

Abstract Submitted
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Fast and sensitive detection of infectious agents using NMR-based sensors HAKHO LEE, TAE-JONG YOON, HUILIN SHAO, RALPH WEISSLEDER, Massachusetts General Hospital / Harvard Medical School — Direct detection of pathogens is key in combating human infections, in identifying nosocomial sources, in surveying food chains and in biodefense. When abundant, bacterial specimen can often be diagnosed by microscopy. Difficulties arise when specimen are scant, the bacterial counts are low, or samples are in complex media such as tissues or blood. Here, we report a new simple nanoparticle-based platform that can be readily used to detect pathogens in native biological samples. In this approach, bacteria are targeted by magnetic nanoparticles, concentrated into a microfluidic chamber, and detected by a miniaturized nuclear magnetic resonance (NMR) system. When applied to diagnose tuberculosis in unprocessed sputum samples, the system demonstrated an extraordinary sensitivity, detecting 20 bacteria/ml in < 30 min. This new detection platform could be an ideal point-of-care diagnostic tool, especially in resource-limited settings.

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