

Thesis abstract

The use of Matrix Assisted Laser Desorption Ionisation Time of Flight Mass Spectrometry (MALDI-TOF-MS) and associated technologies for the study of disease pathogenesis and advanced diagnostics

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The use of Matrix Assisted Laser Desorption Ionisation Time Of Flight Mass Spectrometry (MALDI-TOF-MS) for the analysis of biomolecules is a technique that has existed since the late 1980s. Recent advances have meant that this technology is able to be applied to a range of biological samples that open up new pathways for diagnostics and research.

The utilising of MALDI for the spatial analysis of biomarkers is an established application that is currently being utilised primarily in cancer research and diagnosis and is termed imaging mass spectrometry (IMS). The work within this thesis describes and discusses a reapplication of this technology and the creation of new protocols for the investigation of disease pathogenesis at a protein level using IMS.

The development of these techniques, however, outlined a number of critical limitations inherent to the technology including the inability to perform IMS analysis at sub-cellular spatial resolutions. It is for this reason that development was shifted towards the direct analysis of pathogens utilising more traditional MALDI workflows. The result of this investigation was the development of a novel protocol for the analysis of

microbiological samples using MALDI that provides rapid and accurate identifications for mammalian and agricultural pathogens at strain and sub strain levels.

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