Phytantriol cubosomes for palmitoyl peptide delivery

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Cubosomes are individual nanoparticles formed by the dispersion of the bicontinuous cubic phase in water. Studies suggest that cubosomes can be effectively used for the delivery of active peptides to the skin. The importance of applying cubosomes as a potential carrier for the delivery of peptides arises from the fact that compared to other structures (i.e. liposomes), cubosomes have shown better skin retention and greater peptide penetration [1]. Moreover, a cryo-TEM study has revealed that the biological interface of the skin has a cubic architecture and therefore is important in the development of cubosome based delivery systems [2].

In this study, phytantriol cubosomes loaded with two lipopeptides (palmitoyl-GHK and palmitoyl-GQPR) were prepared using an ultrasonication method. The cubosomes had an average particle size of approximately 200 nm and negative zeta potential values measured by dynamic light scattering (DLS). Cryogenic transmission electron microscopy (Cryo-TEM) displayed that loading the lipopeptides in the cubosomes did not alter their morphology and that this robust approach yielded primarily cubosomes in dispersions. Small-angle X-ray scattering (SAXS) studies revealed a double diamond Pn3m cubic structure for both blank and lipopeptide-loaded cubosomes with an escalation in the lattice parameter from 6 to 8 nm by increasing the lipopeptide content. Finally, Isothermal titration calorimetry (ITC) was used to elucidate the types of interactions between the lipopeptides and blank cubosomes.

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[1] T. Rattanapak, K. Young, T. Rades, and S. Hook, *J. Pharm. Pharmacol.*, 2012, **64**, 1560.
[2] L. Norlen and A. Al-Amoudi, *Soc. Investig. Dermatology*, 2004, **123**, 715.