



Infectious
Diseases Labs

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Prof Bavesh Kana

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Tuesday 13th Jan 2026

4:00 PM to 5:00 PM (SGT)

Venue: Codon A & B, Matrix Level 5

Engineering Enhanced TB Vaccines Through Peptidoglycan Modification

Tuberculosis remains a leading cause of infectious disease mortality worldwide, with the century-old BCG vaccine providing insufficient protection against pulmonary TB in adults. Recent insights into mycobacterial immune evasion mechanisms reveal promising avenues for rational vaccine design. Pathogenic mycobacteria, including the BCG vaccine strain, enzymatically mask the NOD-1 immune receptor ligand (iE-DAP) through peptidoglycan amidation, limiting immune recognition and protective responses.

In this talk, Prof. Kana will present breakthrough research demonstrating how targeted depletion of peptidoglycan amidation enzymes (MurT-GatD) using CRISPRi technology unmasks this critical immune epitope in BCG. The resulting recombinant vaccine (rBCG::iE-DAP) exhibits enhanced immunogenicity, inducing robust NOD-1 activation and improved trained immunity in macrophages. Preclinical studies in murine models demonstrate superior protection against TB challenge compared to standard BCG, with sustained efficacy and enhanced early immune responses.

These findings establish peptidoglycan amidation as a rational target for next-generation TB vaccine development and demonstrate the feasibility of gene regulation platforms for bespoke antigen presentation. This work also offers novel strategies to overcome limitations of current vaccines and holds significant potential for global health impact.

Prof Bavesh Kana directs a research and innovation unit at the University of the Witwatersrand in South Africa. Renowned for his groundbreaking work, he focuses on developing innovative tuberculosis drugs that reduce treatment duration and minimize side effects. Beyond this, his efforts extend to advancing vaccine development and establishing clinical cohorts to better understand tuberculosis treatment responses and disease transmission. His research has yielded tangible results, including diagnostic quality assurance products now utilized in over 50 countries and the launch of a biotech spinout company. Professor Kana's contributions have earned him widespread recognition, such as his appointment as an Early Career Scientist of the Howard Hughes Medical Institute and his inclusion among South Africa's top 200 young achievers. Prestigious honours, including the South African Medical Research Council Scientific Merit Award and the National Research Foundation Societal Impact Award, underscore his transformative impact on communities and global health.

Hosted by: A/Prof Amit Singhal

Seminar is open to all. No registration required.

Questions? Contact us at seminars@idlabs.a-star.edu.sg

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