Filamentous fungal characterizations by matrix-assisted laser desorption/ionization time-of-flight mass spectrometry

ABSTRACT

Matrix-assisted laser desorption/ionization time-of-flight intact cell mass spectrometry (MALDI-TOF ICMS) is coming of age for the identification and characterization of fungi. The procedure has been used extensively with bacteria. UV-absorbing matrices function as energy mediators that transfer the absorbed photoenergy from an irradiation source to the surrounding sample molecules, resulting in minimum fragmentation. A surprisingly high number of fungal groups have been studied: (i) the terverticillate penicillia, (ii) aflatoxigenic, black and other aspergilli, (iii) Fusarium, (iv) Trichoderma, (iv) wood rotting fungi (e.g. Serpula lacrymans) and (v) dermatophytes. The technique has been suggested for optimizing quality control of fungal Chinese medicines (e.g. Cordyceps). MALDI-TOF ICMS offers advantages over PCR. The method is now used in taxonomic assessments (e.g. Trichoderma) as distinct from only strain characterization. Low and high molecular mass natural products (e.g. peptaibols) can be analysed. The procedure is rapid and requires minimal pretreatment. However, issues of reproducibility need to be addressed further in terms of strains of species tested and between run variability. More studies into the capabilities of MALDI-TOF ICMS to identify fungi are required.

Keyword: Filamentous fungi; Fungal identification; MALDI-TOF ICMS; Rapid techniques; Spectral analysis