Better vaccines for tuberculosis could save millions of lives

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Cases of one of the world's deadliest diseases—tuberculosis—are rising at an alarming rate, despite widespread vaccination. Reasons for the ineffectiveness of the vaccine, especially in regions where this infectious disease is endemic, as well as arguments for replacing the existing vaccine with novel synthetic vaccines, are presented in a review published online August 28th in *Trends in Molecular Medicine*.

"Tuberculosis is a global health threat, and it is a highly communicable disease that may influence practically anyone and everyone," says senior author Javed Agrewala of the CSIR-Institute of Microbial Technology in Chandigarh, India. "There is a serious need and challenge for the scientific community to develop alternative vaccination approaches for the control of the disease."

Tuberculosis is a bacterial infection caused by Mycobacterium tuberculosis (Mtb). About one third of the world's population is infected with Mtb, which causes about two million deaths each year. Vaccines may be the best strategy for controlling tuberculosis, but the only available vaccine—Bacillus Calmette-Guerin (BCG)—does not reliably prevent the disease in adults, especially in regions where tuberculosis is endemic.

In the review, Agrewala explains that BCG does not work well in these regions because exposure to prevalent mycobacterial strains triggers the production of antibodies that counteract the vaccine. In addition, infections with parasitic worms called helminths interfere with

protective immune responses induced by BCG.

To overcome these limitations, Agrewala proposes the use of novel vaccines called lipidated-promiscuous-peptide vaccines. These synthetic vaccines are safer than BCG because they do not contain infectious material. Moreover, they generate long-lasting, protective immune responses and are not influenced by pre-existing antibodies. This type of vaccine strategy has already proven to be successful in an animal model of tuberculosis and is being tested in human clinical trials for other infectious diseases and cancer.

"We believe that lipidated-promiscuous-peptide vaccines have all the essential qualities that can make them successful in tuberculosis-endemic countries," Agrewala says. "Such vaccines can impart better protection than BCG and will have a long-reaching positive impact on millions of people."

More information: Gowthama et al. "Lipidated promiscuous peptides vaccine for tuberculosis-endemic regions" dx.doi.org/10.1016/j.molmed.2012.07.008

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