

Furan Fatty Acids in European hake (*Merluccius merluccius*) anatomical parts

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Fish products such as European hake (*Merluccius merluccius*) are the main dietary source of ω 3 polyunsaturated fatty acids (ω 3 PUFAs) and furan fatty acids (FFAs). FFAs are characterized by a furan ring, carrying an unbranched fatty acid chain with 9, 11 or 13 carbon atoms in one α -position and a short straight-chain alkyl group with 3 or 5 carbon atoms in the other α -position. The furan ring can be substituted with just one methyl group in the β -position adjacent to the long aliphatic chain or with two methyl groups. FFAs act as antioxidants as they prevent linoleic acid oxidation; they have been reported to exert inhibitory effects on blood platelet aggregation, (thus protecting against coronary heart disease mortality) and to have potential antitumor activity. Comprehensive bidimensional gas chromatography-mass spectrometry (GCxGC-qMS) was used in order to characterize the FFA pattern in the fillet and organs (liver, testes and ovaries) of European hake. The orthogonal separation according to the boiling point and polarity of the fatty acids in two different chromatographic steps can be displayed in a structured chromatogram in three dimensions. Clustering of the components made the identification of FFAs easier with respect to monodimensional gas chromatography. The identified FFAs were all saturated congeners in the side chains: 10,13-epoxy-11-methyloctadeca-10,12-dienoic acid [MonoMe(9,5)], 10,13-epoxy-11,12-dimethyloctadeca-10,12-dienoic acid [DiMe(9,5)], 12,15-epoxy-13,14-dimethyloctadeca-12,14-dienoic acid [DiMe(11,3)], 12,15-epoxy-13-methyleicosa-12,14-dienoic acid [MonoMe(11,5)], 12,15-epoxy-13,14-dimethyleicosa-12,14-dienoic acid [DiMe(11,5)]. A new saturated congener, 14,17-epoxy-15,16-dimethyldocosa-14,16-dienoic acid [DiMe(13,5)], was identified exclusively in the liver. The FFA profile is peculiar for the different anatomical parts of European hake. The FFA average content of the liver and fillet was about 1.0 % of total fatty acids (4.8 \pm 1.7 mg /100 g of fillet; 333.1 \pm 29.6 mg /100 g of liver). Differently, in ovaries and testes only traces (< 0.1%) of FFAs were detected. The preponderant FFA was MonoMe(11,5) both in the liver and fillet (45 and 40% of FFAs, respectively).