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Investigating the biomarker potential of host proteins and development of lateral flow assays to detect Mycobacterium bovis infection

Tuesday, 10 October 2023 13:00 (15 minutes)

Mycobacterium bovis (M. bovis), a globally prevalent pathogen, causes zoonotic tuberculosis (zTB) in humans and bovine tuberculosis (bTB) in cattle; with significant public, animal welfare and economic impact. While efficient control measures in cattle in some countries rely on test and cull, the field under-performance of diagnostics is a significant challenge. We screened a panel of host immune proteins; and developed up-converting reporter particle (UCP) based lateral flow assays (LFAs); which have proven applications in human TB diagnostics.

Samples from naïve and M. bovis experimentally challenged cattle with or without prior BCG vaccination were tested by ELISA. Levels of bovine tuberculin (PPDb) specific IL-2, CXCL10 and CCL4, in addition to IFN-γ, showed promising biomarker potential to not only identify M. bovis infection but also enabled Differentiation of M. bovis Infected animals from BCG Vaccinated Animals (DIVA).

UCP-LFAs were developed to detect six bovine proteins (IFNγ, IL-2, IL-6, CCL4, CXCL9 and CXCL10). PPDb specific levels of IFNγ, IL-2, IL-6, CCL4 and CXCL9 determined by UCP-LFAs discriminated M. bovis challenged animals from naïve (area under the curve [AUC] range: 0.87-1.00) and BCG vaccinated animals (AUC range 0.97-1.00). This is the first report of UCP-LFA technology for bTB detection. This builds to our on-going efforts of developing a robust, user-friendly multi-biomarker test (MBT) with enhanced diagnostic accuracy for bTB and zTB diagnosis.

Keywords

Biomarkers, bovine tuberculosis, chemokines, cytokines, diagnostics, DIVA, upconverting reporter particles, UCP-LFA

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Professional Status of the Speaker

PhD Student

Junior Scientist Status

Yes, I am a Junior Scientist.

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