2039. Direct-On-Target Microdroplet Growth Assay for Rapid Detection of Carbapenem Resistance in Pseudomonas aeruginosa using MALDI-TOF Mass Spectrometry

Evgeny A. Iidevich, MD; Katrin Sparber, PhD; Markus Kostrzewa, PhD and Karsten Becker, PhD. 1 Institute of Medical Microbiology, University Hospital Muenster, Muenster, Germany

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Background. Varieties of methods have been suggested for rapid detection of carbapenem resistance in gram-negative rods. However, their clinical application is hampered by either detection of only selected resistance mechanisms or labor-intensive processing. This study investigated a novel easy-to-perform, mechanism-independent method for detection of carbapenem resistance in Pseudomonas aeruginosa.

Methods. Clinical P. aeruginosa isolates (12 meropenem-susceptible and 12 meropenem-non-susceptible) were included. Meropenem minimum inhibitory concentrations (MICs) were determined by broth microdilution method. For the novel method, microdroplets (2, 4, 6, 8 and 10 µl) were produced by mixing meropenem-containing cation-adjusted Mueller–Hinton broth (CA-MHB) with bacterial suspension directly on a target (MBT Biotargets-96, Bruker) for MALDI-TOF mass spectrometry (MS). The meropenem concentration of 2 µg/ml and the inoculum of 5 × 10^4 cfu/ml were used. Three targets were inoculated and incubated in a humidity chamber for 4, 5 or 18 hours at 36°C. After inoculation and removal of medium, MALDI-TOF MS was performed directly from dried spots. Isolates were interpreted as non-susceptible if MALDI Biotypy (Bruker) provided successful species identification (score ≥ 2.7) and as susceptible if no identification (score < 1.7) was achieved.

Results. MIC (CA-MHB) and MIC range were 16 µg/ml, 64 µg/ml and 8-64 µg/ml for non-susceptible isolates, and 0.25 µg/ml, 0.5 µg/ml and 0.03-1 µg/ml for susceptible isolates as determined by the reference method. The novel assay demonstrated best performance with 8 µl droplets. Using this volume, 100% agreement with the reference method was achieved after 4 hours. 62.5% of isolates showed successful detection of growth control without antibiotic; sensitivity and specificity were 83.3% and 100%, respectively. After 5 hours, 91.7% of isolates had successful growth control detection, with 100% sensitivity and 90.9% specificity.

Conclusions. This universal and easy-to-perform method showed good performance for determination of carbapenem-non-susceptibility in P. aeruginosa after 5 hours. Longer incubation may be necessary to provide reliable results for isolates with reduced growth rate.

Disclosures: E. A. Iidevich, Bruker: Inventor of a pending patent which is owned by the University of Muenster and licensed to Bruker, Licensing agreement or royalty. K. Sparber, Bruker: Employee, Salary. M. Kostrzewa, Bruker: Employee, Salary. K. Becker, Bruker: Inventor of a pending patent which is owned by the University of Muenster and licensed to Bruker, Licensing agreement or royalty.

2040. Analytical Performance Characteristics of the Accelerate Pheno System for Pathogen Identification and Susceptibility Testing for Gram-negative Bacteria and Gram-positive Candida

Jason Burnham, MD;1 Meghan Wallace, BS;2 Brian Fuller, MD, MSC;2 Carey-Ann D. Burnham, PhD1 and Marin Kolod, MD, FACP, FCCP.2 Washington University in Saint Louis, Saint Louis, Missouri; 3Washington University School of Medicine in St. Louis, Missouri, 4Pathology and Immunology, Washington University School of Medicine, St. Louis, Missouri, 5Washington University School of Medicine, St. Louis, Missouri

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Background. The Accelerate Pheno® system is a novel fast diagnostic that significantly reduces the time to ID and AST for GNB and ID of Candida spp. bloodstream infections. Its potential to impact clinical outcomes. Prospective clinical trials are needed to evaluate the impact of this new system on clinical outcomes and antimicrobrial stewardship.

Methods. From April 14, 2016 to March 3, 2017, blood cultures from unique patients in the emergency department and medical intensive care units at Barnes-Jewish Hospital that signaled positive and were Gram-positive for GNB or Candida spp. were eligible. AXDX testing using pre-FDA cleared software (v1.0) was conducted in parallel with standard-of-care (SOC) diagnostic testing. SOC AST was conducted in duplicate. TTD was measured in the detection instrument, and CFUs were counted at 0, 4, 12, 24, 36, 48, 60, and 72h in incubated bottles. ROC curve analysis was used to define TTD cut-off for discriminative performance.

Results. Control PSA grew to 7.4 × 10^9 cfu/mL with a TTD of 15.5-19.5 hours. Both PSA grew in the presence of MEM trough concentrations with TTD of 21.3 ± 3.3 hours. However, midpoint and peak concentrations inhibited growth of the MEM-S PSA. The MEM-R PSA grew in the presence of all MEM concentrations, with a TTD of 16.8 ± 0.5 hours. Both PSA grew in the presence of C/T trough concentrations with TTD of 23.0 ± 2.6 hours, but were inhibited by midpoint and peak C/T concentrations. For CZA, both PSA grew in the presence of trough concentrations with TTD of 20.1 ± 1.9 hours. Peak CZA concentrations inhibited growth of both PSA, while midpoint concentrations inhibited growth of the MEM-S isolate.

Conclusion. These are the first data to show that BacT/ALERT BC bottles containing ABAs may not sufficiently inactive achievable concentrations of MEM, C/T or CZA, which could result in false negatives. In patients already receiving one of these antibiotics, BCs should be collected just prior to the next dose to increase the probability of PSA detection.

Disclosures. All authors: No reported disclosures.

2041. The Effect of Clinical Concentrations of Meropenem (MEM), Ceftolozane/tazobactam (CT), and Ceftriaxone/mivancitam (CA) on Time to Detection (TTD) and Growth of Pseudomonas aeruginosa (PSA) in bioMerieux BacT/ALERT FA Plus Blood Culture (BC) Bottles

Mordechai Grupper, MD;1 David P. Nicolau, PharmD, FCCP, FIDSA;2 Linda Tanner, MD and Joseph L. Kuti, PharmD.3 C. for Anti-Infect, Res. & Dev., Hartford Hospital, Hartford, Connecticut, 4Center for Infectious Disease Control, Department of Microbiology, Eastern Connecticut Health Network, Connecticut, Manchester, Connecticut, 5Center for Infectious Disease Control, Department of Microbiology, Eastern Connecticut Health Network, Connecticut, Manchester, Connecticut

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Background. Antimicrobial binding agents (ABA) are added to BC bottle media to reduce TTD and prevent false negatives that may result when BCs are obtained in patients receiving antibiotics. Sparse data are available on the effectiveness of ABA containing BacT/ALERT FA Plus BC bottles against MEM, C/T and CZA, which are often administered as high dose and/or prolonged infusion regimens for suspected PSA infections.

Methods. BC bottles were inoculated with 10ml of fresh whole blood collected from healthy volunteers. The blood was spiked to achieve mean peak, midpoint, and trough concentrations of MEM (40, 20 and 5 µg/mL), C/T (150, 50, and 8 µg/mL), and CZA (90, 20, and 10 µg/mL), respectively. A control bottle containing no antibiotic was included. BC bottles were then inoculated with 7–30 colony forming units (CFU)/bottle of either a MEM susceptible (MEM-S) (MIC = 0.5 µg/mL, C/T = 0.5 µg/ml), or MEM resistant (MEM-R) PSA (MIC = 8 µg/ml, CZA = 8 µg/ml). Matching bottles were entered into a BacT/ALERT 3D detection instrument and a standard incubator at 37°C for up to 72h. Each series was conducted in duplicate. TTD was measured in the detection instrument, and CFUs were counted at 0, 4, 12, 24, 36, 48, 60, and 72h in incubated bottles.

Results. Control PSA grew 7.4 × 10^9 cfu/mL with a TTD of 15.5-19.5 hours. Both PSA grew in the presence of MEM trough concentrations with TTD of 21.3 ± 3.3 hours. However, midpoint and peak concentrations inhibited growth of the MEM-S PSA. The MEM-R PSA grew in the presence of all MEM concentrations, with a TTD of 16.8 ± 0.5 hours. Both PSA grew in the presence of C/T trough concentrations with TTD of 23.0 ± 2.6 hours, but were inhibited by midpoint and peak C/T concentrations. For CZA, both PSA grew in the presence of trough concentrations with TTD of 20.1 ± 1.9 hours. Peak CZA concentrations inhibited growth of both PSA, while midpoint concentrations inhibited growth of the MEM-S isolate.

Conclusion. These are the first data to show that BacT/ALERT BC bottles containing ABAs may not sufficiently inactive achievable concentrations of MEM, C/T or CZA, which could result in false negatives. In patients already receiving one of these antibiotics, BCs should be collected just prior to the next dose to increase the probability of PSA detection.

Disclosures. All authors: No reported disclosures.

2042. Molecular Epidemiology of β-lactamase Production in Penicillin-susceptible Staphylococcus aureus under High-susceptibility Conditions

Takashi Matono, MD;2; Maki Nagashima, MT;3 Kazuhsa Mezaki, MT;4 Ayano Motobashi, MT;3 Satoshi Kutsuna, MD, PhD;3 Kayoko Hayakawa, MD, PhD;3 Mitsuou Kaka, MD, PhD2 and Norio Ohmagari, MD, MSC, PhD2. Disease Control and Prevention Center, National Center for Global Health and Medicine (NCGM), Tokyo, Japan, 3Department of Infection Control and Laboratory Diagnostics, Internal Medicine, Tohoku University Graduate School of Medicine, Sendai, Japan 4Microbiology Laboratory, National Center for Global Health and Medicine (NCGM), Tokyo, Japan, 5Microbiology Laboratory, National Center for Global Health and Medicine, Tokyo, Japan

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Background. At the National Center for Global Health and Medicine (NCGM; Tokyo, Japan), prevalence of penicillin-susceptible Staphylococcus aureus isolates with penicillin G minimum inhibitory concentration (MIC) ≤ 0.12 µg/mL comprised 31% of isolates (733/2387) collected between 2013 and 2015; this is higher than those reported in previous studies. However, little is known about the prevalence of β-lactamase production in penicillin-susceptible S. aureus isolates under high-susceptibility conditions.

Methods. We analyzed S. aureus isolates with penicillin G MIC ≤ 0.12 µg/ml that were recovered from in/outpatients between 2016 and 2017. β-Lactamase production was detected by nitrocefin-based and Clinical and Laboratory Standards Institute penicillin zeta unit (penicillin disc) and zeta-use 3D-3 Diagnostics - Bacterial Identification & Resistance.

Results. A total of 108 isolates were analyzed, predominantly originating from the lower respiratory tract (56%), abscesses (9%), upper respiratory tract (8%), and...