New Otago collaboration brings oral TB vaccine for humans closer

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Researchers in New Zealand are inching closer to the development of the first effective oral vaccine to protect against tuberculosis - a disease which still kills more people worldwide than any other bacterial disease.

A new study, led by Dr Joanna Kirman from the University of Otago's Department of Microbiology, has found that in mice, an innovative oral vaccination formula can induce stronger and longer-lasting immune response compared to the current needle vaccination against TB.

In New Zealand there are about 600 notifications of the disease each year, with 300 new cases diagnosed.

For an oral vaccine to work, the bacteria need to be alive. This problem is overcome with the development by Dr Frank Aldwell and colleagues from University of Otago-based Immune Solutions Ltd of a lipid formulation called LiporaleTM, , a formula that coats the BCG bacteria, allowing them to survive the harsh environment of the stomach.

Dr Kirman and colleagues Dr Aldwell, the Malaghan Institute's Fenella Rich , and University of Otago PhD student Lindsay Ancelet, compared the immune response in the spleen and lungs of mice vaccinated with the new formulation, LiporaleTM-BCG, to the response from the traditional injected vaccination.

"LiporaleTM-BCG vaccination induced a long-lived immune response, evident by the detection of increased numbers of tuberculosis-specific T

cells in the lungs and spleen up to 30 weeks after vaccination," Dr Kirman says.

"These results demonstrate that orally delivered LiporaleTM-BCG vaccine induces a long-lived multi-functional immune response, and could therefore represent a practical and effective means of delivering new BCG-based TB vaccines."

These promising results are published today in the peer-reviewed open access international journal, PLOS ONE

Dr Kirman says the oral vaccine, potentially delivered as a syrup or pill, would be easier to administer. Most importantly, it targets the mucosal immune system - a network of the gut and respiratory tract where the immune response is regulated differently from the systemic response triggered by injected vaccines.

TB causes more deaths worldwide than any other bacterial disease. Latest estimates from the World Health Organisation show that in 2010, 8.8 million people became ill with TB and 1.4 million people died, mostly in developing countries including Africa, South-East Asia, Eastern Europe and the Western Pacific.

Dr Kirman says antibiotic resistance to tuberculosis is also increasing.

"In 2010 New Zealand had its first case of extensively drug-resistant TB (XDR) which is incredibly difficult, and sometimes impossible, to treat. That is why we think prevention through vaccination is so important."

Dr Kirman says the researchers are hoping the vaccine will attract more Health Research Council funding to further understand this immune response and to undertake the necessary safety tests. In addition, the not-for-profit product development organization, AERAS, dedicated to the

development of effective tuberculosis vaccines in the US, has undertaken to conduct further tests on the vaccine.

Provided by University of Otago