**INTRODUCTION**

Rapid accurate reporting of organism identifications (ID) corresponding to antimicrobial susceptibility test (AST) profiles from positive blood cultures (BC) is integral to reducing morbidity and mortality in acutely ill patients presenting with severe bacteremia. While many clinical microbiology laboratories have in recent years significantly improved ID turn-around-time (TAT) by implementing MALDI-TOF mass spectrometry (MS), AST is comparatively slow due to its reliance on conventional analytical methods such as subculture and automated AST methods that have not been modified for decades where results may only become available 1-2 days after the Gram stain report.

To address this issue, Accelerate Diagnostics (AXDX, Tucson, Arizona, US) recently introduced a novel rapid (<7h) low-complexity rapid BC ID/AST system that can be performed simultaneously. The AXDX ID system requires that a sample of BC broth be first transferred from the BC bottle to the AXDX PhenoTestTM BC kit sample vial, and for this vial to be clipped into a reagent cartridge, which together with a cassette, is inserted into the instrument for testing. After processing to remove blood products, all bacteria (or yeast, if present) are stained with Acridine Orange to enable a total bacterial count and a mononuclear cell count. This is followed by staining with a limited panel of fluorescent in situ hybridization (FISH) probes that detect the more common organisms implicated in septicemias. Once a bacterial ID has been achieved (>20min), the remaining bacterial cells are distributed through the cassette to be immobilized on the tips of agarose containing anti-bodies specific to the specific organism ID. Using precise coordinates, each immobilized bacterial cell is monitored for its ability to grow (or not) while in the presence of each antibiotic in the test panel. Growth is measured at single cell level using automated image capture with image capture software. The result of each bacterial ID is a representative score of the test organism during its 5h exposure to each antibiotic, which is compared against the AXDX's automated database containing the database containing the cumulative cellular behavior of the test organism over time. Finally, a score is calculated by comparing previously amassed data correlating to behavior of numerous similar organisms with susceptibility (S, intermediate (I) and resistant (R) and a report is generated on the panel. AXDX software protocols are configured with 30/33 categorical results as well as the specific minimum inhibitory concentration (MIC) for each antibiotic. Thus, ID/AST with MIC may be generated shortly after Gram stain (as long as a single organism is present) or a genus-species specific probe on the AXDX PhenoTest® kit ID menu.

This study evaluated the AXDX system ID/AST accuracy and TAT performance. Non-duplicate BC with Gram negative bacilli (GNB) on Gram stain from auto-ID were enrolled in a semi-concurrent manner. Samples of blood were drawn for ID/AST in <4h of BC positivity. Auto-ID results were subject to gold standard MS and/or broth microdilution (BMD) phenotypic susceptibility testing (S/I/R) when obtained. For this study, the AXDX (AXDX kit and AXDX ID menu) was compared to reference standard MS and BMD for AST.

**METHODS**

• Results were not reported on a false positive result (FFPR) due to overlapping specificities
• The AXDX AID was compared to VIDAS (bioMérieux, France) BC kit and the AXDX and MS (Vitek MS,bioMérieux, France) AST results were compared to standard-of-care AST by CLSI broth microdilution (BMD), AST results were compared to CLSI broth microdilution (BMD), AXDX and MS were compared to AST-N213 cards in VITEK®2, Lab standard-of-care AST (from LIS; done using AST-N213 cards in VITEK®2, and AST-250K (from VITEK®2).

**RESULTS**

Table 1 summarizes AXDX AST from 143 (83.6%) BC (140 ID from monomicrobial BC, 3 ID from polymicrobial BC).

**CONCLUSIONS**

• These data suggest AXDX will substantially reduce ID/AST TAT in BC from ≥1 to ≤1h of BC positivity, and enable rapid ID and AST reporting.

**ACKNOWLEDGEMENTS**

**AXDX PhenoTestBC and AXDX PhenoPro™ systems for this study were kindly provided by Accelerate Diagnostics, Tucson, Arizona, US.**