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Abstract (poster session)

Extension of matrix-assisted laser desorption/ionisation-time of flight (MALDI-TOF) mass spectrometry to virus identification

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Objectives: MALDI-TOF mass spectrometry (MS) is an easier and faster detection method of human pathogens than conventional phenotypic and molecular identification assays, with unquestionable reliability and cost-effectiveness. Few reports are available about the application of MALDI-TOF MS for the detection of different viruses of medical interest, including a preliminary one presented by us at ECCMID 2012. In this study MALDI-TOF MS was applied for the identification of specific viral biomarkers of cultivable viruses and for the discrimination of virus serotype. Methods: Different cell culture types were infected with Adenovirus (ADV) strains 18 (ATCC VR-19), 14 p1 (UK Neqas 0645), 2 (UK Neqas 9054), and echovirus 9 (VR 1050). At 72 h post-infection (p.i.) uninfected and infected cells were harvested and the proteins were extracted following the mass spectrometer manufacturer protocol. An aliquot of different adenovirus serotypes as well as echovirus 9 purified particles, obtained after ultracentrifugation, was subjected to the same extraction protocol. The spectra obtained from the samples analyzed by Microflex LT mass spectrometer (Bruker Daltonics) were recorded in positive linear mode (mass range m/z 2-20 kDa). Results: The ADV 18 infected cells at 72 h p.i. showed significant peaks overlapping those obtained by the analysis of purified viral particles and completely missing in uninfected cells. Likewise, purified ADV18 particles, cultured by using different cell lines, showed the same two significant peaks which were in any conditions traceable at 72 h p.i. Moreover, the mass spectra obtained from different adenovirus strains showed different patterns of peaks not traceable in uninfected control cells, but not overlapping the significant peaks of ADV18. The statistical analysis grouped the spectra into 3 clusters which suggests the ability of mass spectrometry to differentiate ADV serotype. Likewise, different spectra were obtained with echovirus 9 infected cells and uninfected control cells. Conclusion: The application of MALDI-TOF MS to investigate host-virus interactions needs to be improved. Many factors have to be taken into account and to be optimized, starting from the preparation of the sample till the complete assignation of spectra, but these preliminary results, open up new opportunities for viral identification by MS as well as for discrimination of different viral serotypes in clinical virology.