

Digital Detection and Absolute Quantification of the Rare biomarkers in the Blood for Blood Biopsy

강동구[†]

인천대학교

(dkkang77@gmail.com[†])

Antimicrobial resistance is a growing health problem in the United States and worldwide. There are more than two million people are infected annually with antibiotic-resistant bacteria, resulting in >23,000 deaths. However, the lack of rapid diagnostics results in either the overuse of unnecessarily broad empiric antibiotics, or a delay of several days in administering the appropriate antibiotic(s). Unfortunately, existing bacterial detection methods are limited by their inability to rapidly detect and identify pathogens that typically occur at low concentrations in blood (1 to 100 colony-forming unit (CFU)/mL), as is commonly found in adult blood stream infections (BSIs). In this study, we have developed an assay that can detect beta-lactamase producing bacteria at single-cell sensitivity within a few hours. Our Integrated Comprehensive Droplet Digital Detection (IC 3D) can analyze mLs of samples containing beta-lactamase producing bacteria. Our system integrates bacterium-detecting sensors specific for drug resistance using a fluorogenic substrate with droplet microfluidics for sensitive analysis.