Multicolor Nanoparticles for Multiplexing of Lateral Flow Immunoassays
Technology #18118

Applications

This technology can be used for sensitive detection of multiple analytes in a biological sample for highly accurate and low cost diagnostics.

Problem Addressed

Lateral flow assays (LFA), a type of immunoassay, are used for detection of analytes in biological samples. LFAs are robust and inexpensive, are easily transportable at ambient temperature, and do not require power or specialized reagents, making them ideal for point-of-care diagnostics. Furthermore, LFAs require only one step, whereas similar ELISA assays require multiple steps.

Multiplexing, the detection of more than one biomarker in a single assay, is desirable because it increases speed, lowers costs, and allows the user to screen for multiple agents simultaneously. However, multiplexed LFAs are prone to false positive results due to the inability to discern the simultaneous responses of multiple labels. This technology is an improved multiplexed LFA design that is not only highly sensitive and easy to use, but also employs nanoparticles as novel detectible labels with numerous advantages outlined below.

Technology

This technology comprises of a porous matrix strip that allows capillary flow, a sample pad to absorb the liquid sample, and a test area capable of detecting at least two analytes. The design also optionally includes either a positive or negative control area, a wick pad to absorb excess reagents, and backing or housing for the assay strip. The strip is small and portable, requiring only a minimal biological sample for quick detection, and requires little training for proper use. This invention is highly sensitive and is able to detect analytes in concentrations on the order of 1ng/ml and has successfully distinguished between dengue, yellow fever, and Ebola viruses, of which dengue and yellow fever belong to the same genus and family. While detection labels depend on intended detection methods, nanoparticles offer distinct advantages since they allow multiplexed analysis in a single channel and do not require an external excitation source. Furthermore, nanoparticles display different colors within the visible spectrum that may be tuned by varying their shape and size. Not only are these colors easy to distinguish by sight, they are also resistant to photobleaching. This invention may be paired with a simple mobile phone camera equipped with Red/Green/Blue analysis software for accessible and straightforward strip analysis, allowing this diagnostic assay to be especially functional in low-resource areas.

Advantages

- Highly sensitive multiplexed assay can distinguish between multiple analytes
- Flexible LFA design may include control, wick pad, or strip housing
• Easy to transport and use
• Does not require a cold chain for transport
• Low cost and applicable to areas with few resources
• Use of nanoparticles for labels means strip does not require excitation source and is straightforward to diagnose

Categories For This Invention:

Life Sciences
Clinical Applications
Infectious Disease
Diagnostics
Other (Diagnostics)

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Publications:

Multicolored Silver Nanoparticles for Multiplexed Disease Diagnostics: Distinguishing Dengue, Yellow Fever, and Ebola Viruses
Lab on a Chip
April 2015

External Links:

Gehrke Lab
https://gehrkelab.org/

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