



## Is cancer contagious?

*No, cancer is not contagious in humans. Yet, the strategies used by our immune system to eradicate germs have the potential to be just as effective in treating cancer.*

Cancer is not a germ - you cannot 'catch' cancer like you would the common cold. Although certain viruses can cause cancer in humans, such as the human papillomavirus (cervical cancer), these diseases are spread via the viruses, not the cancer cells themselves.

Cancer cells from one person are generally unable to live in the body of another person because the healthy person's immune system recognises and destroys them, just as it would a virus. Clearly however, the immune system's normal ability to fight cancer is limited, because many people with healthy immune systems still develop cancer.

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 (called 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 help the immune system recognise cancer cells and strengthen its response so that it will destroy them.

Over half of the scientists at the Malaghan Institute are involved in research programmes devoted to unleashing the full cancer-fighting potential of the immune systems of cancer patients, some of which we spoke about in Scope 47. The primary focus of our cancer research is the development of a cancer vaccine and we have brought together the best expertise in New Zealand to achieve this goal. In this issue of Scope we share what we have achieved so far.

### OUR RESEARCH

The story behind  
our cancer vaccine

### OUR PEOPLE

Queen's Honours for  
Malaghan Trustees

### LATEST NEWS AND EVENTS

It's time to dust off  
those golf clubs

## From the Director



It is a privilege to work in research. To be in a position where we have the opportunity to make a difference to people's lives is a gift none of us here at the Malaghan Institute take for granted.

Having said this, it is getting tougher each year to fund research programmes, both here in New Zealand and overseas. There is less government money coming to research and that which is funded is being broken up into smaller and smaller amounts. The only way to survive in the current climate is to stand out from the masses, so as an Institute we have set our scientists and staff very high goals.

One of these goals is to progress our cancer vaccine to the point where it is available to all New Zealanders seeking a better way to treat their cancer. In this issue of Scope we overview our cancer vaccine programme, from its inception at the Malaghan Institute in 1994, through to where we think this technology is heading in the future. This work requires patience, coordinated effort and considerable resources, but it is my absolute belief that we will succeed.

Prof Graham Le Gros

# How it all happens

*Immunotherapy is emerging as one of the most promising alternative approaches to cancer treatment, with the potential to eradicate cancer with very few side-effects.*

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.

For the immune system to elicit an effective anti-tumour immune response, two things need to happen. The cancer-fighting T cells first need to 'see' the tumour. They also need to be supported so they can mount a big enough immune response to destroy it. This is where the cancer vaccine (or immunotherapy) comes into play.

The cancer vaccine is made from dendritic cells, which are isolated from the patient's blood, and a biopsy or protein fragments of the patient's tumour. The two are mixed together in the laboratory, where over a few days the dendritic cells will process up the tumour into a form (antigens) that can be recognised by the cancer fighting T cells.

The vaccine thus created is then injected back into the patient and the dendritic cells traffic to the sites in the body where T cells reside to present the tumour-specific antigens directly to them. Adjuvants, such as  $\alpha$ -galactosylceramide are sometimes used to help the dendritic cells complete their task and ensure maximum T cell activation.

## Major milestones in our cancer vaccine research programme

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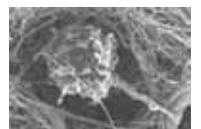
The arrival of Prof Franco Ronchese sees a new direction for the Malaghan Institute – the dawn of cancer immunotherapy research.

96



Techniques established for growing dendritic cells in the laboratory.

97



First demonstration that a vaccine made from dendritic cells and tumour peptides (protein fragments), delayed the development of cancer in a mouse model.

1994 →

*How it all happens*

← 1997

# The story so far

*By combining the disciplines of immunology, cell biology and drug discovery in a programme that involves immunologists, chemists, molecular biologists and clinicians, this research has the potential to launch a new era in cancer treatment.*



It is clear that different cancer vaccination strategies or immunotherapies will benefit different people, in much the same way that some individual's immune systems seem to work better than others. The only way of knowing if a cancer vaccine will work in patients, after having shown promising results in experimental models, is to carry out a clinical trial.

Over the past fourteen years the Malaghan Institute has made significant progress in translating our basic cancer research into real outcomes for patients – a 'bench to bedside' philosophy that has led to

three clinical trials of dendritic cell based vaccines for non-Hodgkin's lymphoma, melanoma and glioblastoma multiforme (GBM).

The GBM trial was completed earlier this year and supported the feasibility and safety of using the cancer vaccine in combination with chemotherapy to treat GBM patients. GBM is a highly aggressive brain tumour with an extremely poor prognosis, so the fact that the combination therapy reduced tumour size in some patients is a promising outcome. Different options for improving the vaccine further are currently being explored.

The cancer trials are supported

by a close working relationship with clinicians from the Wellington Blood and Cancer Centre and Wellington Hospital, and access to a laboratory that operates according to Good Manufacturing Practice (GMP) guidelines at the Malaghan Institute.

Complementing our clinical trials is an extensive basic immunology research programme involving several of the Institute's research groups, aimed at understanding anti-tumour immune responses and how they can be more effectively elicited with vaccines.

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The safety and feasibility of making a cancer vaccine from a patient's own dendritic cells and tumour fragments tested in individuals with non-Hodgkin's lymphoma.

99 - 03



Significant progress made in defining the critical cell types, cytokines and vaccine conditions required for optimal anti-tumour immune responses.

04



New knowledge applied to Phase III clinical trial in patients with melanoma.

06



Killing of the dendritic cells in the vaccine by the same immune cells that eradicate the cancer identified as a reason for the promising but limited anti-tumour immune responses elicited by the cancer vaccine to date. New research focus launched to identify solution for this problem.

07



Clinical study initiated to explore the possibility of using immunotherapy to treat patients with chronic lymphocytic leukaemia (CLL), the most common blood cancer in New Zealand.

08



A phase I vaccine clinical trial undertaken to explore the feasibility of using cancer immunotherapy in combination with chemotherapy to treat patients with the aggressive brain tumour glioblastoma multiforme (GBM).

# Where to from here?

*To address the growing burden melanoma imposes on our society, we have brought together the best expertise in New Zealand to design, manufacture and trial new anti-cancer vaccines.*

Next year Associate Professor Ian Hermans' research team will trial a new vaccine in melanoma patients. This is part of a five year Health Research Council of New Zealand funded programme being undertaken in collaboration with the Capital & Coast District Health Board, Industrial Research Limited, Cancer Trials New Zealand and The University of Auckland. One of the improvements made to the new cancer vaccine is the inclusion of the synthetic glycolipid  $\alpha$ -GalCer, which A/Prof Ian Hermans' basic research has shown induces significantly stronger anti-tumour responses than vaccines without it.

Another goal of our ongoing research is to simplify how the cancer vaccine is prepared. Some patients enrolled in the GBM trial were unable

to be vaccinated simply because our scientists could not isolate enough immune cells from their blood to prepare the vaccine. It also takes weeks to grow dendritic cells for the vaccine, which is a long time to wait for patients with aggressive cancers such as GBM.

Research is currently underway therefore to determine if cancer vaccines that deliver the tumour antigens to the dendritic cells already present inside the cancer patient, rather than having the cells present in the vaccine could be the solution, and early laboratory studies have been very promising. With further work we believe this simplified cell-free vaccine will enable immunotherapy to be accessible to more patients, thus redefining how we treat cancer in the future.

09 - 10



Further refinement of cancer vaccine and demonstration that a compound from marine sponges called  $\alpha$ -galactosylceramide ( $\alpha$ -GalCer) improved the anti-tumour immune response in mouse models.

13



Safety, feasibility and efficacy of using the  $\alpha$ -GalCer adjuvant in combination with refined cancer vaccine will be tested in a Phase I clinical trial for melanoma.

Future



Use of simplified cell-free cancer vaccines that target the activation of dendritic cells already present in patients.

## A patient's perspective

Two years ago, I attended the opening of the Keith & Faith Taylor Cancer Research Laboratories at the Malaghan Institute, in the capacity of a patient with Non-curative Stage 4 Metastatic Melanoma and a recipient of the Institute's Compassionate Use Cancer Vaccine Programme. Recently, I learnt of the proposed 2013 Melanoma Clinical Trial and am absolutely thrilled.

From a patient's perspective, scientific and medical advances and breakthroughs are incredibly important; particularly as patients with metastatic melanoma currently face few treatment options. I still believe a vaccine is our best chance of supporting and 'backing' our immune system in the midst of a cancer challenge. Put simply, the vaccine makes sense.

I am incredibly excited to learn the recruiting of melanoma patients will commence early 2013. The opportunity for patients to participate in the trials is fantastic news and I wish the team and all involved all the best.

I continue to remain well and achieved my dream trip to Ireland earlier this year, a dream I didn't think possible three years ago.



Kathryn Williams



# From the Chairman

*This issue of Scope has inspired me to contribute, as I feel the Institute stands on the cusp of a wave of potential discovery. Both the melanoma vaccine, and the recently funded asthma and allergy programme, are important steps forward for the Institute and as Chairman I feel excited by where these will take us.*

There are two things I'm keen to mention; firstly the very humbling experiences of two board members, David Mossman and myself, receiving Queen's Birthday Honours. Mine is a shared honour as it has come about from my direct involvement with the Malaghan Institute, and recognises the amazing talent and energy that the team, Director, Trustees and wider Malaghan family brings to research. David's was in recognition of Services to Veterinary Science, however they forgot to mention his 10 years of personal contribution to the Malaghan's Hawkes Bay Friends and recently as a Trust Board member. All our Trustees give of their time, experience, knowledge and contacts for the satisfaction of seeing the Institute succeed.



David Mossman



Graham Malaghan

Secondly, I thought I'd give you a small insight into the Capital Endowment Fund. This was formed in the early days by bequests and significant donations and gifts. It is managed by professional investment advisors and overseen by the Trust Board. The income from this fund is used to support the Institute's research, by contributing to the infrastructure and services; last month the Trustees agreed to fund three senior research positions from the fund's capital, and more recently will directly support individual researchers. Some other examples include the fit out costs when we moved to our new premises; and the establishment of specialist labs for our Cancer

Vaccine programme, which were also generously supported, by the Keith and Faith Taylor Family and also the Wade and Angela Thompson family.

However we can only do what we do because of the unyielding support we receive. To all of you reading this, who are supporters through our Friends groups or just as an individual, could I challenge you to find one other person, family, trust or sponsor that could add to our journey. This would really empower us to continue to succeed in these uncertain and trying times.

My thanks to you and the very best of health.

Graham Malaghan

# News under the microscope

## These guys might just be our craziest supporters!

Greig Rightford & William Tokona are both dedicated personal trainers that have set themselves the goal of completing the Marathon of the Sands in April 2013. The race is a 6-day 243km run across the Sahara Desert. It has been described as "the toughest foot race in the world", due to the harsh terrain and the searing forty-degree heat. Their entire campaign is dedicated to raising funds for the Malaghan Institute, which is amazing – and we'd like you to support them in any way you can. You can find out more by going to [www.malaghan.org.nz/news-and-events/greig-and-willie-update/](http://www.malaghan.org.nz/news-and-events/greig-and-willie-update/)



Greig & Willie

## Great NZ Trek 2012



Kitty Johnson (centre) presenting cheque to MS project scientists

The Great New Zealand Trek began in 2006 from the top of NZ as an annual week long event trekking the length of the country in stages, by travelling on horseback, mountain bike or even walking. The Trek also raises funds to help to find a cure for Multiple Sclerosis and as such, Kitty Johnson, Trek Coordinator, was proud to recently present a cheque for \$30,000 to the Malaghan Institute for our MS research programme.

## Recent Grants (Mar – Jun 2012)

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

- WJ Thomson Estate
- Infinity Foundation Ltd
- Lion Foundation
- Cuesports Foundation Ltd

## Golf Tournaments

The Friends of the Malaghan Institute Annual Charity Golf Tournaments are approaching fast with the following details confirmed:

- Hawkes Bay – Friday 26th October at Hastings Golf Club
- Auckland – Friday 2nd November at the Grange Golf Club
- Wellington – Friday 2nd November at Manor Park Golf Club

**For more information about becoming a Hole Sponsor or entering a team, please contact Tanya Fulcher on 04 499 6914 ext. 811 or [tfulcher@malaghan.org.nz](mailto:tfulcher@malaghan.org.nz)**



## A popular publication

When a scientist makes a research discovery they publish it in an international scientific journal so that their new knowledge can be shared with the rest of the scientific community. The more other scientists refer to this work by citing it in their research publications, the more significance is placed on the original piece of work. A 1993 publication by Prof Mike Berridge and research fellow An Tan describing how a dye used to screen for anti-cancer drugs works, hit the 500 citations milestone this month. This is no mean feat for New Zealand-based research and we congratulate Mike and An on their pivotal piece of work.

## Six ways to support our research:

As New Zealand's leading independent medical research institute, the Malaghan Institute is reliant on grants and public support for its valuable work. We are registered with the Charities Commission and all donations over NZ\$5 are tax deductible. There are several ways for you to get more involved.

To find out more, contact Victoria Hale on 04 499 6914 x 821 or email [vhale@malaghan.org.nz](mailto:vhale@malaghan.org.nz) alternatively, visit our website [www.malaghan.org.nz](http://www.malaghan.org.nz)

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