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Title: Detection of volatile organic compounds in cattle naturally infected with *Mycobacterium bovis*

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Body: We report a novel method in detecting *Mycobacterium bovis* infection in cattle based on identifying unique VOC (volatile organic compounds) profiles in the breath of cattle. The study was conducted on breath samples collected from cattle on an *M. bovis*-infected dairy in southern Colorado, USA. All animals were skin test positives; the presence of disease was either confirmed or infirmed after necropsy. Negative controls included breath samples from animals on two tuberculosis-free dairies in northern Colorado. Gas-chromatography/mass-spectrometry analysis revealed significant differences between *M. bovis*-infected and non-infected animals in the concentrations of 15 VOC's, allowing for distinctly different VOC patterns.

Based on these results, a nanotechnology-based array of sensors was tailored for detection of *M. bovis*-infected cattle via breath. The tailored system successfully identified all *M. bovis*-infected animals (8/8) while 21% (3/14) of non-infected animals were misclassified as *M. bovis*-infected.

The method shows promise in identifying unique VOC patterns in cattle with bovine tuberculosis. Applicability in humans warrants further study.