Abstract

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LC-HRMS based lipidomic approach to evaluate the effect of X-ray irradiation treatment on the lipid profile of Camembert cheese

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Abstract

Camembert is a surface mold-ripened soft cheese, as the raw milk cheeses, typically is subjected to spoilage bacteria and for thus it has a short shelf-life. Among the non-thermal technologies to inactivate and destroy pathogenic and spoilage microorganisms, there is the ionizing radiation [1-2]. This technology is able to preserve organoleptic characteristics and health benefits of treated foodstuffs, if it carried out in the range established by the legislation from a dose level of 1 up to 10 kGy [3]. In this study, X-rays irradiation was applied to Camembert cheese and a lipidomic approach was used to evaluate the possible modifications on lipid composition, induced by this treatment. The Camembert samples were irradiated with increased doses of 1.0, 2.0 and 3.0 kGy at a dose rate of approximately 2 kGy h-1. The lipid extraction procedure was based on slightly modified Folch method. Ultra-High liquid chromatography coupled to Q-Exactive Orbitrap mass spectrometry (UHPLC-ESI-Orbitrap-MS) equipped with a heated electrospray ionization (HESI) probe was employed to analyse the lipidomic profiles [4-5]. Lipids are identified by both accurate precursor ion mass and fragmentation features and quantified using LipidSearchTM software. Furthermore, chemometric analyses were used to establish possible differences among irradiated and non-irradiated samples. A total of 16 classes of lipids, including ceramides (Cer), monoacylglycerol (MG), diacylglycerols (DG), triacylglycerols (TG), cholesterol ester (ChE), zymosteryl esters (ZyE), hexosylceramides (Hex1CER), dihexosylceramides (Hex2Cer), lysophosphatidylcholine (LPC), phosphatidylcholines (PC), phosphatidylethanols (PEt), lysophosphatidylethanolamines (LPE), phosphatidylethanolamines (PE), phosphatidylinositols (PI), phosphatidylserines (PS), sphingomyelins (SM) were identified. In particular, in cheese irradiated samples, MG, Pet, PI and PS increased, while TG, DG and PC decreased. This behavior has been observed at a dose level of 3.0 kGy. These results confirm that the lipidomic approach is a powerful means to provide more information on the changes induced by X-ray radiation treatment

Biography

Rosalia Zianni has her expertise and experience in mass spectrometry applied to food safety and quality analysis. In 2013 she has been visiting PhD Student at Mass spectrometry Research Center under supervision of Prof. Richard M. Caprioli at Vanderbilt University Medical Center (VUMC) – Nashville (Tennessee) – USA and in 2014 she awarded PhD in Chemical Sciences at the University of Bari (Italy). After, she began developing analysis methodologies on the Foodomic field of X-ray irradiated food by high resolution mass spectrometry and chromatography at IZSPB. To date, she is coordinator of Operating Unit 2 of Project: “New Strategies for the evaluation of safety and quality of X-ray irradiated soft dairy products” – financed by Italian Ministry of Health (Roma, Italy) and carried out at Chemistry Department of IZSPB (Applicant Institution) and at Department of Clinical and Experimental Medicine of University of Foggia (OperatingUnite2).

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