

Multimodal imaging by MALDI MS and μ XRF

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Matrix-assisted laser desorption/ionisation mass spectrometric imaging (MALDI MSI) is a technique providing localised information on intact molecules in a sample. Micro X-ray fluorescence (μ XRF) imaging allows to examine the spatial distribution of elements in a sample without morphological changes to the sample. These methods have already been applied separately to different tissues, organs, plants and bacterial films, but, to the best of our knowledge, they have yet to be coupled in a multimodal analysis. Such a multimodal combination of MALDI MSI and μ XRF imaging can provide profound understanding of biological structures and processes. In this study, we established and tested sample preparation strategies, allowing multimodal analysis of the very same sample sections of a chicken phalanx. The results of the investigation of such parameters as adhesive tapes supporting tissue sections, and sequence of the imaging experiments are presented. Combination of molecular and elemental imaging was achieved, thus, providing now for the first time the possibility to gather MALDI MSI and μ XRF information from the very same sample omitting therefore data correlation errors that inevitably occur in approaches using consecutive tissue sections.

Electronic supplementary information (ESI)

Figure 1. Characteristic MALDI mass spectrum acquired on a Synapt G2 HDMS™ system (Waters, Manchester, UK) of lipids ablated from chicken bone samples after covering the sample with matrix (dithranol) by sublimation.

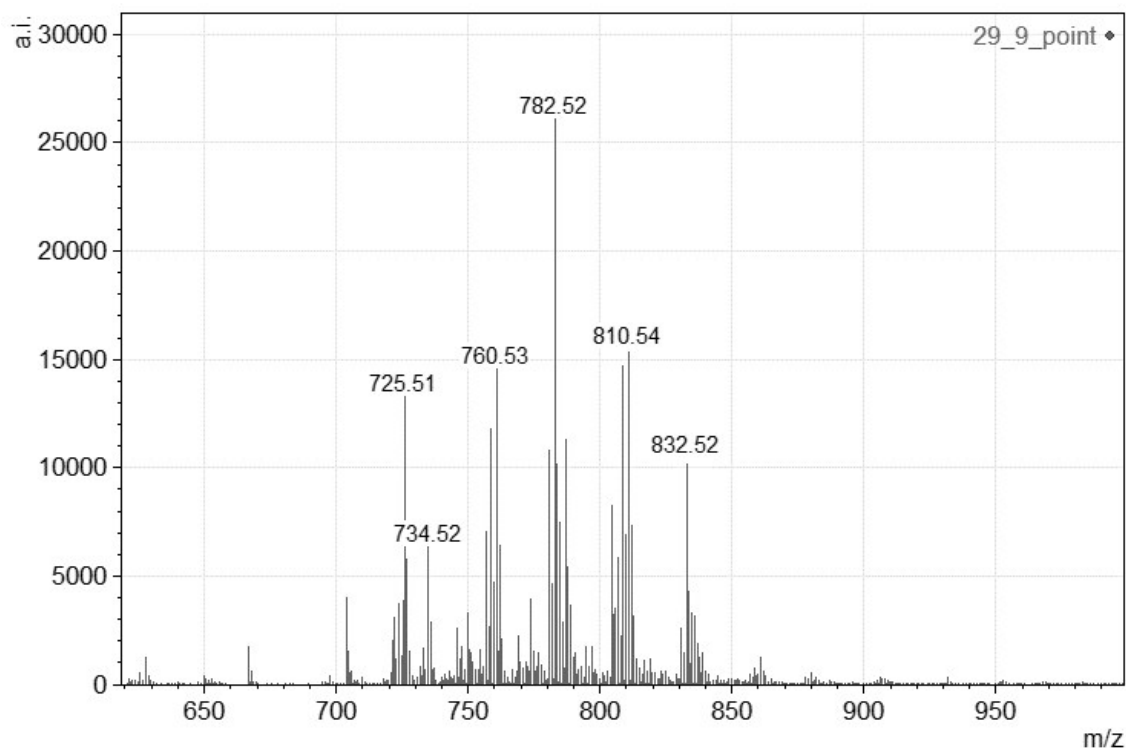
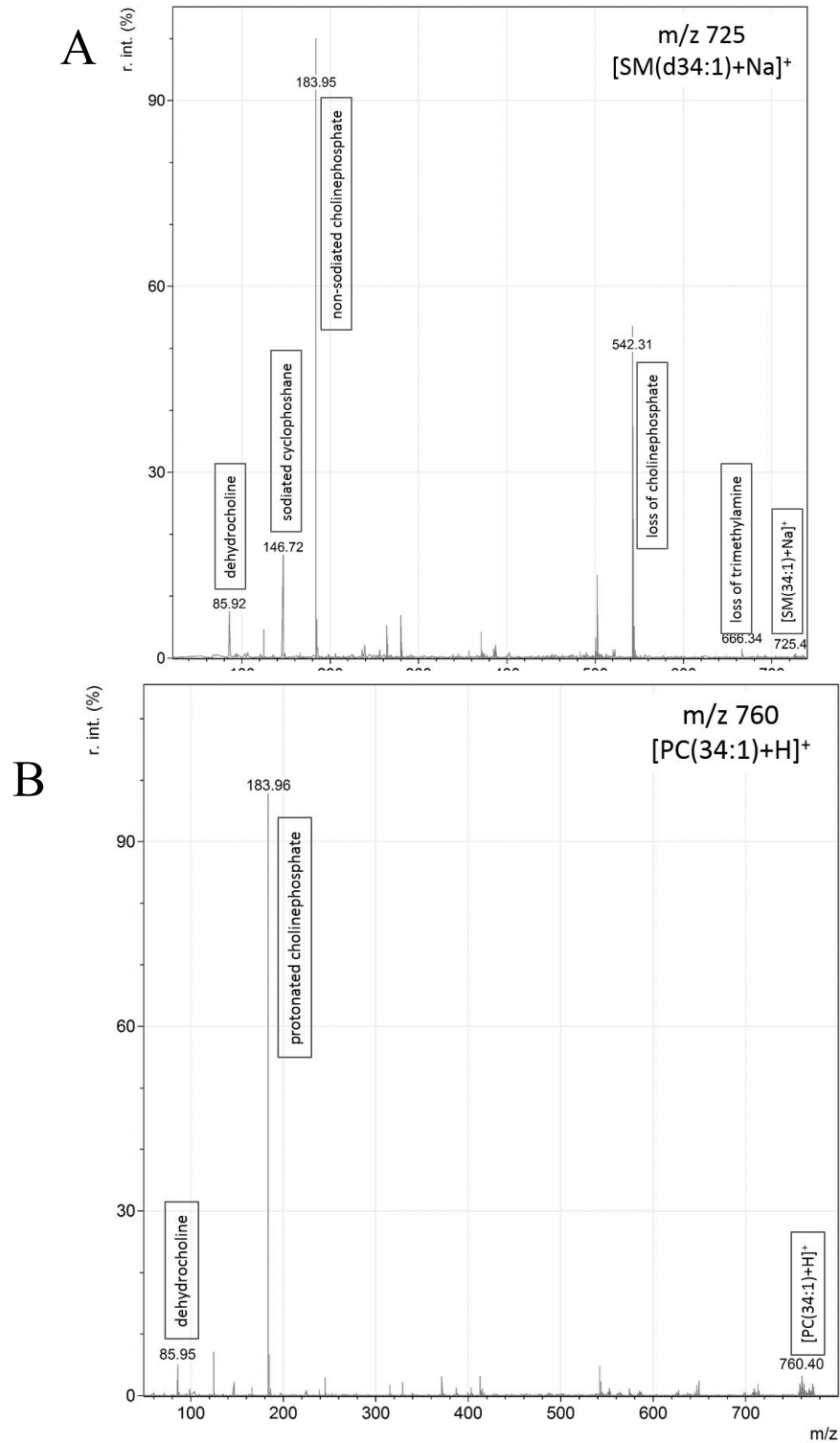
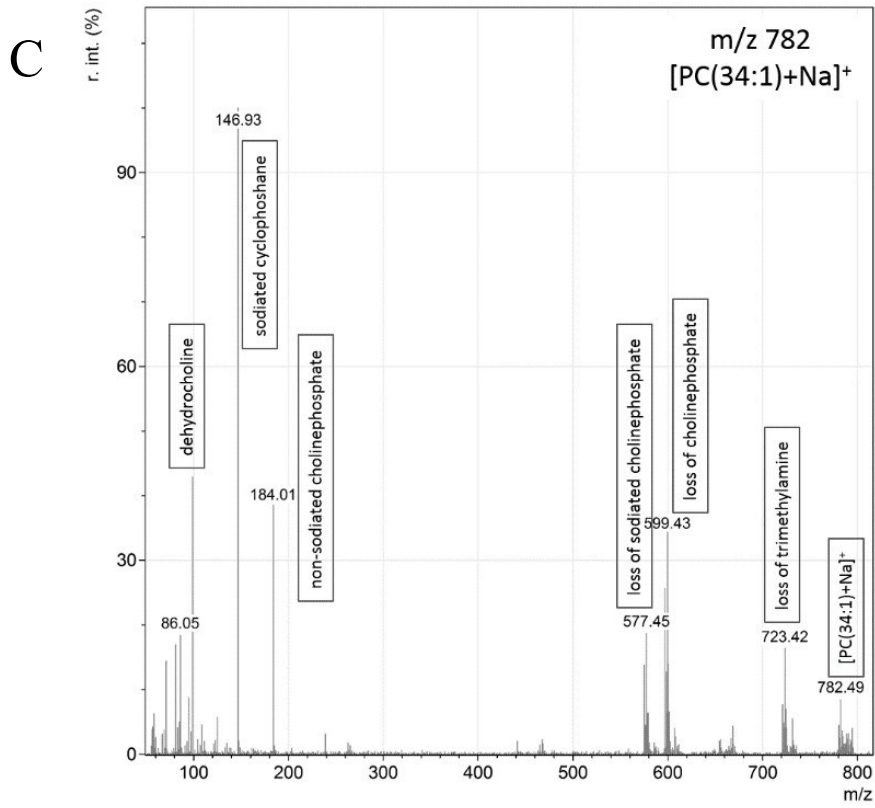


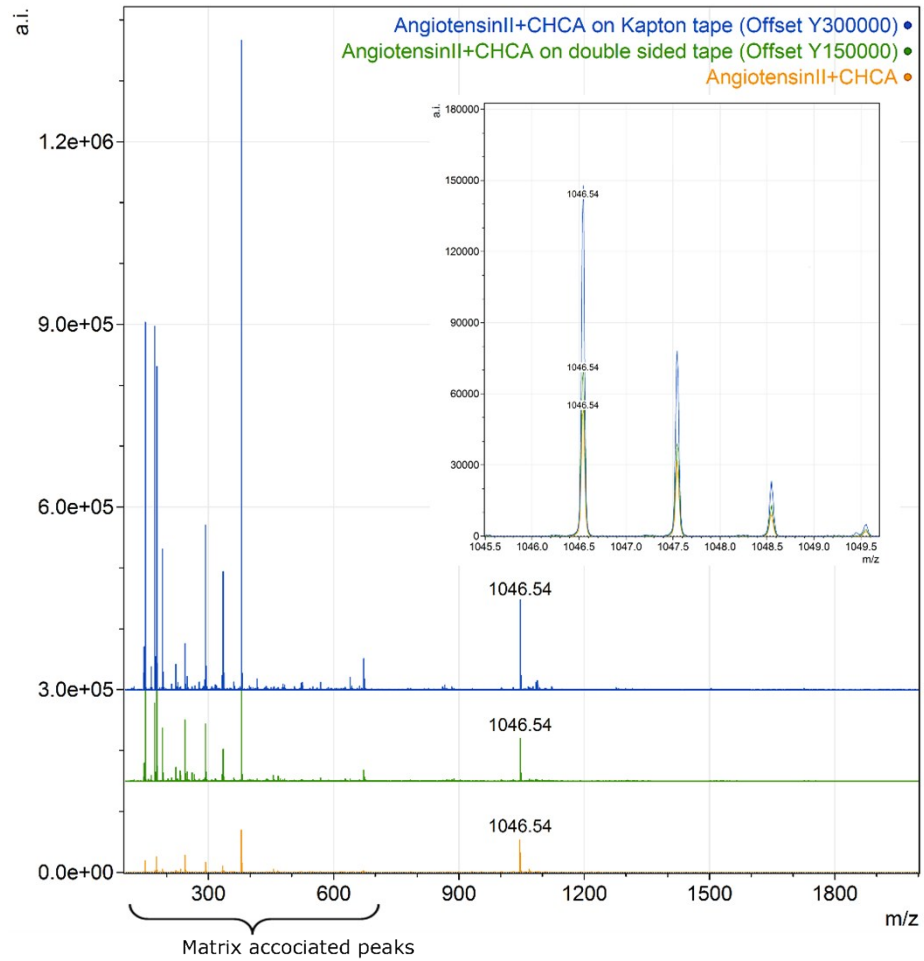
Figure 2. Representative MS/MS spectra of lipids





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Figure 3. MALDI mass spectra of single-spot measurements of Angiotensin II and CHCA spotted directly on glass (in orange), on double sided tape (in green) and on Kapton tape (in blue) showing no interference from the tape.



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Figure 4. Rescaled μ XRF image of Sulphur distribution in a tissue section. The image had to be rescaled due to a “hot spot” (area of extra high intensity). The hotspot was set to zero and the whole elemental map was rescaled according to a new maximum.

