

Enzymatic Production of Structured Lipids from Olive Oil Enriched with Conjugated Trienoic Fatty Acids

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Conjugated linolenic acid (CLNA) is the collective term for a mixture of positional and geometric isomers of octadecatrienoic fatty acids in which the three double bonds are conjugated. The pomegranate seed oil contains 43-88% of CLNA, mainly punicalic acid (9c, 11t, 13c-18:3). Due to its high CLNA content, the pomegranate oil has beneficial effects on human health by reducing visceral lipids and enhancing immune response and preventing metabolic disorders of type 2 diabetes. It also has chemopreventive agents against skin and prostate cancer. On the other hand, olive oil, rich in monounsaturated fatty acids, offers protection against heart disease by controlling LDL levels while raising HDL levels. Olive oil also has a beneficial effect on ulcers and gastritis and it lowers the incidence of colon cancer.

The purpose of this study was to produce structured lipids from olive oil enriched with CLNA. For this purpose, the acidolysis reactions were conducted between olive oil (OO) and pomegranate oil fatty acids (PFA) in the presence of Lipozyme TL IM (*Thermomyces lanuginosa*) lipase.

At first, pomegranate oil was extracted from the seeds with hexane at room temperature and the free fatty acids having 53.4% of CLNA were prepared from pomegranate oil. In general, acidolysis reactions were conducted using 3.6 g of substrates, 30 mL hexane and 12 % (w/w of substrates) of enzyme in a 100 mL glass flask at 50 °C. To see the effects of substrates mole ratio and the reaction time on the incorporation of CLNA into olive oil, series of acidolysis reactions were carried out for 6 h taking the substrate mole ratios of OO:PFA 1:1 - 1:5. The optimal mole ratio of substrates and optimal reaction time were established as 1:5 and 4 h, respectively. At optimal conditions, the structured lipids containing 45% of CLNA were obtained.

Thus obtained CLNA-rich olive oil would be used as a source of dietary CLNA and oleic acid in the formulation of healthy food products.