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Natalia Freund

Tel Aviv University, Israel

Revealing the role of antibodies during chronic HIV-1 and *Mycobacterium tuberculosis* infections in humans

One of the major re-emerging public health threats is *Mycobacterium tuberculosis* (MTb). According to the WHO, one of every three individuals in the world was infected with MTb. This number is expected to increase due to an increasing population of patients with HIV-1 and the increasing incidence of drug-resistant MTb strains. The existing BCG vaccine shows a very low efficacy in preventing new infections. Thus, MTb will pose an even higher threat in the future, requiring the development of new strategies to diagnose, treat and prevent MTb. Previous studies of the natural immune response to MTb have focused mainly on the role of T-cells. Recently, several reports suggested that anti-MTb antibodies could contribute to protection. While advancements were made, several major questions remain unanswered, including which B-cell clones are elicited during infection, how different antibodies correlate with the different disease stages and what is the mechanism of anti-MTb antibody neutralization. Our goal is to reveal the role of B-cell immunity to MTb and based on this, develop antibody-based diagnostics, therapeutics and immunogens against MTb. To achieve this goal we combine single-cell methods, human immunology and protein engineering. We cloned and express five MTb proteins, which are potential targets for antibodies. These antigens were used to screen sera from MTb-infected individuals by ELISA and identify “Elite Responders”, patients who exhibit high antibody responses against MTb. We then apply single B cell sorting to identify and sort MTb-specific memory B cells and sequence the antibodies they express.

Biography

Natalia Freund is specializing in antibody response towards infectious diseases. Until recently she has been investigating the antibody response in HIV-1 infected patients at The Rockefeller University in New York. During her work, she isolated several anti-HIV-1 neutralizing antibodies that were found efficacious in pre-clinical studies. Recently, she moved to Tel Aviv University where she is continuing to carry out cutting-edge research on the antibody response during both Tuberculosis and HIV-1 infection.

nfreund@tauex.tau.ac.il

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