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Fight against deadly parasite

Two Queensland professors are on the cusp of creating an anti-malaria vaccine

ROB KIDD

FOR more than one million people every year, the buzz of a mosquito represents a death sentence.

There were 219 million cases of malaria, a mosquito-borne virus, in 2010, according to the World Health Organisation. The Seattle-based Institute for Health Metrics and Evaluation estimates 1.2 million of those infected died.

According to WHO, 90 per cent of malaria deaths are in Africa, where a child dies from the disease every minute.

But Queensland scientists are fighting on two fronts to combat the devastation malaria brings to the world's poorest.

As a young doctor in Brisbane, Griffith University Professor Michael Good decided to dedicate his working life to finding a way to prevent the suffering he witnessed in hospital wards.

In 1985, Good began research into malaria and today he leads a team at the Institute for Glycomics that is on the cusp of creating an effective vaccine.

"Our main discoveries have been that the parasite has evolved clever mechanisms to avoid immunity by changing its coat proteins in the precise regions that are recognised by the immune system," Good says.

"We then observed that we could trick the parasite and induce a very novel type of immune response that it had not learnt how to evade."

The parasite's DNA is treated with a drug which "puts it to sleep", or induces attenuation. In that state the parasite cannot replicate or grow but continues to travel around, giving the body time to develop immunity.

"Injected in small doses in mice, this induces a type of immune response the parasite has not learnt to escape from," Good says.

"We believe that this is how it will work in humans too.

"We are in the midst of two Phase I (first in human) trials and it is a very exciting time. The trials are primarily to monitor safety.

"The next trials will focus more on efficacy – does it work?

"If all goes well there could be a vaccine in five to 10 years."

At Griffith's campus in the southern Brisbane suburb of Nathan, Professor Vicky Avery from the Eskitis Institute, a drug discovery research centre, is working on a different approach to reduce the impact of the same deadly disease.

She was drawn to medical research after seeing the effects of malaria during a post-PhD trip around Africa.

"I came away with a very, I guess, deep and lasting impression of what these diseases can do," Avery says.

Avery and her team have spent seven years on their High Throughput Screening for Medicines for Malaria Venture to identify starting points for drugs to treat the disease.

Last month, an international project involving researchers from the Eskitis Institute discovered a molecule, ELQ-300, which could form the basis of powerful anti-malaria drugs.

The molecule is significant because it can target multiple stages of the malaria parasite's life cycle and, potentially, lead to drugs that have both a therapeutic effect and prevent transmission of the disease.

"The gametocyte, the sexual stage of the parasite, is what we're trying to attack now because that's what is taken up by the mosquito. It's only that form that can survive in their gut," Avery says. "To eradicate

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malaria it is essential that this step in the life cycle is stopped."

It is also essential any drug or vaccine is affordable for those who need it most.

"There is no point developing a vaccine that people in developing countries cannot afford," she says.

Good says he believes his team's approach, if successful, will also be "very cheap".

The number of malaria deaths peaked in 2004, but has fallen every year since.

In its 2012 malaria report, WHO estimates the proportion of households in sub-Saharan Africa with at least one insecticide-treated mosquito net has risen from 3 per cent in 2000 to 53 per cent in 2012.

The past decade has also seen "tremendous expansion" in malaria control programs. Avery says there are "thousands and thousands" of papers being published about different aspects of treating and preventing malaria.

Even so, she says the parasite is "incredibly clever" and wiping out malaria is a "big ask".

If all goes well there could be an anti-malaria vaccine in five to 10 years

Good believes "a lot will happen in the next 10 years" but says continued investment in health research is critical.

"Or we will lose our best and brightest overseas and our now-proud health record will slip quickly," he says.

"I am particularly disappointed that more effort has not been placed into attracting more bright Australian students into science and research.

"More than half of my own lab are not Australian citizens and about two-thirds were born overseas."

Both agree that, with researchers around the world working on various strategies, the best hope is through working together, a point brought home to Avery at a recent Bill & Melinda Gates Foundation meeting.

"It was quite humbling in providing an important reminder of how much more is required in this field to achieve the ultimate goal of eradication," she says.

"We all came to the realisation that the only way forward is through collaboration and each of us, in his or her way, is contributing to this amazing puzzle, slowly, but surely."

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TEAM WORK: Professor Vicky Avery in her Griffith University lab and her Gold Coast-based colleague Professor Michael Good (below).