

Tuberculosis vaccine research could benefit the elderly and diabetics

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A study of older mice with type 2 diabetes has yielded highly promising results for researchers investigating potential new vaccines for tuberculosis (TB).

A team of researchers from Australia, Bangladesh and France

investigated a potential vaccine, BCG::RD1, and found it highly protective when administered directly into the lungs of diabetic mice, which were then exposed to TB.

According to the World Health Organisation, TB is one of the top 10 causes of death world-wide, and the leading cause from a single infectious agent. The only currently licensed vaccine, BCG, is not effective in adults.

"These findings are especially welcome because type 2 diabetes is not just a significant risk factor for TB, it's a risk factor that becomes more widespread every year in our [aging population](#)," said senior author Dr. Andreas Kupz, a Senior Research Fellow at the Australian Institute of Tropical Health and Medicine (AITHM) at James Cook University.

Lead author and AITHM researcher Harindra Sathkumara said BCG::RD1 proved highly protective when administered to older, diabetic mice, acting not only on T cells but also on the other immune cell subsets, to mount a robust response against the TB-causing bacteria.

"We observed a remarkable level of protection against TB, with a significant increase in immune responses in the lungs of the diabetic mice," he said.

"By comparing the responses of older mice and younger [mice](#), we have also gained insight into how type 2 diabetes increases the risk of TB.

"It appears that type 2 diabetes negatively impacts on how our immune system senses tuberculosis-causing bacteria in the lung and that vaccination with BCG::RD1 can overcome this defect.

"This makes BCG::RD1 a promising candidate for further investigation with a view to use as a [vaccine](#) for older people and those with type 2

[diabetes.](#)"

In future studies the team aims to further investigate the specific immune pathways that are activated by vaccination with BCG::RD1.

Dr. Kupz said multidrug-resistant TB remains a public health crisis, and makes work on new vaccines particularly important.

"That's why at AITHM we work with Australian and international collaborators to develop and test potential new vaccines, as well as to improve the effectiveness of existing treatments," he said.

The research is published this week in *PNAS*.

More information: Harindra D. Sathkumara et al., "Mucosal delivery of ESX-1–expressing BCG strains provides superior immunity against tuberculosis in murine type 2 diabetes," *PNAS* (2020).

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Provided by James Cook University

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