Breakthrough in fighting hookworm parasite

Researchers at the Malaghan Institute of Medical Research have made a discovery that could lead to a vaccine against hookworm, a parasite that plagues an estimated one billion people worldwide.

Once in a host, hookworms suck blood voraciously from the walls of the small intestine causing significant risk of anaemia, a decrease in red blood cells, and loss of iron and protein in the gut.

Hookworm is a leading cause of maternal and child fatalities in developing countries. It can cause intellectual retardation, premature births and low birth weight.

"There is an urgent need to identify the immune mechanisms that can protect against hookworm infection," says Professor Graham Le Gros, Director of the Malaghan Institute and Head of the Institute's Parasitology Research Programme.

The current approach to controlling hookworm involves frequent use of antihelminthic drugs in school-age children, however, high rates of re-infection occur soon after treatment and there is evidence of emerging drug resistance.

"Vaccination is currently viewed as the only long-term solution for reducing the enormous burden this disease imposes on developing countries," says Professor Le Gros.

The Malaghan Institute researchers found that the lung was the critical site for establishing immunity against hookworm and have just had their work accepted for publication in the international scientific journal *Infection and Immunity*.

"Our findings imply that for a vaccine to be effective it must target the immune cells resident in the lung and stimulate a specific kind of immune response that we have not yet discovered," said Dr Marina Harvie, who did this research as part of her PhD thesis.

Professor Le Gros says that it is difficult to develop and trial vaccines against complex parasites such as human hookworm.

To get around this problem, Professor Le Gros' research group has studied the rodent helminth parasite, *Nippostrongylus brasiliensis*, which can be considered a laboratory model of human hookworm infection.

Professor Graham Le Gros

Key words:

Hookworm parasite, anaemia, maternal and child fatalities, helminth parasite, vaccines, immune cells

Aims of this research:

To identify the immune mechanisms that can protect against hookworm infection, and would lead to a vaccine against the hookworm parasite

Ms Mali Camberis, a senior scientist that has been involved in this research for over a decade, says she has always been intrigued by parasites and enjoys the challenge of working with this fascinating creature.

"If we can understand what is happening in the simpler rodent parasite model, then we are far better placed to be able to apply this information to the human hookworm situation," she says.

The HRC recently granted $1.2 million to develop this pioneering research.

"With our HRC funding we will be able to progress this research even further," says Professor Le Gros. "It could alleviate suffering and economic stalemate for over one billion people."

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