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Ernst Goodlett Antimicrobial Resistance Rapid Point of Need Diagnostic Solution

Infectious diseases have a substantial global health impact. Clinicians need rapid and accurate diagnoses of infection to direct patient treatment to improve patient outcomes, antimicrobial stewardship, and length of stay. Current methodologies for pathogen detection in the clinical laboratory include biological culture, nucleic acid amplification, ribosomal protein characterization, and genome sequencing. Collectively, these methods are time intensive, require at least 24 hours of incubation of clinically obtained material, and often significantly increase the cost and burden of diagnostic laboratory support. Pathogen identification from single colonies by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF-MS) analysis of high abundance proteins is gaining popularity in clinical laboratories. Here, we propose a novel and complementary MS approach that utilizes essential, high abundance microbial glycolipids as chemical fingerprints for identification of individual bacterial species. Importantly for clinical use, our glycolipid-based method has three advantages over the protein-based approach: **1)** bacteria can be identified directly from blood culture bottles or urine; **2)** antimicrobial resistant strains can be distinguished from the related susceptible strain in tested cases; and **3)** without the need for culture, the method promises to be more rapid with results possible in one hour or less. Our current mass spectral library has 51 entries of Gram-positive and –negative bacteria, including the so-called ESKAPE pathogens, as well as several fungal species, all which were derived using the same extraction and analysis protocol and the library is expandable.