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# UNTARGETED METABOLOMIC APPROACHES IN FOOD IDENTITATION: THE CASE OF PARMIGIANO REGGIANO PDO CHEESE CERTIFICATION "PRODOTTO DI MONTAGNA PROGETTO TERRITORIO"

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The potential of metabolomics as a robust and efficient analytical tool in food authentication is widely recognized [1-2]. In this study, two different analytical tools, uHPLC-MS and NMR, were used as fingerprinting (untargeted) strategies in a context of *food identitation*, i.e. to define the identity of Parmigiano Reggiano "Prodotto di Montagna Progetto Territorio, PdM, [3] based on the characteristic features which make it unique. In particular, the case of Parmigiano Reggiano PDO certification "Prodotto di Montagna Progetto Territorio" was investigated since this high added value product plays an important role in supporting the sustainability of the mountain areas where it is produced, offering revenue opportunities for local economy. In this preliminary study, 40 cheese samples, 20 *PdM* and 20 Parmigiano Reggiano PDO (hereafter indicated as *conventional PDO*), provided by *Consorzio del formaggio Parmigiano Reggiano*, were analysed by UHPLC/HRMS and NMR profiles, with an untargeted approach in order to characterize the compositional profile of the Parmigiano Reggiano "Prodotto di Montagna Progetto Territorio" samples as well as to find putative markers able to differentiate them from *conventional PDO* ones. Multivariate Curve Resolution methodology, such as ROI-MCR [4], and interval MCR, coupled to other chemometrics tools allowed resolution of overlapped signals and depicting 'identitation' features. The resolved features were putatively identified by different reference spectral libraries (i.e Chenomx NMR Suite, and those present in Compound Discoverer). Finally, Parmigiano Reggiano "Prodotto di Montagna Progetto Territorio" samples resulted well differentiated with respect to *conventional PDO* samples, in terms of amino acids and oligopeptides content, which are the markers showing the highest discrimination potential.

[1] L. Laghi et al. *TrAC* 59 (2014) 93–102
[2] M. Herrero et al. *Mass Spectrometry Reviews*, 2012, 31, 49–69
[3] https://www.parmigianoreggiano.com/product-guide-seals-and-marks#5
[4] Gorrochategui et al. *BMC Bioinformatics* (2019) 20:256