



# Slaying superbugs to save lives

## A smarter way to fight infection in individual patients.

Infections are not only a direct cause of death in 25 percent of the population, they can also profoundly affect treatment outcomes for cancer, cardiac conditions, respiratory illness, surgery and other non-communicable diseases.

The rise and spread of superbugs – bacteria that are inherently resistant to antibiotics – has become so advanced that for some bacteria no drug now exists to prevent their deadly impact. In Australia alone, these infections kill nearly 200 people every week.

To stop the inappropriate use of antibiotics, the primary enabler of antibiotic resistance, doctors need quick and simple diagnostic tools to identify the infection, new and improved ways to treat patients the first time, and in time.

## Changing how we solve the problem of superbug infection.

UQ's Centre for Superbug Solutions is working in three ways to stop bacteria evolving into invincible microbes. We are looking for new ways to prevent, treat and diagnose infections.

Revisiting and optimising antibiotics previously discovered but not developed into drugs is one approach to treating these deadly infections. Another is crowdsourcing compounds from around the world to uncover their antimicrobial properties and transform them into new antibiotics.

Developing point of care testing is another way to solve this problem, and one that Professor Ian Henderson and his team are determined to deliver.

His unique research on the human immune system and its interaction with the bacterial cell has already led to an effective new treatment.

Professor Henderson found some patients overproduce antibodies. This natural part of the immune system is designed to kill bacteria but in these patients the antibodies actually protect the bacterial cell from death, leading to severe infection. Removing the antibodies

and then applying the drug therapy has worked for these patients when all other treatments failed.

It's not a course of action for every patient or every infection, and right now it's not available to enough clinicians for them to discover if their patients would benefit.

## Impact and outcomes

The Centre is not simply focused on new drugs for new bugs; it's about smarter, faster, targeted response options.

As well as understanding more about the cellular behaviour of bacteria, we're learning why patients respond in different ways to different antibiotic-based treatments.

We're building the knowledge needed to develop precision diagnostic tools so we can detect infections earlier to then determine effective individualised treatments.

***We aim to save more than 700,000 lives every year by preventing antibiotic-resistant bacteria becoming a pandemic problem in an age of faster and far-reaching global interaction.***

# Researcher profile

## Professor Ian Henderson

Professor Ian Henderson leads the push to stem the development of resistant microscopic killers. Studying bacterial cell surfaces and how they interact with the human immune system has already led to innovative treatment possibilities for outsmarting superbugs.

Professor Henderson's team focuses on the genes that are important for building the cell membrane of bacteria. Using genetic, biochemical and structural techniques they investigate the activity, regulation and function of these genes and their products. Their discoveries are helping IMB explore new preventative, diagnostic and treatment options, such as vaccines, biomarkers and drug therapies.

Next-generation rapid and accurate diagnostics will help frontline healthcare professionals quickly identify the bug causing the infection so patients can receive the right treatment the first time.

Creating opportunities to connect with clinicians and learn about their patients will allow Professor Henderson and his team to develop more accurate and timely infection-to-intervention matches... and ultimately to save more lives.

## Your opportunity to support game changing research at IMB

Here are just a few ways that giving to UQ's Institute for Molecular Bioscience research can help transform how we save lives from the impact of infection.

\$2,500	Supports early career researchers to launch preliminary experiments to develop crucial rapid diagnostic tools.
\$10,000	Covers the costs of a year's scientific consumables for one team member's research investigations.
\$50,000	Can fast track clinical trials that will close the gap faster between what's proven in the lab to what's effective for patients.
\$100,000	Delivers a diagnostic tool to front-line healthcare practitioners around the world sooner.

We welcome your suggestions for other ways to support IMB's research and help accelerate the translation of discoveries into patient benefits.

## For more information contact:

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*"In high school, I was fascinated by the idea that something so small could have a devastating and long lasting impact on humanity – the Irish potato famine reducing a country's population growth by five million, the plague wiping out 50 percent of Europe's people in the Middle Ages. The deadly Spanish flu just a hundred years ago was only stopped by death and people developing immunity. These catastrophes were caused by microbes. I wanted to know how and why. Given the arrival of COVID-19 and the global fight at hand, I have never been more inspired to accelerate this scientific discovery."*

## Professor Ian Henderson

*Institute for Molecular Bioscience*



**#1** Australian research institute, based on the Nature Index



**1454** international collaborators from 48 countries



**>20%** of patent families at UQ are derived from IMB research