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Driving innovation from discovery to access

A promising mucosal protein vaccine against tuberculosis

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Background: The attenuated Mycobacterium bovis Bacillus Calmette-Guérin (BCG) has been the only vaccine available for humans for more than 100 years. BCG is effective against tuberculosis (TB) in children up to 10 years old, but protection against pulmonary TB in adults remains controversial. Furthermore, BCG does not protect after 10–15 years of vaccination in endemic countries. Thus, in order to eradicate TB, better vaccines are required. We developed a multistage vaccine candidate composed of Mycobacterium tuberculosis (Mtb) antigens secreted during the active (Ag85A) and latent (Rv2626c) phases of infection plus the mucosal adjuvant U-Omp19. The sublingual and intranasal routes were used to deliver the vaccine candidate with the goal of improving mucosal immunity to control Mtb infection.

Methods: Balb/c mice were immunized by the sublingual or intranasal routes with Rv2626c and Ag85A recombinant proteins, together with the U-Omp19 adjuvant three times every 7 days. Mice were immunized with PBS or BCG as negative and positive controls, respectively. 4 weeks after the last immunization, the animals were challenged with the pathogenic H37Rv Mtb strain by intratracheal inoculation. Thirty days post infection, the spleen and lungs were removed and Mtb CFU counting was performed.

Results: The Rv2626c+Ag85A+Omp19 vaccine candidate induced higher protection than BCG, as evidenced by lower CFU counts in spleen and intranasal immunization proved to be more effective than sublingual vaccination in protecting mice lungs.

Discussion and conclusion: The multi-stage vaccine candidate was effective in conferring protection against Mtb infection, specially by the intranasal route. Therefore, it could significantly reduce bacterial load and be more effective than BCG. Our results show that: i) different mucosal routes induce diverse host responses in the mouse and ii) that the use of U-Omp19 as an adjuvant could improve the immune response conferred by the vaccine candidate.

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Conflicts of Interest

None