New diagnostic test kit offers easy identification of virulent pathogens in remote locations

16 December 2016

A team of researchers has developed a portable detection system that can rapidly identify some of the most virulent, often multi-drug resistant pathogens. This device was designed to be used in places where laboratory resources are lacking, such as isolated villages in developing countries. The research is published December 16th in *Applied and Environmental Microbiology*, a journal of the American Society for Microbiology.

Microbial infections afflict approximately1.5 billion people annually, killing roughly 4.6 million, most of that toll in the developing world. The lack of diagnostic facilities in remote locations prevents timely identification of pathogens. That frequently forces caregivers to guess when diagnosing and treating microbial infections. Under these circumstances, treatment is less likely to be effective. For example, when an infection's cause can't be identified with certainty, caregivers frequently use broad spectrum antibiotics to boost the probability of killing the pathogen. Unfortunately, as compared to precisely targeted antibiotics, the use of broad spectrum antibiotics increases the likelihood of spreading antimicrobial resistance genes, said first author Lars D. Renner, PhD, Group Leader at the Leibniz Institute of Polymer Research, and the Max Bergmann Center of Biomaterials, Dresden, Germany.

The new battery powered detection system is small and simple. Sixteen microchambers each contain a genetic sequence from one of the sixteen pathogens the device is designed to detect. When one of these sequences matches a sequence from a patient sample, a fluorescent light illuminates from within the relevant microchamber. Then, an app detects the position of that chamber, and identifies the pathogen according to that position. This very sensitive assay can provide positive identification with patient samples containing as few as 10 DNA sequences.

The investigators picked the sequences the device uses by screening the genomes of the relevant bacteria for unique genetic sequences. Pathogens can be identified using single drops of patient samples from blood, urine, or other bodily fluids, said Renner.

The system can identify *Enterococcus faecium*, *Staphylococcus aureus*, *Klebsiella pneumoniae*, *Acinetobacter baumannii*, *Pseudomonas aeruginosa*, and various species of the genus, *Enterobacter*.

Applications for the technology, besides healthcare, include a variety of areas where it is necessary to identify environmental bacteria—"food security, agriculture, water quality, and industrial processing and manufacturing," said Renner.

Provided by American Society for Microbiology