

Enhancement of the transdermal delivery of catechins by liposomes incorporating anionic surfactants and ethanol

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摘要

Abstract

The aim of this study was to develop and evaluate liposomal formulations encapsulating tea catechins, which possess antioxidant and chemopreventive activities. Liposomes were characterized for size, zeta potential, and entrapment efficiency. Both in vitro and in vivo skin permeation were examined using nude mouse skin as a model. The results suggested that the liposomal composition plays an important role in affecting the efficiency of transdermal catechin delivery. Incorporation of anionic surfactants such as deoxycholic acid (DA) and dicetyl phosphate (DP) in the liposomes in the presence of 15% ethanol increased the (+)-catechin permeation by five to seven-fold as compared to the control. The flexibility of bilayers is suggested as an important factor governing the enhancing effect of liposomes. Intercellular spaces within the stratum corneum but not shunt routes are the major pathways for catechin delivery from liposomes. (+)-Catechin and (-)-epicatechin are isomers which showed similar encapsulation efficiencies and skin permeation in liposomes. (-)-Epigallocatechin-3-gallate showed the highest encapsulation rate and in vivo skin deposition level in liposomes among all catechins tested. The stability and in vitro transepidermal water loss test indicated the safety of the practical use of liposomes developed in this study.