Oxidative and Hydrolytic Stability of Microalgal Oils rich in Omega-3 LC-PUFA

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Numerous epidemiological, animal and clinical studies have shown that the long chain omega-3 polyunsaturated fatty acids (omega-3 LC-PUFA) EPA and DHA are effective in preventing or treating several diseases, such as cardiovascular disorders and cancers, and that they play a role in brain and nerve development of growing fetuses and infants. However, in many Western countries, the current average intake of omega-3 LC-PUFA is below the recommended level. This raises interest in food supplements containing omega-3 LC-PUFA on the one hand and food stuffs enriched with omega-3 LC-PUFA on the other hand.

Currently, the main commercial source of omega-3 LC-PUFA is fish oil. However, several problems are associated with these oils: unpleasant odor, contamination with heavy metals, presence of cholesterol, geographical and seasonal variation in quality, as well as increasingly stringent regulation of fisheries.

The aim of this research was to investigate the possibilities of microalgae as an alternative source of these omega-3 LC-PUFA. The composition of the crude microalgal oil extracted from different species was compared to already commercially available sources such as fish oil, tuna fish oil, krill oil and DHA-S oil. The crude microalgal oil was obtained using an analytical extraction method. The composition includes fatty acid composition, omega-3 LC-PUFA content, lipid class composition, sterol composition and carotenoid composition.

Furthermore, the oxidative and hydrolytic stability of the microalgal oils and commercial oils are compared. In this case, the microalgal oils were obtained with commercialized extraction techniques. The oxidative stability was followed during several weeks by measuring both primary and secondary oxidation products. The hydrolytic stability was followed during several weeks by determining the amount of free fatty acids (FFA) in the oils.