Docket #: S16-097

DMN-Tre: A probe for the rapid, simple, and specific detection of mycobacteria with applications for the rapid diagnosis of *M. tuberculosis* in sputum from TB patients.

TB is the leading cause of death from infectious disease worldwide. Current gold standards for identifying *Mycobacterium tuberculosis* (Mtb), the causative agent of tuberculosis (TB), in patient sputum samples are lengthy processes that depend on method and technician quality. As such, there is a need to improve the diagnostics accuracy, simplicty and specificity for TB. Stanford researchers have developed an environment-sensitive probe (DMN-Tre) for fast and accurate detection of mycobacteria. DMN-Tre is a solvatochromic trehalose conjugate that undergoes dramatic fluorescence enhancement when incorporated into mycobacterial cell wall. As a result, this probe enables the rapid, no-wash visualization of a panel of mycobacterial and corynebacterial species without nonspecific labeling of gram-positive or –negative bacteria. Additionally, DMN-Tre selects for live organisms and is able to detect Mtb in sputum sample from TB patient. Thus, DMN-Tre has a wide range of applications in microbiology research and medicine.

Figure

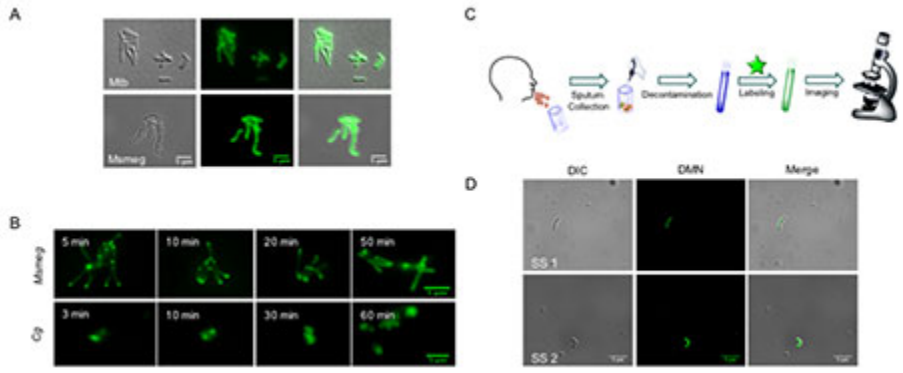


Figure Description: **(A)** *M. smegmatis* and *M. tuberculosis* labeled with DMN-Tre. **(B)** *M. smegmatis* and *C. glutamicum* mycomembrane biosynthesis can be monitored with DMN-Tre. **(C)** Schematic of DMN-Tre protocol as a diagnostics reagent against Mtb in sputum sample. **(D)** M. tuberculosis can be specifically labeled in sputum samples (SS).

Stage of research: The inventors have demonstrated that DMN-Tre can distinguish drug-killed and drug-resistant mycobacteria and the probe will be entering clinical trial testing as a diagnostic in South Africa.

Applications

- Allows for trehalose glycolipid biosynthesis imaging studies.
- Can be used as a viability assay reagent in research.
- Detects live *M. tuberculosis* in TB patient sample.
- Can be used to monitor *M. tuberculosis* viability in TB patient during the course of treatment.

Advantages

- Simple, accurate and specific for mycobacteria and corynebacteria - can visualize Mtb in patient's sputum with no wash steps
- Low cost

- Easy to use - no additional extensive training required
- Little to no background fluorescence from unincorporated probe

Publications

- Mireille Kamariza, Peyton Shieh, Christopher S. Ealand, Julian S. Peters, Brian Chu, Frances P. Rodriguez-Rivera, Mohammed R. Babu Sait, William V. Treuren, Neil Martinson, Rainer Kalscheuer, Bavesh D. Kanaand Carolyn R. Bertozzi Rapid detection of Mycobacterium tuberculosis in sputum with a solvatochromic trehalose probe *Science Translational Medicine* 28 Feb 2018, V 10, Issue 430 DOI: 10.1126/scitranslmed.aam6310

Patents

- Published Application: 20190169671
- Issued: 11,884,956 (USA)

Innovators

- Mireille Kamariza
- Carolyn Bertozzi
- Peyton Shieh

Licensing Contact

Kimberly Griffin

Technology Licensing and Strategic Alliances Manager

Email