Abstract for the general public

Tuberculosis (TB) is notoriously tricky to diagnose, especially in its latent form. Latent TB Infection (LTBI), characterized by a persistent immune response to Mycobacterium tuberculosis (Mtb) antigens without clinical evidence of TB disease, represents a substantial reservoir for future TB cases. The absence of a gold standard for latent tuberculosis infection (LTBI) diagnosis poses a significant challenge in the accurate identification of individuals with this condition. Unlike other diseases, LTBI diagnosis does not rely on the direct presence of bacteria but rather on detecting the immune response to Mycobacterium tuberculosis (Mtb) antigens. Currently, widely used diagnostic methods, such as the tuberculin skin test (TST) and interferon-γ release assays (IGRAs), serve as indirect indicators of LTBI.

The lack of a definitive gold standard means that LTBI identification is a complex process, involving the interpretation of immune responses rather than direct microbial detection. The significance of this research lies in addressing the limitations of existing TB diagnostic tools, especially in distinguishing active TB from LTBI. Successful outcomes from this project can contribute to the development of an improved IGRA, impacting global TB prevention and treatment efforts.

Our research is driven by the urgent need to overcome the limitations of current diagnostic tests. By focusing on specific antigens associated with Mtb dormancy phase, we aim to develop tools that can distinguish between latent infection and active disease. Our mission is to revolutionize the way we detect and understand TB. TB is a silent threat affecting millions globally, and our goal is to develop advanced tools for its early detection and precise diagnosis.

We are looking for antigens that can be used as markers for early TB infection. Our approach involves using sophisticated computer modeling tools to predict which molecules provoke the strongest immune response during LTBI. This insight guides our selection of antigens for experimental validation. By combining computational predictions with real-world experiments, we are striving for an advance in TB detection.