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*UC Irvine's One Step, Rapid in vitro Diagnostic System*

Antimicrobial resistance represents a major health threat worldwide. Lack of rapid diagnostics in the current paradigm of clinical microbiology has resulted in use of inappropriate or unnecessarily broad-spectrum antibiotics, which imposes significant healthcare, economic and social burdens. The proposed solution aims to develop a onestep, rapid *in vitro* diagnostic system at the point-of-care setting that will enable early targeted therapy, resulting in better antimicrobial stewardship. In particular, we will focus on addressing the major unmet clinical need of bloodstream infections (BSIs) where broad spectrum or inappropriate antimicrobial therapy are associated with significantly increased morbidity, mortality and healthcare cost as well as having the potential to select for resistant strains. Our approach employs a high throughput particle counting system that can detect and quantify target pathogens and profile their susceptibility directly from unprocessed blood samples with “Time to test result” in as little as 1-3 hours. If successful, therefore, the proposed technology will help guide the decision making of use of appropriate and narrow spectrum antibiotics when treating BSIs and therefore will decrease antibiotic resistance.