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Disposable Diagnostic for Pathogens in Body Fluids for Use in Resource-Poor Environments

Diagnostics for point-of-care detection and identification of pathogenic organisms in clinical specimens often sacrifice detection limit for speed. In the rapid spread of life-threatening diseases, early diagnosis is of great importance. In such situations, however, pathogen counts will be very low, which also presents a significant challenge to diagnostic methods. We have addressed the urgent problem of determination of pathogens in whole blood (and other body fluids) in resource-poor environments with the development of technologies that provide detection limits as low as a few microbes per mL with no requirement of an outgrowth step.

The body fluid sample is inserted into a self-contained disposable using a syringe which remains in the disposable. All pathogens in the sample are captured from the body fluid on a ligand-coated surface. The captured pathogens are then bound with a ligand-attached dye that also binds pathogens en masse or, alternatively, one that is pathogen specific. This disposable is then placed in a ruggedized hand-held reader which measures the fluorescence of the dye(s). No added reagents are needed. The entire process takes approximately 5 minutes from the time of syringe insertion and is operable in the 4-50°C range. The battery-powered reader and disposables easily fit into a backpack. The diagnostic platform also lends itself to 'plug and play' modifications that include simultaneous, multi-wavelength fluorescence detection of up to eight different analytes in the patient sample.

Biography

Linda S. Powers is the Thomas R Brown Chair in Bioengineering and Professor of Electrical and Computer Engineering as well as Biomedical Engineering. After receiving her PhD from Harvard University, she was a member of technical staff at AT&T Bell Laboratories. She has a broad scope of expertise from biochemistry to electrical engineering and has authored more than 135 technical publications in refereed journals. She is a fellow of the American Physical Society and the American Institute of Chemists and her honors include the First US Bioenergetics Award of the Biophysical Society. She has two start-up companies based on technologies she has developed.

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