

## **Johns Hopkins University II**

### ***Mobile Diagnostic Platform for Integrated Bacteria Identification and Antibiotic Susceptibility Characterization***

Our overall goal is to develop and validate a mobile diagnostic platform which delivers a combined bacterial pathogen identification (ID) and antibiotic susceptibility testing (AST) at the point of need in around 2 hours. Diagnostic information delivered within this time frame will transform clinicians' ability to provide evidence-based diagnosis of bacterial infections, expedite treatment based on objective data, and thereby promote effective utilization of antibiotics. In particular, we aim to improve the diagnosis of urinary tract infection (UTI), one of the most common bacterial infections that affect all ages and are caused primarily by gram-negative pathogens (> 90%). Importantly, the urinary tract is the source of 25% of sepsis cases, which carries a mortality rate of 10-20%. Improving UTI diagnosis will have an enormous impact in human health. Current diagnosis of UTI relies on bacterial culture in centralized laboratories, which typically takes 2-3 days for definitive diagnosis. The significant time delay between sample collection and result reporting contributes to widespread empiric use of broad-spectrum antibiotics in both community-acquired UTI's as well as healthcare-associated UTI's, which has contributed towards emergence of multidrug-resistant pathogen. Using an innovative microfluidic network as the backbone technology which facilitates massively parallelized bioreactions to yield genotypic and phenotypic information at the point of need, we propose to substantially improve upon the speed and accuracy of traditional culture-based methods used in pathogen ID and AST.