Metabolomics-2013
OMICS Group Conferences
Accelerating Scientific Discovery
2nd International Conference and Exhibition on
Metabolomics & Systems Biology
April 8-10, 2013 Hilton Chicago/Northbrook, USA

NMR-based metabolomics in food science

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Abstract

High resolution magic angle spinning, that is, HRMAS, is a quite novel tool in NMR spectroscopy; it offers the almost unique opportunity of measuring intact tissues disguised as suspended or swollen in a deuterated solvent. The feasibility of 1H–HRMAS–NMR in foodstuff characterization has been exploited, but in spite of this, its applications are still limited. Metabolic profiling and biopolymer composition and aggregation are the topics investigated until now for raw vegetables, meat and processed foodstuff. We have applied the NMR-based metabolomics approach by combining HRMAS-NMR and multivariate statistical analysis to different type of foods, vegetables and meats, in order to identify the metabolites correlated to the cropping system (e.g. organic vs. conventional) and the place of origin (e.g. PGI vs. non-PGI) for vegetables, the cattle breed and the cattle species for meats. We recently also investigated Daqu, a starter for solid fermentation used in China for the production of liquors and vinegar. Our next goal is the correlate the metabolic profile with the gene and protein expression.

Biography

Massimiliano Valentini completed his Ph.D at the age of 28 years from Swiss Federal Institute of Technology of Zurich (ETH). He is now working at the Magnetic Resonance laboratory of the Agricultural Research Council (Rome, Italy), focusing his research interest on the HRMAS-NMR-based metabolomics of foods and its integration with genomics and proteomics. He has published more than 40 papers in peer reviewed journals.