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Commentary

APPLICATION OF MASS SPECTROMETRY IMAGING TECHNOLOGY

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COMMENTARY

In order to investigate the spatial distribution of numerous distinct surfaces, imaging mass spectrometry (IMS) is used. Direct study of biomolecules from histopathological tissue surfaces is possible thanks to the use of matrix-assisted laser desorption and ionisation (MALDI). Due to the vast application potential it provides for biomedical studies, MALDI IMS is a discipline that is quickly growing. This article offers a basic insight into the different imaging mass spectrometric approaches and the state-of-the-art instrumental possibilities and developments. Sample preparation and matrix deposition plays a determining role in the relevance of the imaging mass spectrometric results.

Examining the location of biological molecules is possible with mass spectrometry imaging (MSI). In the context of the biospecimen's 3D architecture, this information is frequently of great value and may even make it possible to analyse low-abundance compounds that are hidden in bulk studies. The spatial distribution of biomolecules in tissues, biofilms, chemical arrays, and other biological media have all been studied using this methodology. Desorption electrospray ionisation, laser ablation electrospray ionisation, matrix-assisted laser desorption/ionization (MALDI), secondary-ion mass spectrometry, laser ablation-inductively coupled plasma, nanowire-assisted laser desorption ionisation, and nanostructure initiator mass spectrometry are just a few of the experimental MSI platforms that have been developed and are available commercially [1-3].

The molecular weight of the particles can be ascertained using mass spectrometry (MS), an analytical technique that differentiates ionised particles like atoms, molecules, and clusters by exploiting variations in the ratios of their charges to their respective masses. The following modules make up an MS instrument: an ion source, which separates the sample molecules into

ions; a mass analyzer, which uses electromagnetic fields to sort the ions according to their masses; a detector, which measures the value of an indicator quantity and thus provides data for calculating the abundances of each ion present; and a computer, which controls the mass analyzer and manages the data derived from the detector.A cutting-edge method that combines traditional mass spectrometry with ion imaging is mass spectrometry imaging [4,5]. Mass spectrometry imaging allowed for the visualisation of several chemical kinds in their natural habitats. Currently, matrix aided laser desorption ionisation mass spectrometry imaging, desorption electrospray ionisation mass spectrometry imaging, and secondary ion mass spectrometry imaging are the most widely used mass spectrometry imaging techniques. This article provides an introduction to the fundamentals, history, and applications of widely used mass spectrometry imaging techniques before illuminating the use of such techniques in the study of traditional Chinese medicine. Traditional Chinese medicine has recently employed mass spectrometry imaging to investigate the geographical distribution of endogenous metabolites. It is possible to use the mass spectrometry imaging data further [6].

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