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Method for Improved Pathogen Detection

Stanford researchers have developed a more sensitive and accurate pathogenic infection diagnosis method using intact genetically modified pathogens. Pathogen infection clinical diagnosis requires direct pathogen detection or the detection of pathogen specific antibodies. Antibody detection is often the more reliable method of diagnostic testing. However, current methods have significant limitations, which can lead to inaccurate diagnostic results. To improve results, the inventors developed technology to diagnose pathogenic infection and analyze immune response to infection. The method uses specifically developed diagnostic pathogens-intact pathogens that have been genetically altered to express a fluorophore and to eliminate expression of conserved proteins and epitopes that are shared by many pathogens. The diagnostic pathogen is exposed to the patient sample and then analyzed for pathogen specific antibodies and the isotype distribution of the antibodies. This method provides a more sensitive and specific diagnosis of pathogens, analysis of the immune response to such pathogens, and informed, targeted treatment of the infection.

Stage of Development: Research In Vivo
Using only a small drop of blood, the inventors detected Borrelia Burgdorferi (the pathogen that causes Lyme disease) infection in live mice within the first week of infection. The method also identified critical ratios between different types of antibodies that provides valuable insight into the immune response.

Applications

- Diagnostic for:
    - Infectious disease, including Lyme disease
    - Allergies
- Vaccine design

Advantages

- Diagnostic pathogen designed to allow rapid identification of live, intact, active pathogens
- High sensitivity
- High specificity
- Method maintains proteins in their native conformation for maximal antibody epitope recognition
- Simultaneous resolution of multiple pathogen specific antibody isotypes
- Unlike existing technologies, can measure all antibody subtypes not just IgG and IgM
- More precise determination of the immune response
- More informed, targeted treatment of infection

Patents

- Published Application: WO2020072534
- Published Application: 20220034880

Innovators

- Michal Tal
- Irving Weissman

Licensing Contact

Minxing Li

Licensing and Strategic Alliances Manager

Email