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NMR spectroscopy and mass spectrometry in the discovery of bioactive natural products

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Over the past years there was an increasing attention to the "omics" approaches opening new perspectives to study biological systems. This was mainly due to the development of analytical instrumentation, data processing and chemometric tools that simplified the study of complex systems on a large-scale. Metabolomics is the '-omics' studying the whole metabolome in a cell, tissue or organism from both qualitative and quantitative point of view. The interest in using metabolomics for nutrition, agricultural and food sciences, human health and drug discovery has seen an exponential increase reaching a peak in the last years. This because this approach allows the determination of the metabolite profile of the analysed material without time-consuming and expensive purification steps. Metabolomics is also able to define the biochemical phenotype of a cell or tissue because the chemical complexity of their metabolites, in term of chemical structure and properties, are regulated both by gene expression and environmental conditions. NMR spectroscopy and mass spectrometry are both used in metabolomics studies offering advantages and disadvantages at the same time [1]. We used both approaches for studying the metabolite profile of several plants. Liquid NMR were used to study the chemical composition of food plants of economic interest such as artichokes, tomatoes, and chia seeds [2,3]. Furthermore, these methods have been also used to support a completely new approach in drug development based on the use of nucleic acids searching for more accurate target-specific effects [4].

References

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