Use of MALDI-TOF ICMS on Yeast Identification: Application on Candida Species with Clinical Relevance

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Abstract:

The clinical impact of several yeast infections has increased greatly in the last years, particularly in immunocompromised hosts. Yeasts belonging to the genus Candida have emerged as the major opportunistic pathogens among these patients and are currently considered the fourth most common cause of nosocomial infections in intensive care units. Candida albicans is the most frequent cause of candidemia, but C. glabrata, C. parapsilosis, C. krusei, and C. tropicalis have also emerged as important agents of human infections. Additionally, improved molecular methods for detecting and differentiating yeasts provided evidence for the existence of new Candida species previously misidentified by conventional chemotaxonomic criteria and which may represent new emerging pathogens. However, some of these techniques are time and reagent consuming. The time required for the identification of pathogens is an important determinant of infection-related mortality rates of hospitalised patients. MALDI-TOF ICMS technique has been applied as a sound technique for rapid and reliable microbial identifications. The capability to register biomarker ions in a broad mass charge (m/z) ratio range, that are unique and representative for individual microorganisms, forms the basis of current applications of mass spectrometry in microbiology. The remarkable reproducibility of this technique is based on the measurement of constantly expressed and highly abundant proteins, such as ribosomal molecules. The usually observable molecular mass range is between 2,000 and 20,000 Da, where important metabolites appear. The aim of the present work is to use MALDI-TOF ICMS for yeast identification and evaluate its capability to distinguish among closely related Candida species. Forty yeast isolates were analysed, including several Candida species, Saccharomyces cerevisiae and Lodderomyces elongisporus. Results showed that all isolates belonging to the same species grouped together and that the closely related species C. albicans and C. dubliniensis, C. parapsilosis, C. metapsilosis and C orthopsilosis, as well as C. glabrata and C. bracarensis, could be clearly distinguished. In view of the results MALDI-TOF ICMS stands out as a promising tool for use in clinical laboratories due to its accuracy and rapidity to obtain the identifications.

Key words: Yeast Identification, Candida Species, MALDI-TOF ICMS