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MULTIPLEXED DETECTION AND CHARACTERIZATION OF MICROBIAL NUCLEIC ACIDS USING SPECTRALLY ENCODED BEADS

Researchers at Stanford and the Chan Zuckerberg Biohub have developed a platform for characterizing a population of microbes using spectrally encoded beads.

The clinical treatment of microbial infections is dependent on the proper identification and characterization of responsible pathogens. Standard clinical practice for identifying infectious pathogens can require time-consuming culture steps to increase microbial populations before subsequent nucleic acid detection. Other current PCR-based nucleic acid tests do not require additional culturing but are limited in throughput.

Stage of Research
The inventors have developed methods for multiplexed detection of microbial nucleic acids using spectrally encoded beads. Their system can simultaneously detect multiple pathogens within a given sample by combining sample-derived and PCR-amplified labeled nucleic acid sequences with lanthanide spectrally encoded beads linked 1:1 with known microbe-identifying capture oligonucleotides. The inventors demonstrate the utility of their method by comparing predicted patterns of hybridization with measured patterns of hybridization to identify the species or strain(s) present in a given sample.

Applications

- Nucleic acid-based identification and characterization of low abundance microbial strains within a mixed sample, such as a clinical specimen

- Detection of antibiotic resistant bacteria using capture oligonucleotides complementary to known multidrug resistance genes
- Pathogenic bacterial gram typing

Advantages

- Simultaneous and rapid screening for the presence of multiple bacteria species in a single reaction
- Methods can be used to detect microbes in a variety of samples (e.g., clinical samples such as blood or stool, and environmental samples such as water or food sources)
- Methods can be used to detect viruses, such as SARS-CoV2, fungal infections, or to simultaneously test for viral and bacterial co-infections.

Publications

- PCT publication WO2020243200

Patents

- Published Application: WO2020243200
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