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REIMS, A NOVEL AMBIENT MASS SPECTROMETRY METHOD FOR THE REAL-TIME IDENTIFICATION OF FOOD SAMPLES

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Rapid Evaporative Ionization Mass Spectrometry (REIMS) is a novel ambient MS method that can be used for the real-time identification of unknown samples, without any sample pretreatment. Such an approach is based on the analysis of the vapor produced by thermal ablation. MS profile represents an univocal fingerprinting, usable for geography evaluation and authenticity assessment of foodstuffs. For this purpose, a database of authentic samples need to be created.

The REIMS method was employed for the fast characterization of different food products (fish, cheese, olive oil). It operates using an electrosurgical knife (iknife), which creates an aerosol that is evacuated from the sample through a transfer line into the ionization source, where a heated collision surface is located for the thermal ionization process. A multivariate statistical algorithm was validated for the real-time identification process.

High value products, granted with PDO (Protected Designation of Origin) indication, were analyzed and successfully differentiated, without any geographical mismatching, thus demonstrating the applicability of the new technique in the detection of food fraud. The new technology was also applied to commercially popular and genetically similar Mediterranean Sea fish to obtain fast and accurate speciation results.

Iknife represents a powerful tool in the preservation of food security and safety. It can be also used as a shotgun approach to achieve a comprehensive characterization of a complex sample and, since lipids are normally the most representative detected molecules, it can be successfully employed in lipidomics.