

Title: A novel strategy for discriminating marine oils by using the positional distribution (sn-1, sn-2, sn-3) of omega-3 polyunsaturated fatty acids in triacylglycerols

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Abstract

The quality of marine oils may vary significantly according to the origins and the manufacture of the raw materials, and it is therefore essential to establish reliable analytical methods in order to carry out the quality assessment and authentication work on these kinds of products. Adulteration of marine oils is an old practice. The deliberated addition of low grade shark oil to cod liver oil was reported in 1904. Cod liver and halibut liver oils adulterated with fish oil were seized and destroyed by the Food and Drug Administration in 1929 and 1939, respectively. More recently, in 2013 the same illegal practice was detected in a Danish marine oil supplier which commingled animal feed oils with fish oil from human waste. Unfortunately, the development of techniques for detecting adulteration of marine oils has been much neglected compared to the discrimination of plant oils. Nowadays, dietary oils authenticity has become a focal point for the food industry, the policy makers, the international trade, research institutes and the consumers. The present research proposes a new strategy for discriminating genuine and adulterated marine oils. The strategy consists of i) determining the stereospecific distribution (sn-1, sn-2 and sn-3) of omega 3 polyunsaturated fatty acids (ω−3 PUFA) on the backbone of triacylglycerols by using liquid chromatography tandem mass spectrometry; ii) transforming the qualitative stereospecific information into quantitative data by means of a novel strategy; iii) analyzing the transformed data by principal component analysis. The proposed strategy was tested on pure oils (seal, salmon, cod liver, sandeel, blue whiting, and herring), a mixture of blue whiting, herring, sandeel and Norway pout and some intentionally adulterated oils. In addition, some published krill oil data were analyzed to confirm the reliability of the new approach.

Biography

Mr. Ephrem Tilahun holds degrees from Addis Ababa University (M.Sc. in Analytical Chemistry) and University of Cadiz, Spain and University of Bergen, Norway (Joint M.Sc. EMQAL). In July 2009, he became a lecturer at the department of Chemistry of the Jimma University, Ethiopia, where he became an Assistant Professor in November 2017. His research is situated in the field of Analytical Chemistry, with a special focus on method development of analytical techniques like mass spectrometry and chromatography, speciation of metals and food safety and quality. Ephrem teaches several courses on Advanced Analytical Chemistry courses and also supervise MSc and UG student's research works. He currently serves as Head department of Chemistry, responsible for all academics and Administration activities under the department. He has been involved in collaborative research projects financed by Jimma University and he is (co-) author of three journal papers and one Monograph book.

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