Effects of modified phosphatidylcholine on physical and oxidative stability of omega-3 delivery 70% oil-in-water emulsions

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Title

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Oral Presentation

The objective of this study was to investigate the effects of modified phosphatidylcholine (PC) with different alkyl chain lengths (C14 and C16) and covalently attached caffeic acid on the oxidative and physical stability of high fat 70% fish oil-in-water emulsions. It is hypothesized that 1) modified PC improves the physical stability of emulsions when used in combination with sodium caseinate (CAS) and soybean PC, by its high surface activity as a surfactant, and that 2) modified PC enhances oxidative stability due to the attachment of caffeic acid to the glycerol backbone of PC, which brings the antioxidant in the vicinity of oil-water interface. Physical stability of the emulsions were analyzed using droplet size, viscosity, zeta potential, interfacial tension, and protein content in the aqueous phase. Peroxide value, changes in tocopherol content and secondary volatile oxidation products were determined to evaluate oxidative stability. Results showed that the physical stability of the emulsions was improved with increasing concentrations of added modified PCs. Modified PC C14 showed higher physical stability compared to modified PC C16 by providing smaller oil droplets and higher viscosity as well as higher zeta potential. On the other hand, oxidative stability was higher for the emulsions produced with modified PC C16; increased concentration of modified PC C16 led to a decrease in formation of primary and secondary oxidation products. Modified PCs in combination with CAS and soybean PC thus improved the physical and oxidative stability of 70% fish oil-in-water emulsions compared to emulsions produced with only CAS as an emulsifier.