

Finding the good in the bad: the positives of parasites

Dr Paul Giacomini started his career by researching ways to eradicate parasites but found instead that there was much to learn from them and their battle with the human immune system. Now his research involves infecting willing participants with blood sucking worms and seeing what drugs can be developed through this icky process.

What do you do and what is your research on?

I'm a medical researcher, trained as an immunologist. I study how the immune system works in health as well as in disease and my focus is on the relationship between parasites and the human immune system.

My research involves looking at the beneficial effects of parasitic worms on the immune system. My colleagues and I are looking at how these parasites control the immune response. By understanding this, we will be able to develop new drugs that can treat diseases where the immune system response becomes imbalanced, such as allergies and autoimmune diseases.

What drove you into this field?

My undergraduate and honours degrees were in medical research. I was studying physiology and wasn't interested in continuing in that field. However, I knew I really enjoyed science and the process of undertaking research projects. So, for my PhD I chose a completely different subject – immunology – something I only had superficial knowledge of, but which really appealed to me. There was a logic to the project I was interested in; the tackling of the problem of understanding the complex relationships between worms and the immune system. The immune system wants to kill the worm, and to survive the worm must evolve strategies to suppress that immune response.

I spent my PhD and five years of my USA-based post doctoral position researching ways to eradicate worms and treating gut inflammation in animal models. However, after I returned to Australia to continue my research career, I had the opportunity to



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Degrees:

- Bachelor of Science in Biomedical Sciences
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Key words:

- Immunity
- Inflammation
- Parasites
- Drug development
- Clinical trials

Prizes:

- Queensland Young Tall Poppy Science Award 2016
- Emerging Science Leader in 2017

work on a clinical trial where researchers deliberately infected people with hookworms to see the potentially helpful effects it had on gut inflammatory responses. Through meeting the people who ran and participated in the clinical trial, I found I enjoyed interacting with the end users of my research. Seeing and hearing stories of how these worms could help people who were suffering from inflammatory diseases changed the trajectory of my research career.

Tell us how you got to where you are now.

My PhD was productive in terms of publications, which gave me the momentum to apply for competitive fellowships that could allow me to go anywhere in the world to train. I was successful in gaining work in an internationally renowned lab but was also able to come back to Australia to apply that knowledge and expertise at home. When I came back to Australia, I was able to join a group led by a like-minded Professor researcher in Cairns and since then, I've been able to establish myself as a group leader and can pursue my own research interests.

What's something cool about your research?

People feel icky when they learn that we take parasites from human poo, purify them, and then give them to willing participants. These tiny worms go through the skin, travel around the blood to the lungs and the gut where they live for up to ten years, feeding on blood and nutrients. Sometimes I'm a bit surprised that there are so many willing volunteers! But people who suffer from chronic, currently incurable diseases are motivated after reading of the potential benefits. And since we acknowledge that not everyone wants to be infected with live parasites, we hope our research will be able to identify the compounds that these parasites release to control the immune system, so we can potentially produce these compounds as useful anti-inflammatory drugs.

Is there an important moment in your career that you often look back to?

It all comes back to that first clinical trial. I was initially quite happy doing basic research about the immune system, giving relatively little consideration to how the community could be interested in my findings. However, after we published the results from that trial, people were really interested and saw the potentially life-changing outcomes. The media called, I was on TV, I was getting emails from people who

suffered from immune conditions and wanted to know more. I got many more opportunities to communicate my science to the general public, something I hadn't had the opportunity to do much of before. It made me much more interested in the translational side of my research. I realised what I wanted to do for the rest of my career, I wanted to develop products to better people's health.

“*... we acknowledge that not everyone wants to be infected with live parasites...*”

What is your hope for the future and for future generations?

I hope in the future there will be more investment in science, technology, engineering and mathematics (STEM) research and careers, to help develop and retain highly talented and skilled individuals in Australia. Being a scientist in Australia is an exciting career choice, but it's a bit of a challenge trying to find enough funding for research. Yet, working in STEM has the potential to benefit the community and the Queensland economy. The scientific training here in Australia is so great and I hope that more students can take advantage of that in the future.

What advice would you give to young people who are looking at going into STEM?

Learning STEM subjects will benefit you in so many ways. You don't have to become a scientist or a mathematician. STEM subjects teach you how to learn, think, be curious, ask questions, question everything and solve problems. Through training and learning STEM you develop critical thinking and communication skills, especially around complex concepts, that will help you in any field of work.

You won a Queensland Young Tall Poppy Science Award. How did this benefit you?

In the year I won, I was transitioning from working with another professor to becoming an independent research leader. It gave me opportunities to promote myself and get recognition as someone who had potential, which was important when applying for competitive grants, fellowships and appointments. The Queensland Young Tall Poppy Science Award was pivotal to the advancement of my career.