

Enzymatic Interesterification of Fish Oil with Lauric Acid for the Synthesis of Structured Lipid

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Abstract

*Structured lipid (SL) containing of medium chain fatty acid (MCFA) at outer position and polyunsaturated fatty acid (PUFA) at sn-2 position has superior dietary and absorption characteristics. The most methods for the enzymatic synthesis of SL were through two steps process, so that it was inefficient. Caprylic acid was usually used as a source of MCFA. In this research, SL was synthesized by enzymatic interesterification between fish oil and lauric acid. The specific lipase from *Mucor miehei* was used as catalyzed. Factors, such as the incubation time, substrate mole ratio, and reaction temperature were evaluated. The incorporation and the position of lauric acid on glycerol backbone and glyceride profile were determined. The results showed that SL containing of lauric acid at the outer position and PUFA at sn-2 was successfully synthesized, and it was done through one step process. From regiospecific determination, it showed that the position of lauric acid incorporation was only at the sn-1 and sn-3. Only 0.87% of lauric acid was incorporated at the sn-2. The optimum time and temperature of the reaction, and the substrate mole ratio were 12 h, 50°C and 1:10, respectively, in which the incorporation of lauric acid was 62.8% (mol). Glyceride profile was affected by incubation time, substrate mole ratio and reaction temperature. Triglyceride concentration decreased with an increase in the incubation time (> 12 h). In contrast, the diglyceride concentration increased at longer incubation time (> 12 h). Beside, triglyceride concentration increased with an increase in substrate mole ratio to 1:10, but it decreased when mole ratio of substrate was 1:15. At higher temperature (50°C), triglyceride decreased with an increase in the reaction temperature. In summary, the SL was successfully synthesized by the interesterification of fish oil and lauric acid using specific lipase of *Mucor miehei*.*

Key words : *Intesterification, fish oil, lauric acid, structured lipids, lipase*