

Dipartimento di Biotecnologie e Bioscienze – UNIMIB

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Seeing is believing 2.0: gaining insights into organisms and cells via Mass Spectrometry Imaging (MSI)

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Abstract: Nowadays, a major focus of biological research is to unveil and understand processes in the sub-micrometer scale. However, scientists face the challenge of making measurements in subcellular compartments to better understand the role of elements and molecules. Omics techniques (e.g. transcriptomics, metabolomics) as well as bulk analyses have improved our understanding on the biology of complex biological systems. But these approaches do not maintain the cell integrity and only provide averaged information among the cell population and their organelles. Different analytical tools that preserve the spatial arrangement of the analyte have been used to obtain chemical information in cells and tissues without the necessity of staining. These techniques are often referred to as Mass Spectrometry Imaging (MSI) and allow mapping of chemical compounds, even without a priori knowledge of the targeted analyte. This allows the visualization and quantification nutrients (N, P, S), trace metals (Fe, Cu, Zn) and exogenous compounds (NPs, drugs) at subcellular level. Consequently, these MSI techniques have the potential to boost a rapid development of multiple fields such as toxicology, biomedicine, and cell biology.

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