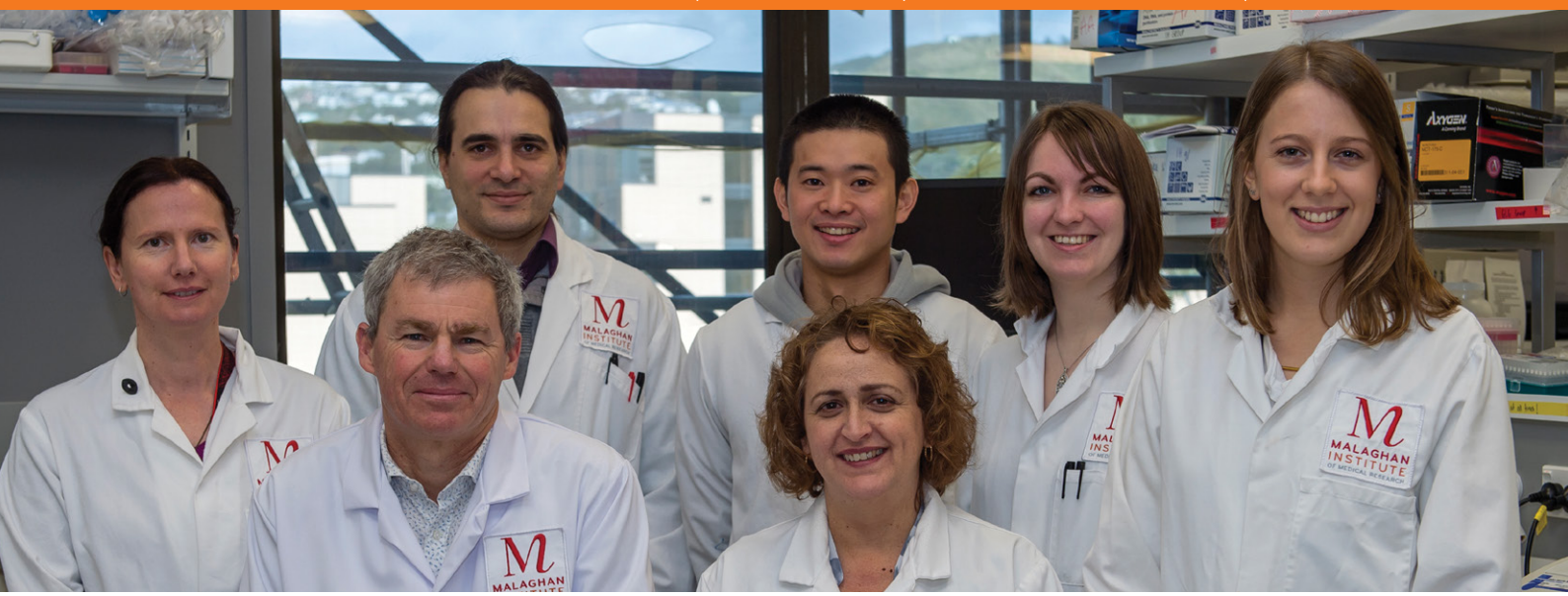
SCOPE 61
A MALAGHAN INSTITUTE PUBLICATION

MALAGHAN INSTITUTE OF MEDICAL RESEARCH
50 YEARS
1966 - 2016

MALAGHAN INSTITUTE OF MEDICAL RESEARCH | NEW ZEALAND | WWW.MALAGHAN.ORG.NZ | NOVEMBER 2016



Parasitic diseases and allergy group.

Worldwide efforts target human hookworm

An ancient Egyptian papyrus records the symptoms of hookworm infection: extreme anaemia, abdominal pains, heart palpitations. Fast-forward 3500 years and those same severe symptoms are found in more than half a million people worldwide, with the health of another 700 million affected by the parasite. Our goal is to help change that.

We study human hookworm using a mouse model, as well as researching the effects of parasitic worms on the immune system more broadly. The aim of this work is not only to find a better treatment for hookworm but to gain new knowledge about how worms dampen harmful immune responses towards them and 'turn off' allergy and autoimmune diseases at the same time.

As part of an ongoing collaboration, the Sabin Vaccine Institute and the Center for Vaccine Awareness and Research at Texas Children's Hospital in the United States have invited us to test their new human hookworm vaccine candidates in our model. Today's drugs kill hookworms in the intestine but a vaccine that targets the early blood-feeding phases is ideal. This approach would help reduce the associated anaemia as well as tackling the problem of reinfection with the worms after treatment.

Our model for human hookworm infection allows for much more flexibility in testing the dosage, timing and protection levels for developing a vaccine that is safe and effective. A number of promising targets have been sent to us and testing is now underway, alongside clinical trials happening overseas.

It is gratifying to be able to partner with the Sabin Vaccine Institute and contribute to its not-for-profit programme to get better therapies to people who are disabled by hookworm in the developing world. The gains are not just for individuals but have potential to increase the health status, intellectual capacity and economic output of entire countries.

OUR RESEARCH
Human worms: friend or foe?

OUR PEOPLE
Lessons from the tropics

OUR COMMUNITY
Celebrating our 50th at Parliament

From the Director

In our first 50 years we built a strong foundation in basic biological research. Those decades of investment and support for clarifying the operations of the human immune system are now paying off – we have an understanding of the immune system that is making it possible to use the body's own systems to heal itself.

Our work has focused on cancer, asthma and allergy research so far, but in the next decade or two – perhaps sooner – I believe we will see an immune-based approach applied to treating conditions such as multiple sclerosis, autism and diabetes. Even more challenging, and very timely given the world's ageing populations, could be its extension to treating dementia and other neurological problems. Being able to lead a full and healthy life for as long as possible will have massive implications not just for the individuals and their families but for society more broadly.

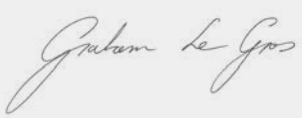
Through our long term asthma research, we have gained deep insights into the way parasites interact with and modulate our immune system. It is serendipitous that we are now able to contribute our expertise directly to efforts to reduce the global burden of human hookworm, through our collaboration with the Sabin Vaccine Institute.

Climate change is also forcing us to rethink our risk from parasitic diseases here in New Zealand. In a warming world, diseases that are currently confined to warmer countries may become a serious threat. Chagas disease, for example, has high human and economic costs and a growing prevalence in this country.

We are seeing the way forward now. We have proof that the immune system can be used and manipulated naturally to change disease outcomes. The Institute is recognised globally as a world leader and we are well-supported by a strongly interested set of philanthropic individuals and organisations who want to see us play an important role in shaping New Zealand's future.

The opportunity to create a healthier world has never been closer.

Prof Graham Le Gros



Good news for New Zealand leukaemia sufferers

Pharmac recently announced plans to fund two immunotherapies for three types of leukaemia from 2017. Malaghan Institute clinical researcher Dr Robert Weinkove led two of the funding applications and supported the third through correspondence and meetings with Pharmac. Dr Weinkove researched chronic lymphocytic leukaemia (CLL) during his PhD with Professor Franca Ronchese and continues to treat patients with CLL at the Wellington Blood & Cancer Centre.

"I am delighted with this announcement, which will improve the lives of hundreds of New Zealanders with CLL and hairy cell leukaemia. I am also hoping for future funded access to new treatments for patients whose leukaemia becomes resistant to these treatments."

Texas-Wellington connection strengthened

Our collaborator Professor Maria Elena Bottazzi, deputy director of the product development partnership known as the Sabin Vaccine Institute and Texas Children's Center for Vaccine Development at Baylor College of Medicine, visited the Malaghan Institute in October.

"We parasite people are a small community and we try to learn from each other", she says. "Our work programmes are complementary."

The Sabin's mission is to find new interventions to prevent and treat neglected tropical diseases, which are primarily caused by parasites. They afflict the poorest people in the world, but available drugs are not having an impact in preventing or controlling these diseases. Maria believes vaccines will have the best global health impact, in combination with other interventions such as improved water supply and sanitation.

"I was raised in Honduras so I've seen the suffering caused by these diseases. I am now involved in developing tools that can be deployed in the population. Our vaccines have to be usable: low cost and easy to distribute. Thanks to the private funds we have access to, we can de-link the end cost of the vaccine from the cost of its development."

From left: Kara Filbey, Jodie Chandler, Maria Elena Bottazzi, Graham Le Gros, Mali Camberis.

Maria values the capability of the Malaghan Institute, which is complimentary to Sabin's. "You have ample expertise in developing and establishing animal models with similar parasites, which can really help us understand the pathology of the worms. Your immunological expertise in understanding the host-pathogen relationship is also very valuable for our programme."

THE SCIENTIST BEHIND THE RESEARCH – MALI CAMBERIS

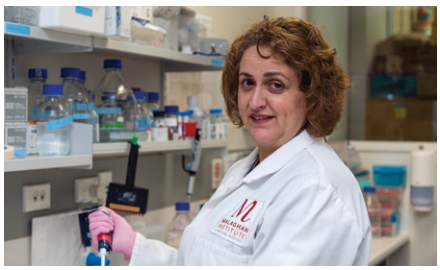
"I've always been interested in parasites – they're quite grotesque but so fascinating," says Mali Camberis, research manager of the allergic and parasitic diseases programme.

Mali grew up in a nature-focused family where long walks with her father provided informal biology lessons. Seeing her dad use natural products to treat injuries also led her to wonder what else in nature could be useful.

Her interest in worms started about age 10 and grew over time. Striking images of parasites such as guinea worms and tapeworms caught her attention, as did the unusual lifecycles of these creatures. While studying biology at Victoria University, parasitology was her thing.

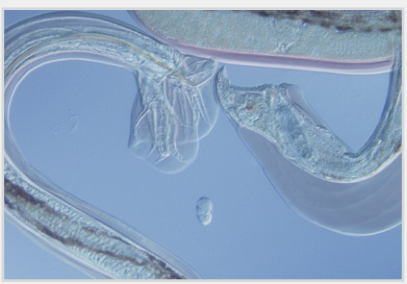
Mali spent six years at AgResearch, took a break to have a family, then an opportunity to combine two passions, parasites and medical research, came up with a position at the Malaghan Institute.

"Twenty years later and I'm still here. A lot has changed in that time as we've learned more about the intriguing lifecycles of parasites and how they interact with our immune system. It's nice to prove that they are not just nasty critters."



Worm therapy

Humans evolved with parasitic worms, which manipulate our immune system so they can live inside us without causing too much damage. Experiments in mice show that when worms dampen our immune response against them, they reduce allergic and inflammatory reactions at the same time. When we no longer have worms, our immune systems may react to harmless allergens instead. Giving worms as a therapy is being trialled in the United States but people with autoimmune diseases are also known to infect themselves in order to reduce their symptoms. Other approaches that use drugs to mimic the effect of the worms are also being researched.



Male and female worms and a worm egg.

Lessons from the tropics

Dr Kara Filbey took a trip to Ecuador to see how worms affect allergies in a community.

People in the world's tropical countries have the highest rates of infection with intestinal worms but also the lowest instances of allergy and autoimmune diseases.

In July Kara visited Quininde, a small town in inland Ecuador, and the base for a study of 2400 children and their mothers. The comprehensive ECUAVIDA study is looking for correlations between parasite infection and the development of allergy in the children.

"The children are now 5–8 years old and come in to the clinic for regular checks. I was able to watch the staff doing the tests – height, weight, skin prick test, lung function, nasal lavage (wash), blood and urine. I don't know Spanish and the nurses had no English but when the lab nurse started holding her nose, I knew they were about to sieve the poo to look for worm eggs!" she says.

Keeping track of the participants is a big challenge. Their living conditions are all documented as part of the study, so a visit to update the records is required if the family moves house. Kara accompanied the team to some rural villages in the rainforest during her stay.

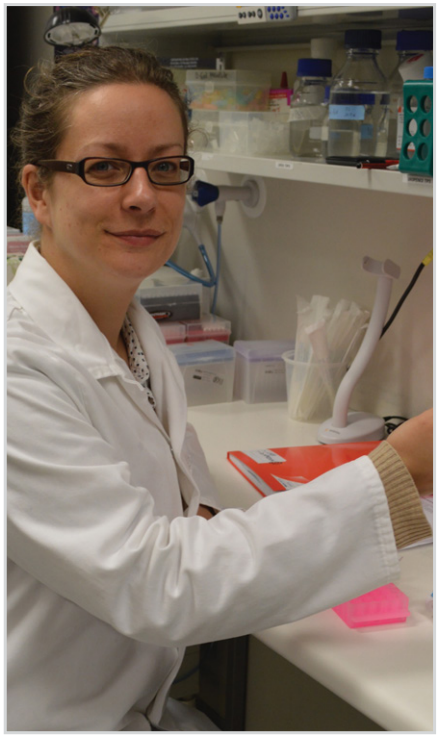
"The nurses are amazing. They have to go to places that can be quite dangerous so two always go together with a male driver. Many of the houses were pretty basic with challenging living conditions – one was like a tree house with very precarious stairs we had to clamber up. But the children are just beautiful and the families were very welcoming to us."

Preliminary results show that 46 percent of the mothers had a worm infection – commonly one of two roundworms and occasionally hookworms or tapeworms. The children are regularly de-wormed at school and therefore have a lower infection rate. There are low rates of allergy in the population.

In Ecuador, getting first-hand experience of research in a challenging environment, sampling and dealing with human participants (rather than our mouse models) and seeing the conditions in which parasitic infection is endemic, was valuable for a wider perspective on the work we are doing here in Wellington."

Following the visit to the Ecuador Kara also visited the Sabin Vaccine Institute and met its senior leaders Professors Peter Hotez and Maria Elena Bottazzi.

"It was an excellent opportunity to foster and strengthen our collaborations with these leaders in their fields.



Dr Kara Filbey (centre). Other images show typical living conditions, a nasal lavage, home visit and faecal sample preparation.

50th celebrations at Parliament

More than 200 supporters, past and present trust board members, Friends, collaborators and staff members gathered at Parliament on 11 October for a reception hosted by Health Minister Jonathan Coleman to acknowledge our 50th year. We were also pleased to welcome Prime Minister John Key to the event.

From left: Mr Graham Malaghan, Hon Dr Jonathan Coleman, Rt Hon John Key, Prof Graham Le Gros

Recognition for our Trust Board members

Dr Dianne McCarthy

As a new Companion of the New Zealand Order of Merit, Dr Dianne McCarthy is quick to point out that the honour is more "about recognising the other people involved, the organisations we work for, the community we're a part of" than about herself.

That's a broad field, with Di's services to science, business and women being recognised. These include seven years as CEO of the Royal Society of New Zealand, being a co-founder of the New Zealand Women in Leadership programme and holding board positions with the Cawthron Institute as well as the Malaghan Institute.

"I really enjoy my work with these institutes, especially the opportunity to be a sounding board and to promote their excellent science more widely," she says.

Ian Paterson

When a letter stamped with the Governor-General's coat of arms arrived, Ian Paterson assumed it was a request for help with another charity auction (something he does regularly). Instead it announced he was to be awarded a Queen's Service Medal for services to philanthropy.

"It was recognition of what our family has done in a whole lot of ways to help the Malaghan, and many other institutions too."

As well as organising auctions and golfing tournaments, Ian and his two daughters have donated a percentage of fees from their real estate company Just Paterson in support of the Malaghan Institute's brain cancer research.

"It's not just about giving money, but giving your time," Ian says. "And it's very satisfying that you're able to help."

Ian Paterson and Astrid Authier-Hall, Senior Research Officer.

News under the microscope

Run for Research 2017

Join us to Run for Research in the Round the Bays runs: Wellington 19 February and Auckland 5 March or the Hawke's Bay International Marathon on 13 May. These events have options that are suitable for everyone. Make it a fun day for all the family, or challenge yourself and your friends – anyone can take part!

See **supportourresearch.co.nz** to find out more.

Run for Research Ambassador and football commentator Jason Pine at the 2016 Wellington event.

Recent grants (July – Sept 2016)

We would like to acknowledge and thank the following Trusts and Foundations for their recent support.

FH Muter Charitable Trust
EM Pharazyn Charitable Trust
Kelliher Charitable Trust
Infinity Foundation Limited
The Thompson Family Foundation Inc
Jennifer Smith Family Trust
Four Winds Foundation
The Nick Lingard Foundation
Brown Chapman Family Trust
John Holt Memorial Trust
Rex & Betty Coker Foundation

YES! I'D LIKE TO ACCELERATE THE PACE OF RESEARCH.

NAME ..... ADDRESS .....

EMAIL .....

I'd like to donate $ ..... to help accelerate the pace of research.

☐ I would like information about making automatic gifts to the Malaghan Institute.

DONATION METHOD

☐ **Credit Card** – Visa / MasterCard / AMEX / Diners

Card number ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐ Expiry ☐☐/☐☐

Name on card ..... Signature .....

☐ **Cheque** – Payable to the Malaghan Institute of Medical Research

Please return to PO Box 7060, Wellington, 6242

Online – www.malaghan.org.nz/support-our-research/donate

Electronic Transfer – Bank Account 06 0507 0052635 30

Please call to inform us of your donation so we can send your tax receipt. Donations over $5 are eligible for a tax refund of up to 33%.

Or call **0800 MALAGHAN** (0800 625 244) to make a donation over the phone

MALAGHAN INSTITUTE OF MEDICAL RESEARCH

Research is our journey. Cure is our destination.

T: +64 4 499 6914 | PO Box 7060 | Wellington 6242 | New Zealand | www.malaghan.org.nz | info@malaghan.org.nz