



A MESSAGE FROM THE DIRECTOR, PROF GRAHAM LE GROS

Seeing the Invisible

How do you study something you cannot see?

The basic materials that a scientist works with are very different to those of other professions. Unlike engineers, artists or teachers, a scientist spends most of their time handling things that are invisible to the naked eye. This is one of the challenges of research and technology is constantly evolving to enable scientists to effectively 'see into the unknown'.

If you have the opportunity to visit the Malaghan Institute, peer through the laboratory windows and you will observe some of our scientists carefully transferring droplets of what looks to be water from one tube to another. Of course these droplets contain a lot more than simply water. Some will contain thousands of dollars worth of antibodies, while others might hold a patient's personalised cancer vaccine - however to the observer, they all look the same.

Microscopes were invented centuries ago for this very reason and are still used today to provide information on particular characteristics of biological materials, such

as cells, that cannot be determined by eye. However, microscopy is a time-consuming and labour-intensive method that has only limited capacity when it comes to addressing more complex questions such as 'did the cancer vaccine stimulate an anti-tumour immune response?', or 'which cells are important for asthma?'.

To answer these questions a scientist will turn to the extraordinary power of a rapidly developing technology called fluorescence-activated cell sorting (FACS) or flow cytometry, of which the Malaghan Institute has the most state-of-the-art facility in New Zealand.

In this issue of Scope we provide an overview of how this technology works and how it underpins our cancer and asthma research programmes. This is only the tip of the iceberg and I feel very excited about the future application of flow cytometry in the clinical arena, where its ability to provide individualised cellular profiles for patients promises to revolutionise the way we treat diseases in the future.


Prof Graham Le Gros

OUR RESEARCH

Flow Cytometry

SHEDDING LIGHT ON THE UNKNOWN

OUR SUPPORTERS

Just Paterson Real Estate
The Dr Marjorie Barclay Trust

OUR TEAM

Take a Peek
Behind the Scenes

Flow Cytometry

– shedding light on the unknown

Flow cytometry is a fundamental tool used by every research group at the Malaghan Institute.

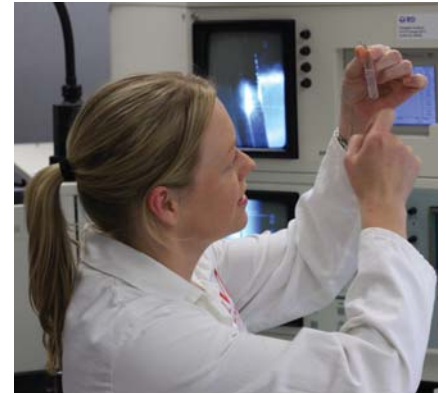
Using flow cytometry a scientist is able to take a tube of invisible cells and in the blink of an eye, know exactly what it contains. Whether it be the study of a whole lymph node, or a newly discovered cell type, the knowledge gained from using this technology is invaluable. So, what is flow cytometry and how does it work?

If we use the analogy of a bag of jellybeans to describe the cells present in a lymph node, then each of the different coloured lollies would represent a different cell type – black jellybeans could be T cells, red jellybeans, dendritic cells, and so on. If that bag contained thousands of jellybeans, just as lymph nodes

contains thousands of cells, then the process of counting them and working out how many of each colour were present would be an arduous process. However, a flow cytometer can count and identify each cell type at the extraordinary rate of up to 20,000 cells per second!

Furthermore, if a scientist were only interested in one particular flavour of jellybeans then a more advanced cytometer called a cell sorter could be used to separate them away from all the others at the same high speed.

Unlike jellybeans however, cells are not naturally coloured, so fluorescent dyes are first attached to the cells via specific antibodies to help the scientist



Flow Cytometry Suite Manager
Kylie Price

mark the cells they are interested in. When placed into the flow cytometer the dyes are excited by laser beams, which give out different signals that are picked up by detectors and translated into useful information about the size and identity of the cells present.

With recent advances in the number of characteristics that can be simultaneously analysed per sample, the applications of flow cytometry are limited only by the user's imagination.

THE SCIENTIST BEHIND THE RESEARCH



The Malaghan Institute is proud to host the busiest flow cytometry facility in the country and provides access to state-of-the-art equipment. This would not be possible were it not for the determination of Kylie Price (pictured above), who oversees the whole operation.

Kylie, who is supported by the generosity of the Hugh Green Charitable Trust, says that as a child of

rural New Zealand she was exposed to the realities and hardships of disease as it pertained to animals from an early age. "These experiences created a passion for understanding what creates wellness and disease. I wanted to find a career where I could be involved in positively affecting the health and wellbeing of people and believed that science was the tool I could use to achieve this goal."

Very specialised training is required to operate the Institute's four cytometers, which range in value from \$100,000 to over a million dollars, and Kylie's unique skill set and expertise has scientists from all over Australasia contacting her for assistance on a diverse range of projects – a challenge Kylie says she relishes.

When not in the lab hunting for cancer stem cells, or analysing viruses from Antarctic sea ice, Kylie can be found out and about enjoying nature or indulging her love of languages (she is fluent in German and is currently learning Spanish with a vengeance!).

A Natural Way to Awaken the Immune Response

The immune system has all the properties that are required to detect cancer and control its progression.

Immunotherapy holds great promise for cancer treatment - immune cells are specific and can discriminate between normal and cancer cells, they have potent 'killing' capacity and can also travel to different tissues to eliminate all traces of disease. However, the immune system of a cancer patient can co-exist in equilibrium with their cancer for many years because there is insufficient immune activation to completely reject the tumour.

Several research groups at the Malaghan Institute are investigating different strategies for reawakening these immune cells so that they stimulate an anti-tumour immune response. The dendritic cell cancer vaccine that is currently being used in a phase I clinical trial for the treatment of patients with glioblastoma multiforme is one such example of this, however other approaches are

also being evaluated.

PhD student Sabine Kuhn (pictured below) has been investigating the ability of various stimuli (adjuvants) to activate the non-responsive immune cells by injecting specific products derived from bacteria and viruses directly into tumours and then analysing the resulting immune responses by flow cytometry.

In doing so, Sabine discovered that several of the compounds were able to stimulate the activation of immune cells in culture. Interestingly, these compounds were also able to delay tumour growth and prolong survival in laboratory cancer models, suggesting that natural adjuvants can be used to rescue the function of immune cells found in tumours.

These adjuvants may eventually become the basis of safe and simple methods for activating the immune system against tumours in patients.



Sabine Kuhn, PhD student in the Immune Cell Biology group

Real Estate and Research

Less than one year after raising an incredible \$60,000 to support the Malaghan Institute's Cancer Vaccine Programme, Ian Paterson and the team at Just Paterson Real Estate in Wellington have raised the bar by making a further \$50,000 donation to support research into glioblastoma, the form of brain cancer that tragically claimed Sally Paterson – beloved wife of Ian, mother, business owner and work colleague of all the team at Just Paterson - in 2009.

Just Paterson co-director Ian Paterson says Sally's death highlighted the groundbreaking work the Malaghan Institute is doing and provided Sally's family, colleagues and clients with an opportunity to create something good out of their loss.

Following their 'Blue September' promotion in 2009, Just Paterson has continued to raise much needed funds for the Malaghan Institute through agent fee donations, company contributions and gifts from the community, with members of the team also participating in the Malaghan Run for Research appeal in February this year.

"We're committed to working long-term with the Malaghan Institute to support their bid for a vaccine for this particular form of brain tumour," Ian states.

Our utmost respect and gratitude go to Ian, his family and the Just Paterson team for their unwavering support in Sally's memory.



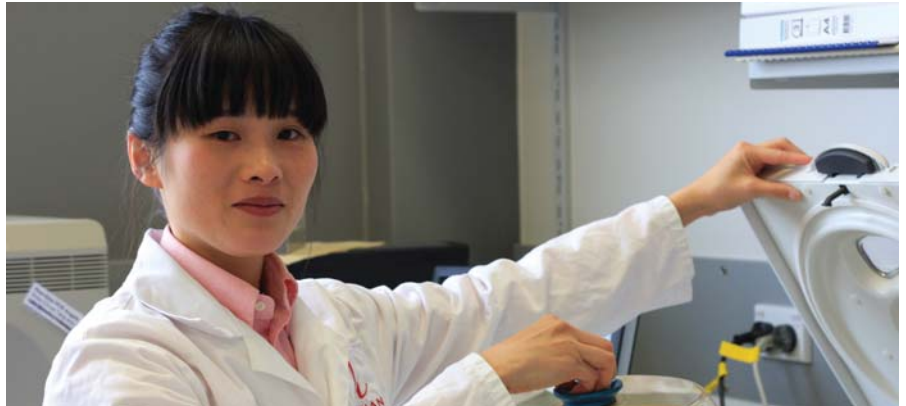
Sally Paterson (1947-2009)

Identifying Targets for More Specific Asthma Therapies

Asthma is the world's most common chronic disease in children and its prevalence in New Zealand is amongst the highest in the world.

Current asthma treatments usually involve the use of non-specific immune suppressive agents such as corticosteroids. However, although these treatments are effective at reducing the immediate symptoms of asthma, their impact is not specific to the asthmatic immune response and can leave patients more susceptible to common infections such as influenza.

Understanding the signals that trigger the initiation of asthma is critical for the development of treatments that selectively suppress only the asthmatic immune response. Until now our knowledge of these early events has been lacking because we haven't had the tools to study them.



Asthma researcher, Shiao-Choot Tang

By taking advantage of the recent advances in flow cytometry capability, Prof Graham Le Gros' Asthma and Allergic Diseases research group has been able to identify a unique population of dendritic cells that are capable of initiating what is known as a Th2 immune response – the type experienced by those with asthma.

Dendritic cells function like sentinels, patrolling the body and alerting the immune system to the presence of germs and other potential threats.

There are many different classes of dendritic cells, each varying in their surface structure, location in the body and function. Those identified by Prof Le Gros' team are particularly interesting because of their highly specific ability to drive a Th2 immune response. This makes them potential targets for the development of vaccines and therapies that can be used to specifically treat the asthmatic immune response, without impacting on the rest of the immune system.

Late Pioneering Doctor Supports Asthma Research

For over a decade, The Dr Marjorie Barclay Trust has been making an annual donation in direct support of Prof Le Gros' asthma research group. The Trust was set up from the estate of the late Dr Marjorie Barclay, who was one of New Zealand's first female hospital specialists. Not content with this achievement alone, she then also specialised in the relatively new field of diagnostic radiology. Dr Barclay studied extensively overseas before returning to New Zealand where she lectured at the University of Otago

Medical School and worked for the Otago Hospital Board. Later in her life, Dr Barclay, who suffered from asthma, relocated to Wellington as she felt the bracing sea air would benefit her health.

Sadly, Dr Barclay passed away in 1978, but her Charitable Trust has since seen over \$3 million dollars distributed to various New Zealand charities. One such charity is the Malaghan Institute, having been a grateful recipient of the Trust since 2000. The Trust funding we receive is allocated specifically for the

purposes of research into asthma and has allowed for many purchases of important scientific equipment for the research group, as well as vital salary support for training scientists in the asthma area.

The Malaghan Institute is extremely thankful to The Dr Marjorie Barclay Trust for its ongoing support of Prof Le Gros and his work. We are pleased to be committed to honouring the memory of Dr Barclay by continuing to be at the forefront of asthma research, not only here in New Zealand, but also worldwide.

Take a Peek Behind the Scenes

Most people, when thinking about a world class research institute, naturally assume that it would operate behind locked doors and be accessible only to its highly qualified personnel. While this may be true about some facilities, it is not the case for the Malaghan Institute.

As well as conducting ground-breaking research into cancer, asthma, arthritis, MS and infectious disease, a key goal is also to educate the community about the importance of medical research. One way that we do this is by organising tours of our world class facilities based in Kelburn, Wellington. Throughout the year we open our doors to dozens of community groups who all share a common desire to see 'behind the scenes' and learn more about the research we are conducting to improve the health of New Zealanders.

We have received wonderful

feedback from those who have visited, with one 'tour coordinator', Rod Davie of Waikanae, stating "Our members loved it! They were amazed by all the things they saw."

In addition to offering tours, the Malaghan Institute also arranges for its scientists to visit schools and community groups to talk about their research programmes.

If you are interested in arranging a tour or speaker, or would like to find out more, please contact:

Victoria Hale on 04 499 6914 ext. 821 or email vhale@malaghan.org.nz.



Members of Victoria University of Wellington's Hunter Club visiting Malaghan laboratories in May 2011



Meet and Greet



One of the first faces that will greet you at the Malaghan Institute is that of Security and Reception Manager, Dominique Hawinkels.

Dominique has been a valued staff member of the Malaghan Institute for two decades – in fact, his 20 year anniversary passed this April. He began as Administrative Technician back in 1991 when the Institute was located in Newtown at the Wellington School of Medicine.

Needless to say, he has been here for many of the important changes that the Institute has been through during that time, including the growth from nine staff to over 80, a change of Director and the move to our current location in Kelburn.

Dominique says that one of the things he likes most about working at the Malaghan Institute is discovery. "Being involved in the magic that is scientific discovery is very motivating. I also believe that the Institute is here to improve people's lives through research and I am glad to be a part of that. The great people who work here are also a bonus."

National Development Director Appointed

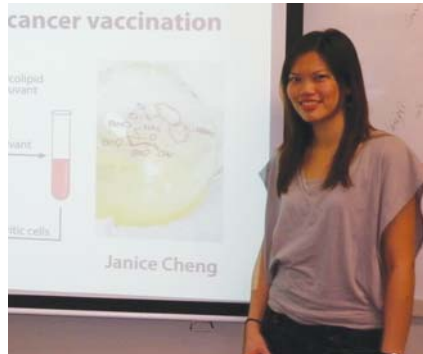


We welcome Viv Bernard to her new role as National Development Director. Viv comes to us from Te Papa, where she was the Manager of Sponsorship and Development. Her experience with corporate development, relationship management and marketing will bring a new perspective to the Fundraising and Marketing operations of the Malaghan Institute and we look forward to working with her.

News Under the Microscope

Wellington Friends Winter Cocktail Party

The very impressive Premier House was the setting for a recent fundraising event organised by the Wellington Friends of the Malaghan Institute. Over 150 people gathered at the beautiful premises in Wellington on the evening of June 9 for a winter cocktail party. Sean Plunkett was MC for the evening and guests had the opportunity to mix and mingle while listening to pianist Jennifer Timmings. The night was a huge success with over \$7,000 raised for the Institute. A special thank you to all the generous sponsors: Spy Valley Wines, Zibibbo Restaurant & Bar, Lion Nathan, SHOTT Beverages, Marianne Muggeridge and Inspire Photography.



Malaghan PhD Student Shines in 3 Minute Thesis Competition

Janice Cheng, a PhD student in our Immunoglycomics research group, recently won the 'English as a second language' category of Victoria University's 3 Minute Thesis competition. The competition invites postgraduate students to present a three-minute speech on their thesis topic and its significance to the wider community. Janice says that the biggest thing she has learnt from this experience is the power of effective communication. "While we know that the research we are doing here at the Malaghan Institute is something very special - and so are happy to give up our weekends and evenings to continue it - this is of little value if we

cannot communicate its significance to people outside the Institute." On behalf of everyone at the Malaghan Institute we congratulate Janice and look forward to more scintillating talks.

2011 Golf Tournaments

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

- Hawke's Bay – Friday 28 October at Hastings Golf Club
- Auckland – Friday 11 November at the Grange Golf Club
- Wellington – Friday 18 November at the Royal Wellington 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.

Recent Grants (MAR – JUN 2011)

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

- Infinity Foundation Ltd
- The Dr Marjorie Barclay Trust
- Cuesports Foundation Ltd

Five ways to support our research:

As New Zealand's leading independent medical research centre, 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 ext. 821 or email vhale@malaghan.org.nz or visit our website www.malaghan.org.nz

1. MAKE A DONATION
2. SET UP AN AUTOMATIC PAYMENT
3. LEAVE A BEQUEST IN YOUR WILL
4. BE A SPONSOR (corporate or individual)
5. JOIN A VOLUNTEER FRIENDS GROUP