin-derived peptide (MOG). This conjugate has been shown to alleviate the symptoms of disease in experimental models, however the mechanism of protection was unknown at the time.

"Our research has revealed that the reduced disease-mediating T cell activity observed in experimental MS models following treatment with the superantigen conjugate, correlates with a restoration of blood monocyte suppressor function," says Dr Jacquie Harper. "Importantly, when we transferred blood monocytes isolated from conjugate-treated mice into naïve mice, the cells were able to protect the recipient mice from developing MS symptoms. This is significant because it suggests that the effects we observe with the superantigen conjugate can be traced back to a change in monocyte function."

"This research has identified a new therapeutic approach that has the potential to control the inappropriate inflammation that occurs in autoimmune diseases such as MS."

Slaney CY, Toker A, Fraser JD, Harper JL, Bäckström BT (2013) A modified superantigen rescues Ly6G-CD11b+ blood monocyte suppressor function and suppresses antigen-specific inflammation in EAE. Autoimmunity, 46:269-78

› Dr Lindsay Ancelet.

Publications

2012

Ancelet LR, Aldwell FE, Rich FJ, Kirman JR (2012) Oral vaccination with lipid-formulated BCG induces a long-lived, multifunctional CD4+ T cell memory immune response. **PLoS One**, 7:e45888

Ancelet L, Rich FJ, Delahunt B, Kirman JR (2012) Dissecting memory T cell responses to TB: Concerns using adoptive transfer into immunodeficient mice. **Tuberculosis (Edinb)**, 92:422-33

Dickgreber N, Farrand KJ, van Panhuys N, Knight DA, McKee SJ, Chong ML, Miranda-Hernandez S, Baxter AG, Locksley RM, Le Gros G, Hermans IF (2012) Immature NKT cells pass through a stage of developmentally programmed innate IL-4 secretion. **J Leukoc Biol**, 92:999-1009

Herbst T, Esser J, Prati M, Kulagin M, Stettler R, Zaiss MM, Hewitson JP, Merky P, Verbeek JS, Bourquin C, Camberis M, Prout M, Maizels RM, Le Gros G, Harris NL (2012) Antibodies and IL-3 support helminth-induced basophil expansion. **Proc Natl Acad Sci USA**, 109:14954-9

Hunn MK, Farrand KJ, Broadley KW, Weinkove R, Ferguson P, Miller RJ, Field CS, Petersen T, McConnell MJ, Hermans IF (2012) Vaccination with irradiated tumor cells pulsed with an adjuvant that stimulates NKT cells is an effective treatment for glioma. **Clin Cancer Res**, 18:6446-59

Kanakkanthara A, Rawson P, Northcote PT, Miller JH (2012) Acquired resistance to peloruside A and laulimalide is associated with downregulation of vimentin in human ovarian carcinoma cells. **Pharm Res**, 29:3022-32

La Flamme AC, Kharkrang M, Stone S, Mirmoeini S, Chuluundorj D, Kyle R (2012) Type II-activated murine macrophages produce IL-4. **PLoS One**, 7:e46989

Lim SN, Kuhn S, Hyde E, Ronchese F (2012) Combined TLR stimulation with Pam3Cys and Poly I:C enhances Flt3-ligand dendritic cell activation for tumor immunotherapy. **J Immunother**, 35:670-9

Liu X, Chia E, Shaw OM, Martin WJ, Harper JL (2012) Rapid CCL2 release by membrane stromal cells initiates MSU crystal-induced monocyte recruitment in a peritoneal model of gouty inflammation. **Eur J Inflamm**, 10:165-74

Ma Z-I, Lim SN, Qin JS, Yang J, Enomoto N, Ruedl C, Ronchese F (2012) Murine CD4+ T cell responses are inhibited by cytotoxic T cell-mediated killing of dendritic cells and are restored by antigen transfer. **PLoS One**, 7:e37481

Ma Z-I, Yang J, Qin JS, Richter A, Perret R, El-Deiry WS, Finnberg N, Ronchese F (2012) Inefficient boosting of antitumour CD8(+) T cells by dendritic-cell vaccines is rescued by restricting T cell cytotoxic functions. **Oncoimmunology**, 1:1507-16

Parker S, La Flamme A, Salinas I (2012) The ontogeny of New Zealand groper (*Polyprion oxygeneios*) lymphoid organs and IgM. **Dev Comp Immunol**, 38:215-23

Paterson DB, Poonam P, Bennett NC, Peszynski RI, Van Beekhuizen MJ, Jasperse ML, Herst PM (2012) Randomized intra-patient controlled trial of mepilex lite dressings versus aqueous cream in managing radiation-induced skin reactions post-mastectomy. **J Cancer Sci Ther**, 4:347-56

Rawson P, Stockum C, Peng L, Manivannan B, Lehnert K, Ward HE, Berry SD, Davis SR, Snell RG, McLauchlan D, Jordan TW (2012) Metabolic proteomics of the liver and mammary gland during lactation. **J Proteomics**, 75:4429-35

Rich FJ, Kuhn S, Hyde EJ, Harper JL, Ronchese F, Kirman JR (2012) Induction of T cell responses and recruitment of an inflammatory dendritic cell subset following tumour immunotherapy with *Mycobacterium smegmatis*. **Cancer Immunol Immunother**, 61:2333-42

Robinson M, McConnell MJ, Le Gros G (2012) How epigenetic imprinting contributes to stabilizing the Th2 phenotype. **Immunol Cell Biol**, 90:917-8

Sauvageau J, Foster AJ, Khan AA, Chee SH, Sims IM, Timmer MSM, Stocker BL (2012) Synthesis and biological activity of the LTA glycolipid anchor from *Streptococcus sp. DSM 8747*. **Chembiochem**, 13:2416-24

Smit AM, Strabala TJ, Peng L, Rawson P, Lloyd-Jones G, Jordan TW (2012) Proteomic phenotyping of *Novosphingobium nitrogenifigens* reveals a robust capacity for simultaneous nitrogen fixation, polyhydroxyalkanoate production, and resistance to reactive oxygen species. **Appl Environ Microbiol**, 78:4802-15

Williams JM, Young P, Pilcher J, Weatherall M, Miller JH, Beasley R, La Flamme AC (2012) Remote ischaemic preconditioning does not alter perioperative cytokine production in high-risk cardiac surgery. **Heart Asia**, 4:97-101

2013

Ataera H, Simkins HM, Hyde E, Yang J, Hermans IF, Petersen TR, Ronchese F The control of CD8+ T cell responses is preserved in perforin-deficient mice and released by depletion of CD4+ CD25+ regulatory T cells. **J Leukoc Biol**, (in press)

Brooks CR, van Dalen CJ, Hermans IF, Douwes J (2013) Identifying leukocyte populations in fresh and cryopreserved sputum using flow cytometry. **Cytometry B Clin Cytom**, 84:104-13

Camberis M, Prout M, Tang SC, Forbes-Blom E, Robinson M, Kyle R, Belkaid Y, Paul W, Le Gros G (2013) Evaluating the *in vivo* Th2 priming potential among common allergens. **J Immunol Methods**, 394:62-72

Corkran HM, Munneke S, Dangerfield EM, Stocker BL, Timmer MSM Applications and limitations of the I^2-mediated carbamate annulation for the synthesis of piperidines: 5- versus 6-membered cyclisation. **J Org Chem**, (in press)

Ferguson PM, Feindel KW, Slocombe A, MacKay M, Wignall T, Delahunt B, Tilley RD, Hermans IF (2013) Strongly magnetic iron nanoparticles improve the diagnosis of small tumours in the reticuloendothelial system by magnetic resonance imaging. **PLoS One**, 8:e56572

Ferguson PM, Slocombe A, Tilley RD, Hermans IF (2013) Using magnetic resonance imaging to evaluate dendritic cell-based vaccination. **PLoS One**, 8:e65318

Grainger R, McLaughlin RJ, Harrison AA, Harper JL (2013) Hyperuricaemia elevates circulating CCL2 levels and primes monocyte trafficking in subjects with inter-critical gout. **Rheumatology (Oxford)**, 52:1018-21

Grasso C, Larsen L, McConnell M, Smith RA, Berridge MV (2013) Anti-leukemic activity of ubiquinone-based compounds targeting trans-plasma membrane electron transport. **J Med Chem**, 56:3168-76

Harvie M, Camberis M, Le Gros G (2013) Development of CD4 T cell dependent immunity against *N. brasiliensis* infection. **Front Immunol**, 4:74

Herst PM, Berridge MV (2013) Cell hierarchy, metabolic flexibility and systems approaches to cancer treatment. **Curr Pharm Biotechnol**, 14:289-99

Hunn MK, Hermans IF (2013) Exploiting invariant NKT cells to promote T cell responses to cancer vaccines. **Oncoimmunology**, 2:e23789

Johnston LR, Larsen PD, La Flamme AC, Harding SA (2013) Methodological considerations for the assessment of ADP induced platelet aggregation using the Multiplate® analyser. **Platelets**, 24:303-7

Johnston LR, Larsen PD, La Flamme AC, Michel JM, Harding SA (2013) Suboptimal response to clopidogrel and the effect of prasugrel in acute coronary syndromes. **Int J Cardiol**, 167:995-9

Khan AA, Kamena F, Timmer MSM, Stocker BL (2013) Development of a benzophenone and alkyne functionalised trehalose probe to study trehalose dimycolate binding proteins. **Org Biomol Chem**, 11:881-5

Kuhn S, Hyde EJ, Yang J, Rich FJ, Harper JL, Kirman JR, Ronchese F Increased numbers of monocyte-derived dendritic cells during successful tumor immunotherapy with immune-activating agents. **J Immunol**, (in press)

Prendergast KA, Kirman JR (2013) Dendritic cell subsets in mycobacterial infection: control of bacterial growth and T cell responses. **Tuberculosis (Edinb)**, 93:115-22

Roediger B, Kyle R, Ho Yip K, Sumaria N, Guy TV, Kim BS, Mitchell AJ, Tay SS, Jain R, Forbes-Blom E, Chen X, Tong PL, Bolton HA, Artis D, Paul WE, Fazekas de St Groth B, Grimbaldeston MA, Le Gros G, Weninger W (2013) Cutaneous immunosurveillance and regulation of inflammation by group 2 innate lymphoid cells. **Nat Immunol,** 14:564-73

Roohullah A, Moniwa A, Wood C, Humble M, Balm M, Carter J, Weinkove R Imipenem versus piperacillin/tazobactam for empiric treatment of febrile neutropenia in adults. **Intern Med J**, (in press)

Shaw OM, Harper JL An efficient single prime protocol for the induction of antigen-induced airways inflammation. **J Immunol Methods**, (in press)

Slaney CY, Toker A, Fraser JD, Harper JL, Bäckström BT (2013) A modified superantigen rescues Ly6G-CD11b+ blood monocyte suppressor function and suppresses antigen-specific inflammation in EAE. **Autoimmunity**, 46:269-78

Steiger S, Harper JL (2013) Neutrophil cannibalism triggers transforming growth factor β1 production and self-regulation of neutrophil inflammatory function in monosodium urate monohydrate crystal-induced inflammation in mice. **Arthritis Rheum**, 65:815-23

Stocker BL, Jongkees SA, Win-Mason AL, Dangerfield EM, Withers SG, Timmer MS (2013) The 'mirror-image' postulate as a guide to the selection and evaluation of pyrrolidines as α-L-fucosidase inhibitors. **Carbohydrate Res**, 367:29-32

Stocker BL, Timmer MS (2013) Chemical tools for studying the biological function of glycolipids. **Chembiochem**, 14:1164-84

Stocker BL, Timmer MS Trehalose diesters, lipoteichoic acids and α-GalCer: using chemistry to understand immunology. **Carbohydrate Res**, (in press)

van Panhuys N, Camberis M, Yamada M, Tegoshi T, Arizono N, Le Gros G (2013) Mucosal trapping and degradation of *Nippostrongylus brasiliensis* occurs in the absence of STAT6. **Parasitology**, 140:833-43

Weinkove R, Brooks CR, Carter JM, Hermans IF, Ronchese F (2013) Functional invariant natural killer T cell and CD1d axis in chronic lymphocytic leukemia: implications for immunotherapy. **Haematologica**, 98:376-84

Weinkove R, Brooks C, Carter JM, Hermans IF, Ronchese F Efficient depletion of chronic lymphocytic leukemia B cells using serial rounds of immunomagnetic depletion. **J Immunol Methods**, (in press)

Weinkove R, Clay J, Wood C (2013) Temperature management in haematology patients with febrile neutropenia: a practice survey. **NZ Med J**, 126:62-73

Weinkove R, Dickson M, Eliadou E, Stace NH, Goossens L, Ferguson P Fever and pancytopenia in a patient with Crohn's disease. **Gut**, (in press)

Full details of all 'in press' publications will appear in the 2014 Annual Report.

PATENTS GRANTED IN 2012 – 2013

Painter GF, Johnston K, Anderson RJ, Compton BJ, Hayman CM, Hermans IF, Larsen DS (2013) Sphingoglycolipid Analogues. NZ611741

Painter GF, Anderson RJ, Compton BJ, Hayman CM, Hermans IF, Larsen DS (2012) Conjugate Compounds. NZ604085

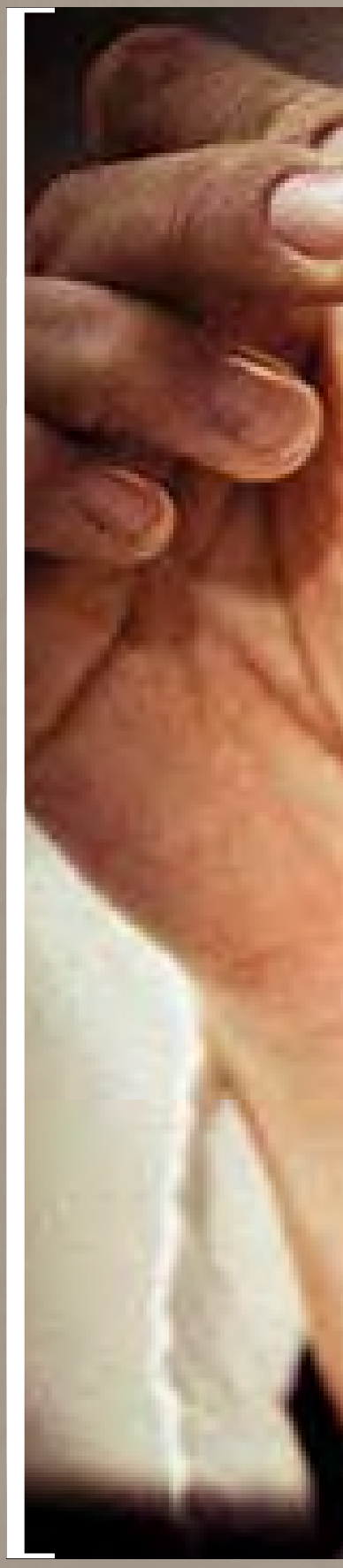
Painter GF, Anderson RJ, Compton BJ, Hayman CM, Hermans IF, Larsen DS (2012) Organic Compounds. NZ601473

Financial Report

The Malaghan Institute is an independent charitable trust with tax-exempt status.

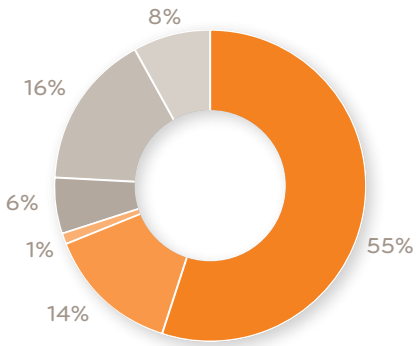
With no host organisation or direct government funding, we rely on fully-costed grants and public donations to support our research programmes.

The Trust Board provides the Institute with strategic guidance and oversight, while the management of the Institute is overseen by Director Professor Graham Le Gros.



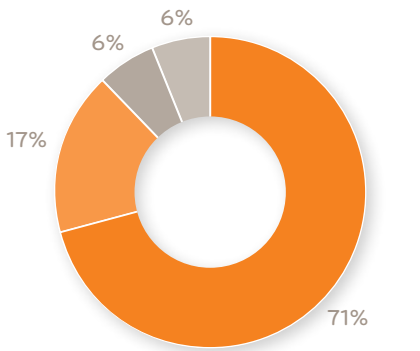
Dr Melanie McConnell.

Financial Overview



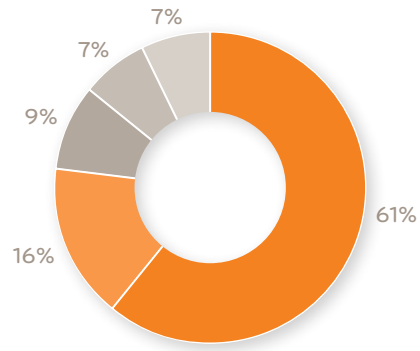
INCOME

	Contestable Grants – Government
	Contestable Grants – Non-Government
	Other Funding
	Donations
	Bequests
	Investment Income



EXPENDITURE

	Science
	Laboratory Support
	Development & Communications
	Administration



STAFF NUMBERS – HEADCOUNT

	Science
	Science Students
	Laboratory Support
	Development & Communications
	Administration

Financial Overview For the Year Ended 31 July	2013 CONSOLIDATED	2012 CONSOLIDATED
Income – Operating		
Donations	596,657	461,837
Scientific Grants	6,945,144	6,728,551
Sundry	302,585	261,209
	7,844,386	**7,451,597**
Expenses – Operating		
Salaries	4,062,725	3,984,960
Science & Laboratory Support	3,420,956	3,411,190
Other	200,891	255,876
	7,684,572	**7,652,026**
Operating Surplus (Deficit)	**159,814**	**(200,429)**
Depreciation	(449,804)	(453,018)
Grant Income	133,008	515,600
Net (Deficit)	**(156,982)**	**(137,847)**
Income – Other		
Capital Endowment Fund – Investment Income	628,368	264,462
Capital Endowment Fund – Bequests	1,557,675	415,895
Net Income Capital Endowment Fund	**2,186,043**	**680,357**

Financial Overview As at 31 July	2013 CONSOLIDATED	2012 CONSOLIDATED
Current Assets	3,739,274	4,049,456
Current Liabilities	(3,712,321)	(4,367,405)
Working Capital	**26,953**	**(317,949)**
Fixed Assets	1,329,117	1,478,581
Investments	7,260,468	5,426,845
Total Equity	**$ 8,616,538**	**$ 6,587,477**

Hugh Green pictured with Hugh Green Flow Cytometry Fellow Kylie Price, February 2011.

Hugh Green Foundation

ACKNOWLEDGING THE SUPPORT OF AN INSPIRATIONAL MAN – HUGH GREEN

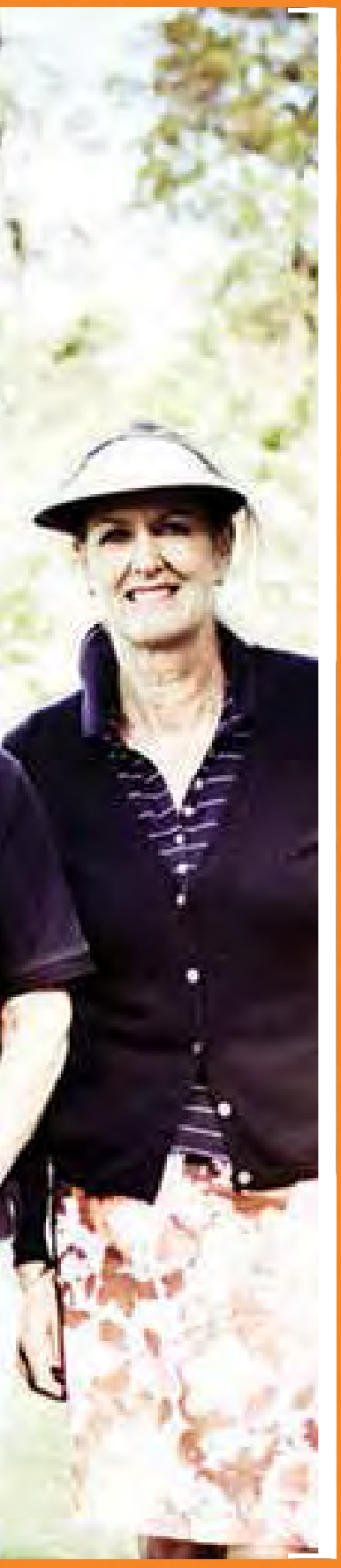
Hugh Green was one of seven laureates this year to be inducted into the Fairfax Media New Zealand Business Hall of Fame. He joins the Institute's namesake, Mr Len Malaghan, who was inducted in 2007.

Hugh's innate entrepreneurialism, determination, hard work and generosity are an inspiration to us all – none more so than to Hugh Green Flow Cytometry Fellow Kylie Price, who manages the Malaghan Institute's Cell Technology Suite.

Since 2011, the Hugh Green Foundation has supported Kylie in maintaining the cell sorting technological platforms and infrastructure that underpin all our research programmes. Kylie was privileged to spend time with Hugh on several occasions prior to his death in 2012, and is committed, in Hugh's name, to fulfilling her vision for the Institute's Cell Technology Suite as a supportive hub of expertise and technology for all New Zealand science and health researchers.

Hugh achieved wonderful things in his lifetime, as recognised by the New Zealand Business Hall of Fame, and we feel honoured to have been touched by his spirit and generosity.

› Hawkes Bay Friends Golf Tournament 2012.



Community Engagement

Support from the community underpins the Malaghan Institute of Medical Research and we are extremely grateful to have a wonderful network of donors, sponsors and volunteers who work tirelessly to ensure our research can continue.

This support enables us to remain independent and allows us to follow a journey of discovery that is dictated by research and hope; a hope that all our supporters share in.

Fundraising Highlights

RUNNING FOR FUN, RUNNING FOR GOOD AND... RUNNING FOR RESEARCH!

Sunday 17 February 2013 marked our second year as the Official Charity Partner of the iconic Wellington event AMI Round the Bays, and our third and most successful Run for Research to date.

Despite some drizzle for those who started early for the half marathon, spirits were high at the sell-out event and the atmosphere was one of excitement, anticipation and community spirit. The Malaghan Institute Run for Research brought together people of all ages, from all walks of life and fitness levels, however a uniting feature was their motivation to get behind a great cause and support our research. Thanks to everyone who got behind the Run for Research, over an incredible $40,000 was raised!

The Run for Research received some great promotion through a fantastic looking Run for Research branded Lexus RX SUV that was out on the streets of Wellington, thanks to Lexus of Wellington and Z Energy. It also received backing from the Malaghan Ambassadors; world-renowned runner Melissa Moon, Newstalk ZB radio DJ Jason Pine and sports reporter and athlete Meghan Mutrie.

It is thanks to our ongoing partnership with AMI Insurance and Sport Wellington that we have this valuable opportunity to connect with the community and to raise awareness of the Malaghan Institute, while providing a way for people to make a difference by fundraising in support of our research. We are humbled by the enthusiasm and dedication of the individuals and teams who took part in the Run for Research, and the support of those in the community who donated. Thank you to everyone involved in making the 2013 Run for Research such a great success!

Island Bay mother of five, Sarah Christie (L), who eight weeks after a scary run in with a 1.2 kg malignant ovarian tumour used the Run for Research as a chance to get back into running and support research into diseases including cancer.

"Every step brings us closer to a cure"

- As the Official Charity Partner of AMI Round the Bays we were able to get our message out to a record crowd of over 13,000 participants.
- In total, over $40,000 was raised to support our research programmes.
- This was thanks to more than 250 wonderful people who ran or walked as part of the Run for Research, their sponsors, and over 160 people who took part via Limited Run for Research Entries.
- Malaghan Ambassadors included Radio DJ Jason Pine, world-renowned runner Melissa Moon and sports reporter Meghan Mutrie.

A family affair

One of the many teams who supported the Run for Research was a large family of 28, 'Team Politi', who raised over $2,000 through their online fundraising page. It was a family affair for a very good reason; "We have all heard of friends, distant family members, people you know or went to school with being hit by cancer, some with good outcomes and others losing the battle. But when it hits closer to home, like our beloved family member who has recently been diagnosed with a highly aggressive brain tumour (GBM) we want to find a cure." M

JOIN US IN 2014!

There are many ways that you can support the Run for Research:

- Participate and fundraise as an individual, family, group of friends or corporate team
- Sponsor someone taking part
- Volunteer

For more information contact: Victoria Hale, Marketing & Relationship Manager, 04 4996914 ext. 821 / vhale@malaghan.org.nz

Some of the 28 strong Team Politi Running for Research.

SAHARA CHARITY CHALLENGE APRIL 2013

A broken neck and a hamstring ripped from the bone could be seen as rather large hurdles when it comes to a 243 km run across the Sahara Desert. But Greig Rightford and Willie Tokona (Wellington Personal Trainers) are as tough as teak and not only did they soldier on to the 2013 Marathon of the Sands, they finished in the top 100 of 1300 runners.

Throughout the 18 month lead up and the event itself, Greig and Willie raised $30,000 for the Malaghan Institute. "We thought that it would be great to represent an organisation that has a positive impact in the Wellington community and after reviewing several charities, we agreed on the Malaghan Institute. It had the appeal of being a local organisation with global implications," says Greig.

Their main driver was the personal challenge of how to handle the physical and mental challenge of competing in such an event, no less important motivation to them was providing inspiration to clients, friends and family – that ordinary people can achieve extraordinary things – with the right attitude, planning and preparation.

What an amazing and inspirational effort by two inspirational men, thank you Greig and Willie. M

Greig Rightford and Willie Tokona.

Friends of the Malaghan Institute

The Malaghan Institute is very fortunate to have the support of five regional volunteer Friends committees. These wonderful people work extremely hard on our behalf, not only to raise funds for our work, but also to raise overall awareness of the Malaghan Institute. Our sincere thanks go to these amazing people who give their time to our cause.

AUCKLAND COMMITTEE

Matthew Malaghan (Chair)
Margaret Malaghan
Lindsay Bradfield
Mary Collow
Trudi Gardner
Elaine Haggitt
Alison McKenzie
Deborah Malaghan
Jane Parlane
Raewyn Roberts
Julie Sobiecki
Greg Shepherd

HAWKES BAY COMMITTEE

David Mossman (President)
Denise Bull (Chair)
Margie Dick
Beth Kay
Bry Mossman
Andy Neilson
Rosemary O'Connor
Jan Paterson
Kathy Rittson-Thomas
Bruce Speedy
Lynn Spence
John Stovell
Terry Thornton
Graeme Wedd

TAUPO COMMITTEE

Anne Velvin (Chair)
Merryn Herrick
Caroline Martin
Kathryn Uvhagen
Rick Whitlock
Adele Wilson
Doug Wilson

WELLINGTON COMMITTEE

Fiona Matthews (Chair)
Susan Laurenson
Adrienne Bushell
Maureen Cameron
Kelly Falconer
Eleanor Harford
Jennie Johnstone
Jill Kinloch
Emma Lawler
Fleur Stewart
Denise Udy

We look forward to working with the Wairarapa Committee in the year ahead.


10263
40309
10249


Tip Top


Faith & Keith Taylor
New Zealand Community Trust


21660

Funding Sources

Thank you to the following individuals, organisations, businesses, trusts and foundations who helped support the Malaghan Institute from 1 August 2012 – 31 July 2013.

Grants, Trusts and Foundations

AgResearch Ltd, Hamilton
Arthur N Button Charitable Trust
BEA Trust
Cancer Society of NZ (National Body and Wellington Division)
Cuesports Foundation Limited
EM Pharazyn Charitable Trust
FH Muter Charitable Trust
Genisis Oncology Trust
Harvard University
Health Research Council of New Zealand
Hugh Green Foundation
Infinity Foundation Limited
Jennifer Smith Family Trust
Just Paterson Real Estate
Keith Seagar Research Fund
Margaret Neave Charitable Trust
Ministry of Business, Innovation and Employment (MBIE)
Maurice & Phyllis Paykel Trust
New Zealand Lottery Grants Board – Health Research
Ngahina Trust
Rex & Betty Cocker Foundation
Roy & Joan Watson Trust
SE Leuchars Family Trust
Stella Daniell Family Trust
The Dr Marjorie Barclay Trust
The Foundation for Research, Science and Technology (FRST)
The Great New Zealand Trek Charitable Trust Inc.
The Johnson Charitable Trust
The Margaret Ann Tibbles Charitable Trust
The Nick Lingard Foundation
The Paddy Brow Charitable Trust
The Royal Society of New Zealand Marsden Fund
The Southern Trust
The Thompson Family Foundation, Inc.
University of Otago
Victoria University of Wellington
Wellington Medical Research Foundation

Bequests

The following people generously left bequests to the Institute:
Dr Ngaire Adcock
Vernon Spencer Avery
Irene Annie Burkitt
James Baird
BEARD 42 Charitable Trust
Dorothy Bulmer
W A Clark
Amy Dora Davidson
Denise Dellabarca
Alan McLean Duncan
EF Haslam
Peter John Heatherington
Fay Joan Hindmarsh
MM Kilner
M W Margaret Lythgoe
Yvonne Patricia McKenzie
Desley Mackey
Edward Morgan
AM Pears
Mary Rei Preston-Thomas
Lalla Mary Price
Ruth Gordon Shannon
B B Stoker

In Memoriam

Donations were received in memory of the following people:
Gerhard Bachler
James Baird
Margaret Grace Buddicom
Graeme Butcher
Evelyn May Campbell
Deborah April Chan
Richard James Daly
Trevor Daly
David John Dinnison
Kathleen Funnoula Floyd (Kitty)
Bruce Alan Page Hanify
Warwick Harvie
Dinah Hedger
Kjeld Holscher
Bernard Johnson
Bruce Mansell
Aarron McDonald
Irene Massey
Mervyn Hector George Missen
Beatrice Mary Mullis
Helena Parham
Mrs Averil Majorie Pears
Danny Rice
Mrs Joyce Robb
Mrs Trudie Roberts
Winifred Rodenburg
Richard Rowell
Gwen Silvester
Bill Simmons
George Arthur Smith
Patricia May Wartski

Corporate Partners

AMI Insurance
Clemenger BBDO
Dave Clark Design
First NZ Capital
Frank Millar & Co (Wgtn) Ltd
Interwaste
Just Paterson Real Estate
Lexus of Wellington
Lithotech
Sport Wellington
Spy Valley Wines
Z Energy

Corporate Supporters

Beckton Dickinson
BNP Paribas Security Services
Crombie Lockwood (NZ) Ltd
GBL Personnel
Kinetics Group Ltd
Olympus New Zealand Ltd
Wairoa Warrant of Fitness Centre
Walker & Hall

Special Donors

Allan Abel
John Anderson
Vivienne Apperley
Anna Bidwill
Anne Burkinshaw
John & Janet Butcher
Roger Butland
A & J Cockburn
J Crosse
Alan Crowe
J W Dalmer
Mavis J Evans
Dawn & Roy Ferguson
Robert Field
John & Anne Gelb
N M Gillies
R Harris
J & MI Holdsworth
S Iorns
Jan V Johnson
W Kayes
Frances Lee
Warren & Lynne Leslie
Lions Club of Johnsonville
Lower Hutt Lions Club (Host) Inc
Michael & Liliane McClelland
Michael McCormack
McCormack Painters
Maungaraki Tennis Club
Motor Neurone Disease Association of NZ – Wellington Branch
Oliver R Nees
Ngatitoa Lodge No. 143
Andrew Pankhurst – Sahara Charity Challenge
Beverley Peach
R Pilgrim
W J Plimmer
Greig Rightford – Sahara Charity Challenge
Rotary Club of Port Nicholson
Rotary Club of Wellington Inc.
St Lukes Mission Guild
R W Stannard
Anna Stichbury
Chris Suggate
The Estates of Ellen, Sinclair, Barbara and Alison Wallace
The Auckland Friends of the Malaghan Institute
The Hawkes Bay Friends of the Malaghan Institute
The Taupo Friends of the Malaghan Institute
The Wellington Friends of the Malaghan Institute
Helen Todd
Jan Thomson
C M Tisdall
Willie Tokona – Sahara Charity Challenge
Trevor Tso
W Tucker
Victoria Rebekah Lodge No.2 IOOF
Vivien Ward
Waikanae Auxiliary Cancer Society
Vicky Watson – Cycle Queensland 2012
Ngaire A Whitelaw
Michael R Wilkes
Max Wilkinson
Dan & Tessa Williams

Event Sponsors

AMI Insurance
ANZ Bank New Zealand Ltd
Astrata Ltd
Axiom Hydraulics
Cameron Partners
Capital Construction
Coolbreene Trust
CSG Print Sevices
Danntor Consulting Ltd
First NZ Capital
Fliway International Ltd
Fonterra Brands (Tip Top) Ltd
Fuji Xerox
Gadbrook Trust
Graham De Gruchy
HSBC
Industrial Processors Ltd
JacksonStone & Partners
JB Were (NZ) Pty Ltd
Just Paterson Real Estate
Lexus of Wellington
Loyalty NZ
National Bank
New Zealand Post
Opus International Consultants
Parker & Associates
Pearson Investment Advisory Limited
Porter Hire Ltd
Property Brokers Hastings
Red Rock Consulting
Roger Properties
Russell McVeagh
Saunders Unsworth
Senate SHJ
Swarbrick Beck Mackinnon
The David Levene Foundation
Veterinary Services – Wairoa
WaterForce
Westcon Group
Whakatu Coldstores Limited
Z Energy

Event Supporters

Acurity Health Group
Adsett & Braddock
Air New Zealand
AMI Insurance
Amora Hotel
Ancesteral
Andrea Cranswick
ANZ Bank New Zealand Ltd
Bayleys Real Estate Manukau
Beauty and Beyond Khandallah
Beecees
Best Travel
Jan Bird
Colin Blair
Boulcott Street Bistro
Britannia Restaurant
Mal and Lizzie Brow
Business World Travel
Ferne Butler
Café L'affare
Rodney Callender
Cape Kidnappers Resort
Chalk Cho-ku
Circa Theatre
Craggy Range Winery
Crescent Point B & B
Delmaine Fine Foods
Diva Bistro & Bar
Dynamic Meat Company Ltd
Elaines Spa
Elements Café
Ellerslie Jewellers
Fiona Ellis
Elm Grove Cottage
Esteem Jewellery
Eurovintage
Farmlands Trading Society Ltd
Ferrymans Cottage Martinborough
Forbes and Co
Craig Foss MP
Freedom Farms
Gallery Hair Design
Gannet Safaris Overland Ltd
Glengarry Wines
Global Dairy Network
Gordon's Outdoor Equipment
Malcolm Gourlie
Hair Ministry
Hastings Golf Club Pro Shop
Hawkes Bay Insurances
Heritage Hotels
Higgins Contractors
Elizabeth Horne
Hotel Intercontinental Wellington
Hugh Green Foundation
Jan & Bryan Johnson
Jenny Johnson
Johnson Estate
John Holt Memorial Trust
Judy Jordan
Karori Flower Shop
La Cloche
Laserforce
Richard Laurenson
Rod Lingard & Katrina Bach
Loyalty NZ
Steve Marshall
Martin Bosley's Yacht Club Restaurant
Matangi Cottage
Trevor Melville
Mill Hills Lodge
Millenium Hotels
Millwood Gallery
David & Bry Mossman
Museum Art Hotel
Bill Nelson
NZ Symphony Orchestra
Obiqo
Kevin and Julie O'Connor
Off The Track Restaurant
Olive Tree Café
Orton Catering
PAK'n'SAVE Hastings
Pak-line
Palmers Café
Jane Parlane
PaR nz Golfing Holidays
Paraparaumu Beach Golf Club
Peak Horticulture Ltd
Peter Shirtcliffe
Port of Napier
Rose & Shamrock Village Inn
Roxy Cinema
Royal NZ Ballet
Russell McVeagh
Tracey Russell
Samson & Delilah Hairdressing
Sconners
Don and Pat Scott
Shed 5
Sileni Estates
Silver Fern Farms
SOI Bar and Restaurant
Sound Business Systems
Spy Valley Wines
Stars Travel
Alastair & Lynne Spence
Stevenson Foundation
Strawberry Patch
Synergy Group Worldwide
Systems Advisory Services Ltd
Team McMillan BMW
The Beach Hut
The Diamond Shop
The Gables
The Make Up and Nail Studio
The Malaghan Family
The Rivets
Wendy Thompson
Thomson's Suits
Tiaki Pilates
Toms Cottage
Tremain Real Estate
Trilogy Products
Trinity Hill
Tuanui Farmstay
Tunanui Farm Cottages
Turners & Growers
Urban Retreat of Hastings
Urban Retreat of Havelock Nth
Urban Sanctuary Beauty Theraphy Clinic
VetEnt Wairoa
Veterinary Assoc. Hastings Ltd
Village Press
Vista Café
Walk Gisborne
Wellington Friends of the Malaghan Institute
Wellington Host Lions Club
Whittakers Chocolates
Wild Rock Wines
Gerald Wilson
John Wilson
Wycroft Forbury
Yummy Fruit Co Ltd
Z Energy
Zibibbo Restaurant & Bar

Run for Research Special Supporters

Cameron Field
Susannah Field
Gilling me Softly
Victoria Hale
Jason Pine
Team Just Paterson
Team Politi
Telesmart
The Woodsides
Darci Thompson

Run for Research Ambassadors

Melissa Moon
Meghan Murtrie
Jason Pine

How You Can Help

The Malaghan Institute is independent and receives no direct government funding. We are reliant on contestable research grants and contributions from corporate sponsors, trusts, bequests, individuals and fundraising initiatives.

We are at the forefront of international medical research, and our scientists believe that the key to fighting illness lies in the immune system. Our research programmes are focused on finding better treatments and cures for diseases affecting New Zealanders – cancer, asthma, allergy, arthritis and inflammation, multiple sclerosis and infectious disease.

The Malaghan Institute is a registered charity and you can support our vision by investing in health for the benefit of all New Zealanders. The following are some options of how you can become involved:

Donations

Donations from individuals and trusts form a key part of our funding. The income is used to support our research programmes. Donations over $5 may be eligible for a tax credit.

In Celebration Donations

Instead of receiving presents for your celebration please consider asking people to donate to the Malaghan Institute in your name instead.

In Memory

Your gift is a way to express your sympathy and remembrance while at the same time making a real difference to medical research. Gifts can be small or large, in lieu of flowers at a funeral, or as a tribute to a life well lived.

Bequests

The research at the Malaghan Institute is very dependant on bequests. We have developed an endowment fund that will grow from major gifts and bequests, hence sustaining the future of the Institute.

Following is a suggested format for the wording of a bequest.

"I give and bequeath to The Malaghan Institute of Medical Research,

- A percentage (%) of my estate; or
- The following property and assets; or
- The residue of my estate; or
- The amount of $ (in words) for its general purposes (or for the purpose of....) and I declare that the receipt of the chief executive or other proper officer shall be full and sufficient discharge to my trustees"

We would be delighted to discuss options for acknowledgement to suit your wishes.

Corporate Sponsorship

Corporate sponsorship enables the Institute to focus financial resources on core medical research and offers an opportunity to the corporate sector to enjoy the promotional benefits of being associated with the Malaghan Institute. We have several options for sponsorship including local and national events, laboratory naming rights and the procurement of specialist pieces of scientific equipment.

Should you require any additional information about the above options or have any queries, please contact:

James Araci
National Development Manager
Malaghan Institute of Medical Research
PO Box 7060
Wellington 6242
New Zealand

P: +64 4 499 6914 ext. 855
E: jaraci@malaghan.org.nz

Please visit www.malaghan.org.nz for further information.

Directory

Board of Trustees

Mr Graham Malaghan ONZM, *FCILT, Hon.DSc(VUW)* ***(Chairman)***

Mr John Beattie *LLB(VUW)*

Professor David Bibby *DSc (Loughborough University)*

Associate Professor John Carter *BMedSc, MBChB(Otago), FRACP, FRCPA*

Professor Peter Crampton *MBChB(Otago), PhD(Otago), FAFPHM, MRNZCGP*

Dr Allan Freeth PhD*(ANU Canberra), MBA(Dist)(Canterbury), BSc (1st Class Hons)(Canterbury)*

Mr Bryan Johnson *BCA(VUW)*

Professor Graham Le Gros *FRSNZ BSc(Massey), Dip Immunol(Otago), MPHIL(Auck), PhD(Auck)*

Mr Matthew Malaghan *BCom(Otago)*

Dr David Mossman *QSM, BVSc, MRCVS, MNZIF*

Mr Gary Quirke *BCA, CA, FCILT*

Dr Jim Watson *PhD(Auck)*

Mr C Dan Williams *CA*

Staff of the Institute 2012/13

SCIENTIFIC

Director of Research

Professor Graham Le Gros *FRSNZ BSc(Massey), Dip Immunol(Otago), MPHIL(Auck), PhD(Auck)*

Deputy Director of Research

Associate Professor Ian Hermans *BSc(Hons)(Otago), MSc(Distinc)(Otago), PhD(VUW)*

Group Leaders

Professor Mike Berridge *Bsc, MSc(Hons), PhD(Auckland)*

Dr Jacquie Harper *BSc(Hons), PhD(Otago)*

Dr Melanie McConnell *BSc(Hons), PhD(Otago)*

Professor Franca Ronchese *PhD(Padua), Dip Microbiology*

Dr Bridget Stocker *BSc(Hons, 1st class), PhD(VUW)*

Research Associate

Associate Professor Anne La Flamme BS(MIT), MS, PhD(Washington)

Science Staff

Dr Lindsay Ancelet *BSc(Hons) (University of Saskatchewan, Canada), MSc(University of Toronto, Canada), PhD(University of Otago, New Zealand) – Research Fellow*

Astrid Authier *BSc, MSc(Massey) – Senior Research Officer*

Naomi Baker *BMLSc(Otago) – PhD Student*

Arie Bates-Hermans *– Laboratory Assistant (from Jul 2013)*

Dr James Baty *PGDipPH(Massey), BSc(Hons)(VUW), PhD(Otago) – Research Fellow*

Evelyn Bauer *NZCSc, Cert Animal Sci & Tech(Massey) – Clinical Trials Manager*

Dr Tiffany Bouchery-Smith *MSc(Rennes), PhD(MNHN, Paris) – Research Fellow*

Collin Brooks *BSc(Massey) – Visiting Scientist*

Jonathan Brown *– Masters Student (to Feb 2013)*

Deborah Brunskill *BSc(Massey) – Animal Technician (Nov 2012 – Jul 2013)*

Mali Camberis *BSc(VUW) – Senior Research Officer*

Alanna Cameron *BBmedSc(VUW) – PhD Student*

Leticia Castro *BMedSci(Hons)(Sydney) – Research Officer*

Stephanie Chee *BSc(VUW) – Masters Student*

Janice Cheng *BBmedSc(Hons)(Massey) – PhD Student*

Charlotte Cheriton *– Training & Operations Manager BRU*

Dr Lisa Connor *BBmedSc(Hons), PhD(Otago) – Research Fellow (to Apr 2013)*

Hilary Corkran *BSc(Hons)(Massey) – PhD Student*

Chris Covich *– Laboratory Assistant (P/T) (to May 2013)*

Charlotte Everitt *BBiomedSc(Hons) (Otago) – Animal Technician (from Dec 2012)*

Marie-Sophie Fabre *MSc(Brest) – Research Officer*

Kathryn Farrand *MSc(Massey) – Senior Research Officer (from Feb 2013)*

Cameron Field *BSc(Hons)(Otago) – PhD Student*

Dr Elizabeth Forbes-Blom *BSc(VUW), PhD(ANU) – Senior Research Fellow*

Dr Olivier Gasser *MSc(Strasbourg), PhD(Basel) – Senior Research Fellow*

Sayani Ghosh *BSc(Calcutta), GradDip(VUW), MSc(VUW) – Research Officer (from May 2013)*

John Gibbins *BBmedSc(Hons)(VUW) – PhD Student*

Carole Grasso *BSc(Hons)(West of England) – Research Officer*

Dr Shujie He *MSc, PhD, MBChB (Jilin, China) – Research Fellow*

Patries Herst *BSc, MSc(Nijmegen, Netherlands), MPhil(Waikato), PhD(Otago) from the Department of Radiation Therapy, University of Otago, Wellington – Visiting Scientist*

Kerry Hilligan *BBmedSc(VUW) – Masters Student*

Claire Horvat *BSc(Otago), PhD(VUW) – Research Officer (Sep – Dec 2012)*

Mr Martin Hunn *MBChB(Otago), FRACS – Clinical Research Fellow*

Evelyn Hyde *MSc(Distinc)(Otago) – Senior Research Officer*

Jessica Jones *BSc(Melbourne) – Senior Research Officer (to Mar 2013)*

Ashna Khan *BSc(USP, Fiji), PGDip(Auckland) – PhD Student*

Sabine Kuhn *Diplom Biologie(LMU Munich, Germany) – Research Fellow*

Ryan Kyle *BBmedSc(Hons)(VUW) – PhD Student*

Hannah Larsen *BSc(Hons)(Queensland) – Deputy Manager BRU (to Jan 2013)*

Kunyu Li *– Visiting Student (to May 2013)*

Kelly Locke-Nelson *– Senior Animal Technician (to Jan 2013)*

Victoria Long *BSc(VUW) – Animal Technician (to Feb 2013)*

Rene McLaughlin *BBmedSc(Hons)(VUW) – PhD Student*

Laura McVeigh *BSc(Hons)(Leeds, UK) – Research Assistant (to Aug 2012)*

Helen Mearns *BSc(Hons), MSc(Cape Town, RSA) – PhD Student (to Oct 2012)*

Brigitta Mester *MSc(Hungary) – GMP Research Assistant*

Matthew Munro *BSc(VUW) – Honours Student (Mar – Jun 2013)*

Karmella Naidoo *BBmedSc(University of KwaZulu Natal), PGDipBBmedSc(VUW) – Research Officer (from Feb 2013)*

Tina Nie *BSc(VUW) – Honours Student (from Mar 2013)*

Sotaro Ochiai *BSc(Hons)(Auckland) – PhD Student*

Taryn Osmond *BBmedSc(Hons)(VUW) – PhD Student*

Dr Deepa Patel *PhD, BSc(Hons) (University of Auckland) – Visiting Research Fellow (from May 2013)*

Adeline Peignier *– Visiting Student (Feb – Jul 2013)*

Dr Troels Petersen *MSc, PhD(Copenhagen) – Senior Research Fellow (from Feb 2013)*

Lucas Pitt *BMedSc(VUW) – Animal Technician*

Catherine Plunkett *BBmedSc(Hons) (VUW) – PhD Student*

Dr Hazel Poyntz *BSc(Hons)(Bristol,UK), PhD(Oxford, UK) Research Fellow (from Mar 2013)*

Kelly Prendergast *BBmedSc(Hons)(VUW) – PhD Student*

Kylie Price *BSc(Otago), MSc(Hons)(VUW) – Hugh Green Flow Cytometry Fellow*

Melanie Prout *BSc(Hons)(VUW) – Senior Research Officer*

Dr Pisana Rawson *BSc(Hons)(University of Pisa, Italy), PhD(VUW) – Senior Animal Technician (from Jan 2013)*

Marcus Robinson *BBmedSc, MSc(Hons)(VUW) – Research Officer (to Apr 2013)*

Bradley Rose *BSc(VUW) – Animal Technician (to Feb 2013)*

Ian Saldanha *BSc, PGDipSci(Otago), DipVetNursing(Otago Polytech) – BRU Manager*

Alfonso Schmidt *BSc(Chile) – Staff Scientist*

Lisa Shaw *BSc, MSc(Otago) – Research Officer (to Jun 2013)*

Dr Odette Shaw *BSc(Hons) Pharmacology(Otago), PhD Anatomy (Otago) – Senior Research Officer*

Professor David Shepherd *PhD (OSU,USA) – Visiting Scientist (Oct 2012 – Feb 2013)*

Dr Celine Shepherd *PhD(University of Montana, USA) – Visiting Scientist (Oct 2012 – Feb 2013)*

Dianne Sika-Paotonu *BSc, BBmedSc, MBmedSc(Hons)(VUW) – PhD Student*

Stefanie Steiger *DipSci(MLU,Germany) – PhD Student*

An Tan *BSc(VUW) – Research Fellow*

Ching Wen Tang *MSc(Otago) – Research Officer*

Shiau-Choot Tang *Grad Dip Sci(VUW) – Senior Research Officer*

Dr William Telford *PhD(Michigan State University) – Visiting Scientist (Aug 2012)*

Dr Mattie Timmer*(VUW) MSc, PhD(Leiden, The Netherlands) – Co Group Leader*

Lejla Varga *MSc of Science in Biology (Lorand Eotvos University of Science) (Budapest, Hungary) – Animal Technician (from Feb 2013)*

Xiao Wang *Dip Med Tech, Dip Midwifery(Shanxi) Senior Animal Technician*

Dr Robert Weinkove *MA(Cantab), MBBS(Hons), MRCP, PhD, FRCPath – Clinical Research Fellow*

Catherine Wood *RH, BN, MHSc – Research Nurse*

Dr Jianping Yang *BM(Shanxi) – Senior Research Officer*

SUPPORT AND ADMINISTRATION

Marie Armstrong *BAP – IT Support Technician*

Viv Bernard – *National Development Director (to Jan 2013)*

Chris Covich – *Laboratory Assistant (P/T) (to May 2013)*

Sally Culbert – *BBS-Finance(Massey) – Financial Accountant (P/T) (from Feb 2013)*

Aimee de Koning *CA(VUW) – Financial Accountant (P/T) (to Apr 2013)*

Gabrielle Dennis *RSA(English), Pitmans – HR and Admin Officer*

Tanya Fulcher *BSc(VUW) – Development Operations Manager (P/T) (to Oct 2012)*

Janine Gray *BCA(VUW) – Assistant Accountant (P/T)*

Victoria Hale *BCA, BSc(VUW) – Marketing & Relationship Manager*

Carolyn Hallsmith – *Purchasing Co-ordinator (P/T)*

Dominique Hawinkels *NZCS, DipBusStudies(Massey) – Security/Reception Manager (P/T)*

Ilse Potes Morales *MAdvertising (U. San Martin – Colombia) – PA to the Director (from Nov 2012)*

Dr Debbie Scarlett *BSc(Hons), PhD(Otago) – Science Communications Adviser (P/T)*

Jenny Sim – *Fundraising Operations Manager*

Darrell Smith *MSc(Hons)(VUW), Dip A.T.(Wtgn Polytech), BSA(Massey), Cert Building Mgmt(VUW), Electrical Applied Service Cert(WelTec) – Facility Manager*

Apii Ulberg – *Domestic Services*

Jacqui Whelan – *Fundraising Assistant (P/T)*

Susie Whelan *CA, NZIMDip – Finance Manager*

Michal Zablocki *BA(Hons)(Bristol), PGDipBA(VUW) – Chief Operating Officer*

Research and Clinical Consultants

Adjunct Professor Richard Beasley – *University of Otago*

Associate Professor John Carter – *Wellington Blood & Cancer Centre and University of Otago*

Professor Brett Delahunt – *University of Otago*

Dr Peter Ferguson – *Wellington Hospital*

Dr Michael Findlay – *Cancer Trials NZ, University of Auckland*

Professor Andrew Harrison – *Dept of Medicine, Wellington School of Medicine & Health Sciences*

Dr Rebecca Grainger – *Hutt Hospital*

Associate Professor David Ritchie – *Peter MacCallum Cancer Centre, Melbourne, Australia*

Independent Strategic Review

Julian Clark – *PhD FTSE MAICD Director, Julian Clark Consulting Pty Ltd*

Professor Ashley Dunn – *Former Associate Director of the Ludwig Institute and Fellow of the Australian Academy of Science*

Advisors

Auditors
Deloitte

Bankers
ANZ Bank New Zealand

Investments
First NZ Capital

Solicitors
Simpson Grierson

The Malaghan Institute would like to thank Dave Clark Design Associates and Lithotech
for their support in designing and printing this Annual Report, October 2013.

E: info@malaghan.org.nz
W: www.malaghan.org.nz

P: +64 4 499 6914
Charity Reg: CC10357

A: Victoria University, Gate 7, Kelburn Pde.
PO Box 7060, Wellington 6242, New Zealand

MalaghanInstitute

Malaghan-Inst