Early Stage Detection and Diagnosis of Tuberculosis Infections

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Technology description

Tuberculosis (TB) infections are a major global health problem and one of the leading causes of death worldwide. According to the WHO, in 2016 there were an estimated 10.4 million new cases of TB, globally, with about 1.7 million associated deaths. Early and rapid diagnosis and treatment are essential for reducing morbidity, mortality and transmission of TB. However, current serological tests are insufficiently sensitive and specific, often because they are based on too limited a number of antigens to capture the diversity of TB cases. New biomarker targets need to be identified to develop reliable and simple test for TB in endemic regions.

Researchers at the Biodesign Institute of Arizona State University in collaboration with a colleague at the Albert Einstein College of Medicine have identified novel immunogenic biomarkers associated with TB infections for the diagnosis and treatment of TB. Utilizing their superior NAPPA platform, a panel of 40 biomarkers were identified that can be applied in the serological diagnosis of active TB. Sera from HIV uninfected and co-infected tuberculosis patients as well as controls from two different geographic regions (US and South Africa) were probed to identify the comprehensive biomarker panel. These biomarkers were deconvoluted and further validated with another 124 biologically independent samples.

These biomarkers contribute greatly to the spectrum of already identified TB targets, and, because they are developed into panels, show improved performance in the serological diagnosis of active TB infections.

Application area

- Active TB Serodiagnosis
- TB targets for developing treatments/vaccines

Advantages

- This platform has identified novel valuable targets for TB serodiagnosis that might not have been discovered with conventional array platforms

• Easily scaled up into rapid, robust dip-stick formatted tests
• Low cost
• Can be used in remote and very resource-limited settings
o Does not require advanced training or expensive and specialized laboratory infrastructure
• Using a panel improves diagnosis resolution due to the complexity of TB
o The panels can distinguish TB patients from noninfected or latently infection subjects, with and without HIV coinfection
• Classifiers were developed, and with ROC curve analysis under cross validation, the classifiers performed with an AUC for US/HIV- at 0.807; US/HIV+ at 0.782; SA/HIV- at 0.868; and SA/HIV+ at 0.723
• Does not require a respiratory tract sample

Institution

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