

Alpha-linolenic Acid Rich Lipid Formulations for use in Functional Foods

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High α -linolenic acid (ALA) level in the diet has positive health effects. The overall aim of this project is to make ALA-containing lipid formulations in which the beneficial properties of ALA are optimized. Lipids are tailor-made using enzymatic methods and their physiological effects will be evaluated in animals and humans.

ALA has two interesting properties: It is preferentially oxidized and it may be converted to the long chain n-3 fatty acids that are abundant in fish i.e. eicosapentaenoic and docosahexaenoic acid. These properties may be beneficial in counteracting cardiovascular disease. There is also evidence that the preferential oxidation of ALA may be beneficial in obesity and diabetes. It is abundant in certain vegetable oils as rapeseed and linseed oil. The possibilities to optimize the beneficial effects of ALA have not been fully explored.

Enzymes are useful catalysts for tailoring lipid molecules. They can be used to selectively incorporate desired fatty acids into different positions in the lipid molecules.

The enzymatic transesterification reactions were carried out in 3-g scale at 60°C. The enzyme was the immobilized lipase Lipozyme TL IM (*Thermomyces lanuginosus*) from Novozymes. The substrates were rapeseed oil + butter oil and linseed oil + butter oil in different proportions. The substrates and transesterified products were characterized by the following methods: Fatty acid composition, HPLC-analysis of intact triglycerides, HPLC-ESI-MS/MS-analysis of intact triglycerides, and amount free fatty acids.

It is clear that enzymatic transesterification is taking place. Some peaks in the HPLC-chromatograms increase and others decrease during the reactions. The enzymatic reactions reach an equilibrium stage after a few hours. Some of the triglyceride peaks in the HPLC-chromatogram were identified by HPLC-ESI-MS/MS. In the transesterified rapeseed oil + butter oil, we could identify new triglycerides for example 18:3+18:3+4:0.