

Identification and differentiation of bacteria by MALDI-TOF MS

Klaus Eschrich und Stefan Rupf*

Institute for Biochemistry, Medical Faculty, University of Leipzig

*Department of Conservative Dentistry and Periodontology, University of Leipzig

Matrix Assisted Laser Desorption/Ionization Time-of-Flight Mass spectrometry (MALDI-TOF MS) is well established as one of the key methods in protein analysis. With the more widespread accessibility of this still expensive technique its potentials have been explored in other fields of biosciences. Among the more recently developed applications of MALDI-TOF MS the analysis of DNA (e.g. for SNP analysis) and the “bioprofiling” of body fluids and whole cells gained momentum during the last few years.

In microbiology, MALDI-TOF based “bioprofiling” of intact cells (ICM-MS) offers great advantages for the identification of cultured microorganisms as well as for their differentiation at the sub-species level. Examples for both the identification of bacteria and the differentiation of oral streptococci at the sub-species level will be presented. While identification of different bacteria species can often be accomplished by a simple visual inspection and comparison of MALDI-TOF MS spectra, the sub-species differentiation is a more tedious task requiring the development and application of suitable algorithms for spectra analysis.

The identification of bacteria by ICM-MS rests essentially on a comparison with spectra previously obtained for known organisms. To prove the results obtained via bioprofiling or to identify organisms for which no reference spectra are available yet, DNA based analysis is still the method of choice. While the products of Sanger DNA sequencing are routinely analyzed either on polyacrylamide gels or by capillary electrophoresis, MALDI-TOF MS can also be used for that purpose. While limited by the reading length of the sequences, MALDI-TOF MS based DNA sequencing has the unique property to allow the reading of several sequences in one run.