Rapid Detection of Carbapenem Resistance in Acinetobacter baumannii Using Matrix-Assisted Laser Desorption Ionization-Time of Flight Mass Spectrometry

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Résumé en anglais	Rapid detection of carbapenem-resistant Acinetobacter baumannii strains is critical and will benefit patient care by optimizing antibiotic therapies and preventing outbreaks. Herein we describe the development and successful application of a mass spectrometry profile generated by matrix-assisted laser desorption ionization-time of flight (MALDI-TOF) that utilized the imipenem antibiotic for the detection of carbapenem resistance in a large series of A. baumannii clinical isolates from France and Algeria. A total of 106 A. baumannii strains including 63 well-characterized carbapenemase-producing and 43 non-carbapenemase-producing strains, as well as 43 control strains (7 carbapenem-resistant and 36 carbapenem-sensitive strains) were studied. After an incubation of bacteria with imipenem for up to 4 h, the mixture was centrifuged and the supernatant analyzed by MALDI-TOF MS. The presence and absence of peaks representing imipenem and its natural metabolite was analyzed. The result was interpreted as positive for carbapenemase production if the specific peak for imipenem at 300.0 m/z disappeared during the incubation time and if the peak of the natural metabolite at 254.0 m/z increased as measured by the area under the curves leading to a ratio between the peak for imipenem and its metabolite being <0.5. This assay, which was applied to the large series of A. baumannii clinical isolates, showed a sensitivity of 100.0% and a specificity of 100.0%. Our study is the first to demonstrate that this quick and simple assay can be used as a routine tool as a point-of-care method for the identification of A. baumannii carbapenemase-producers in an effort to prevent outbreaks and the spread of uncontrollable superbugs.
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