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Why, when, and how to shake off bad reputation from wax esters

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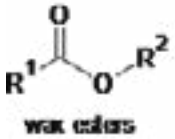
Until not so long ago, wax esters had an overall bad reputation. Spermaceti, jojoba oil, orange roughy oil are typical examples of wax esters, well renown insofar that they are used topically, mostly for cosmetic purposes. However, it is equally well known that these products should never be ingested, under penalty of very unpleasant consequences, such as nausea, diarrhoea, and steatorrhea. Some years ago, we started a program to understand some rather contradictory data. It is known that roe (fish eggs) is consumed as a food since time immemorial. This occurs either on roe as is (caviar, lumpfish roe) or after some treatment (Italian bottarga, Greek taramosalata, Japanese karasumi, Scandinavian Lysekils kaviar). Moreover, it was known that wax esters are an important constituent of roe, in some instances the majority component. In spite of this, no concern had ever been raised as to edibility or side effects of such products. The first results in analyzing wax esters from several roe-based foods showed that polyunsaturated fatty acids were a very important component of the acidic moiety. Successive results from other research groups confirmed our original results. These findings partially supported substantiating and launching a commercial product, Calanus® oil, extracted from copepod *Calanus finmarchicus*, rich in wax esters and in omega-3 polyunsaturated acids. From all this, it is clear that the term wax ester is just a rough chemical definition. Within this class of lipids different molecules are included. Some of them are essentially saturated molecules, primarily intended to assist buoyancy and to store energy. Other molecules represent a more complex metabolism, not yet fully understood. Differences are reflected in the metabolic fate when ingested. Competitive kinetics results will be presented from several wax esters and lipases, revealing suggestions about wax esters as a delivering form for omega-3.



wax esters

Hydrolysis rate for different lipases:
$k = a\,nC_{sn1} + b\,n\ \text{double bonds}_{sn1}$

Recent Publications:

1. Galliani G, Rindone B, Suarez-Bertoa R, Saliu F and Terraneo A (2013) Stereoselective addition of Grignard reagents and lithium alkyls onto 3,5-disubstituted-1,3-oxazolidine-2,4-diones. Synthetic Communications 45(5)749-57.
2. Fraccalvieri D, Motta S, Galliani G, Cavaletti L and Bonati L (2014) Design of gliadin peptide analogues with low affinity for the celiac disease associated HLA-DQ2 protein, Molecular BioSystems 10(8):2064-73.
3. Galliani G and Brucka M (2016) Cholesteryl esters from squid oil contain only saturated fatty acids, whereas the crude squid oil is rich in EPA and DHA and contains almost no saturated fatty acids. European Journal of Lipid Science and Technology, 118(3):453-460.
4. Galliani G (2016) 1-O-alkylglycerols and fatty acids of cholesteryl esters in squid oil are fully saturated and show parallel relative abundance of chain lengths. A possible compartmented fatty alcohol cycle in squid. European Journal of Lipid Science and Technology 118(9):1399-1408.

Biography

Guido Galliani has graduated in Chemistry at Milano University in 1974 where he has spent ten years as a Research fellow and an Assistant Professor. His main research interests were physical organic chemistry, oxidation mechanism, and model reactions for oxygen reactive intermediates. He served as a R&D Director and then as a factory manager in companies producing Active Principle Ingredients (Labochim, Honeywell). Partner for ten years of a company (Chorisis) eventually sold to Euticals group, he developed API impurities characterization, design of experiments, and continuous process development. In the same years, he held an assignment as adjunct Professor at Bicocca Milano University. He has spent more than six years in Norwegian factories (Lipro, PharmaMarine), introducing new techniques and processes for omega-3 products, including technology for the industrial production of squid oil as a DHA source. Since January 2017 he is acting as a Consultant for Gleaner srls.

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