Effects of photosensitized oxidation on stability of limonene encapsulated in solid lipid nanoparticles

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摘　要

Essential oils (EOs) are volatile, natural, and complex compounds with strong odors that characterize the flavor of aromatic plants. EOs such as citrus oils have been widely used in pharmaceutical, sanitary, cosmetic, agricultural, and food industries. EOs mainly consist of terpenes and terpenoids, which are susceptible to oxidation due to abundance in unsaturated chemical structure. Therefore, EOs must be protected from the adverse factors in order to maintain their activity in applications. Solid lipid nanoparticles (SLN) are one of the useful drug delivery systems. SLN have been abundantly reported in encapsulation of nonvolatile oil-soluble drugs or active ingredients. However, relatively much less research has been conducted to systematically investigate the encapsulation efficiency of volatile substances such as EOs in SLN due to difficulty in isolation of these substances from the lipid matrix. Limonene is a hydrocarbon monoterpene and the main compound in citrus oils. Limonene is unstable under light illumination. Therefore, the aim of this research was to investigate the oxidative stability of limonene encapsulated in SLN (limonene-SLN) in the presence of light. The SLN was prepared by high pressure homogenization. The formation of carvone (a compound derived from oxidized limonene) and loss of limonene during the photosensitized oxidation were used as indicators to evaluate the limonene stability. The results showed that the oxidative stability of limonene was greatly enhanced by the SLN as compared with that of limonene without the SLN.

Keywords: limonene, solid lipid nanoparticle, photosensitized oxidation

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