Background: The timely identification of bacteria causing bloodstream infections remains a diagnostic challenge for the clinical microbiology laboratory. Emerging technologies, such as matrix-assisted laser desorption/ionization—time of flight mass spectrometry (MALDI-TOF MS) and QuickFISH, show promise as methods to routinely provide rapid identification of microorganisms directly from positive blood cultures. To date, there have been only a few studies comparing the efficacies of these methods. The goals of this study were to compare the effectiveness of two rapid diagnostic methods for the identification of Gram-positive cocci in clusters using the Bruker MALDI Biotyper and the AdvanDx Staphylococcus QuikFISH™ BC Kit.

Methods: A total of 158 patient blood culture broths which had flagged as positive on the Bactec FX automated blood culture instrument were subsequently demonstrated Gram-positive cocci in clusters were obtained from the Indiana University School of Medicine 1, Department of Pathology and Laboratory Medicine, Indianapolis, IN 46202. The specimens were analyzed by the Bruker MALDI Biotyper using the MALDI Sepsityper Kit® and by the AdvanDx Staphylococcus QuikFISH BC assay. Bacteria were identified as either Staphylococcus aureus, coagulase-negative staphylococci (CoNS), or neither. Of the MALDI-TOF MS cutoff scores used were 1.600-1.799 for genus-level and ≥1.800 for species-level identification. Results were compared to conventional laboratory identification.

Results: MALDI-TOF MS successfully identified 95% (57/60) of S. aureus isolates and 79.0% (72/91) of CoNS isolates to the species level. QuikFISH correctly identified 100% of S. aureus and CoNS. In four mixed cultures, MALDI-TOF MS identified CoNS in 2 of the cultures and returned an ID reflecting the second organism in the remaining 2. QuikFISH identified the CoNS in all four cultures. Overall, MALDI-TOF MS was successful at distinguishing S. aureus and CoNS 85% of the time, compared to 100% for QuikFISH. Eight bottles demonstrated neither S. aureus nor CoNS. Each were identified correctly to the genus level by MALDI-TOF MS and were interpreted as negative by QuickFISH.

Discussion: MALDI-TOF MS allowed for a high percentage of identification from blood culture bottles; however, all study samples were identified correctly as S. aureus, CoNS or neither using QuickFISH, including mixed cultures. MALDI-TOF MS has the advantage of identifying more frequently-pathogenic CoNS species, such as S. lugdunensis, and non-staphylococcal isolates. The utility of each of these technologies for direct-from-blood-culture testing should be evaluated on an individual lab basis.

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