

The Composition of the Micellar Phase During *in vitro* Intestinal Digestion of Omega-3 Fish Oil in Ethyl Ester Form

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Omega-3 sources can be found both as purified fish oil and as concentrates in the form of triacylglycerols (TAGs), free fatty acids (FFAs) and ethyl ester (EE), but differences exist regarding intestinal metabolism of lipid forms. The typical intestinal digestion of lipids (mainly as TAGs) involves formation of mixed micelles (micellar phase, MP) containing hydrolysis products (FFAs- and monoacylglycerols -MAG-) which are, later on, absorbed by enterocytes. Regarding to EEs it is known that hydrolysis by pancreatic lipase is lower compared to TAGs, but their subsequent absorption is contradictory since both lower and similar absorption to TAGs were reported. Absorption of EEs without prior hydrolysis has been suggested. In order to contribute to the information concerning the intestinal metabolism of EEs, the analysis of the lipid composition of the MP after *in vitro* digestion of an omega-3 fish oil in the form of EE (ω 3-EE) was carried out. Results were compared with those of a purified fish oil (salmon oil, SO).

The composition of oils before digestion was 100% TAGs for the SO and 77.2% EEs and 22.8% of MAGs for the ω 3-EE oil. The *in vitro* digestion of SO resulted in the formation of three fractions after centrifuging the medium: a MP containing hydrolysis products, an oily phase (OP) containing undigested lipids, and a precipitate pellet containing insoluble soaps of fatty acids. The digestion of the ω 3-EE oil only resulted in the formation of a MP and an OP. The MP of SO included a 29.5% of total lipids before digestion, whereas the MP of the ω 3-EE only included 10.2%, the rest of lipids being lost in the OP. The MP of SO mainly consisted of hydrolysis products (53.9 g of FFAs/100 g of lipids and 37.0 g of MAGs/100 g of lipids), whereas the MP from ω 3-EE consisted of undigested EEs (38.4 g/100 g of lipids) and released FFAs (57.5 g/100 g of lipids). The present study shows that a slight ratio of undigested EEs seems to be included in the MP after *in vitro* intestinal digestion of a ω 3-EEs concentrate. However, taking into account that most EEs remains undigested in the OP, it could be concluded that, if EEs are effectively absorbed by enterocytes, the major intestinal absorption does not seem to take place via mixed micelles.