Online-Only Abstracts

The influence of incubation time, sample preparation and exposure to oxygen on the quality of the MALDI-TOF MS spectrum of anaerobic bacteria

A. C. M. Veloo1, P. E. Elgersma1, A. W. Friedrich1, E. Nagy2 and A. J. van Winkelhoff1,3
1) Department of Medical Microbiology, University of Groningen, University Medical Center Groningen, Groningen, the Netherlands, 2) Institute of Clinical Microbiology, University of Szeged, Szeged, Hungary and 3) Department of Dentistry and Oral Hygiene, University of Groningen, University Medical Center Groningen, Groningen, the Netherlands

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Abstract

With matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS), bacteria can be identified quickly and reliably. This accounts especially for anaerobic bacteria. Because growth rate and oxygen sensitivity differ among anaerobic bacteria, we aimed to study the influence of incubation time, exposure to oxygen and sample preparation on the quality of the spectrum using the Bruker system. Also, reproducibility and inter-examiner variability were determined. Twenty-six anaerobic species, representing 17 genera, were selected based on gram-stain characteristics, growth rate and colony morphology. Inter-examiner variation showed that experience in the preparation of the targets can be a significant variable. The influence of incubation time was determined between 24 and 96 h of incubation. Reliable species identification was obtained after 48 h of incubation for gram-negative anaerobes and after 72 h for gram-positive anaerobes. Exposure of the cultures to oxygen did not influence the results of the MALDI-TOF MS identifications of all tested gram-positive species. *Fusobacterium necrophorum* and *Prevotella intermedia* could not be identified after > 24 h and 48 h of exposure to oxygen, respectively. Other tested gram-negative bacteria could be identified after 48 h of exposure to oxygen. Most of the tested species could be identified using the direct spotting method. *Bifidobacterium longum* and *Finegoldia magna* needed on-target extraction with 70% formic acid in order to obtain reliable species identification and *Peptoniphilus ivori* a full extraction. Spectrum quality was influenced by the amount of bacteria spotted on the target, the homogeneity of the smear and the experience of the examiner.

Impact of source of infection and vancomycin AUC0–24/MIC<sub>BMD</sub> targets on treatment failure in patients with methicillin-resistant *Staphylococcus aureus* bacteraemia

N. Ghosh1, R. Chavada1, M. Maley1 and S. J. van Hal2
1) Department of Microbiology and Infectious Diseases, Liverpool Hospital, Liverpool and 2) Department of Microbiology and Infectious Diseases, Royal Prince Alfred Hospital, Camperdown, Sydney, Australia

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Abstract

Despite recent controversies about toxicity and reduced efficacy, vancomycin remains the current treatment of choice for methicillin-resistant Staphylococcus aureus (MRSA) bacteraemia. The parameter associated with treatment success is the vancomycin 24-h area under concentration-time curve to MIC ratio (AUC_{0–24/MIC}). We aimed to determine the utility of calculated AUCs and explore the optimal AUC_{0–24/MIC} targets associated with treatment success. In this single-centre retrospective observational cohort study of 127 patients with MRSA bacteraemia, forty-five (35.4%) did not respond to vancomycin treatment. Patient characteristics were essentially the same between those who did not respond to vancomycin treatment and those with treatment success, with independent predictors of treatment failure being source of bacteraemia (odds ratio (OR), 4.29; 95% confidence interval (CI), 1.50–12.26; p 0.007) and not achieving an AUC_{0–24/MIC_{BMD}} (using broth microdilution) target of ≥398 (OR, 11.4; 95% CI, 4.57–28.46; p < 0.001). Bacteraemic source-specific thresholds were observed with a higher AUC_{0–24/MIC_{BMD}} target of 440 required for high-risk sources (e.g. infective endocarditis) compared with 330 for low-risk sources (line related bacteraemia). Overall treatment success in patients with MRSA bacteraemia was associated with a vancomycin AUC_{0–24/MIC_{BMD}} target of ≥398, with source-specific targets observed. Future vancomycin practice guidelines will need to take into account MIC methodology, source of bacteraemia and patient populations prior to setting targets and monitoring recommendations.

A simple, robust and rapid approach to detect carbapenemases in Gram-negative isolates by MALDI-TOF mass spectrometry: validation with triple quadrupole tandem mass spectrometry, microarray and PCR

C. Vogne¹, G. Prod’hom¹, K. Jaton¹, L. A. Decosterd² and G. Greub¹
1) Institute of Microbiology, University of Lausanne and University Hospital Center, and 2) Laboratory of Clinical Pharmacology, Innovation and Development Unit, Service of Biomedicine, Lausanne, Switzerland

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Abstract

Carbapenemases should be accurately and rapidly detected, given their possible epidemiological spread and their impact on treatment options. Here, we developed a simple, easy and rapid matrix-assisted laser desorption ionization-time of flight (MALDI-TOF)-based assay to detect carbapenemases and compared this innovative test with four other diagnostic approaches on 47 clinical isolates. Tandem mass spectrometry (MS-MS) was also used to determine accurately the amount of antibiotic present in the supernatant after 1 h of incubation and both MALDI-TOF and MS-MS approaches exhibited a 100% sensitivity and a 100% specificity. By comparison, molecular genetic techniques (Check-MDR Carba PCR and Check-MDR CTI03 microarray) showed a 90.5% sensitivity and a 100% specificity, as two strains of Aeromonas were not detected because their chromosomal carbapenemase is not targeted by probes used in both kits. Altogether, this innovative MALDI-TOF-based approach that uses a stable 10-μg disk of ertapenem was highly efficient in detecting carbapenemase, with a sensitivity higher than that of PCR and microarray.