INCORPORATION OF BIOACTIVE COMPOUNDS IN EMULSIONS FOR APPLICATION IN COSMETIC INDUSTRY

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Liposomes and binary systems such as cocrystals, solid solutions and eutectics are formulations that have interesting applications, especially, in pharmaceutics and cosmeceutics. The aim of this thesis work is to evaluate liposomal systems encapsulating species that have potential applications in pharmaceutical or cosmeceutical industry and to form cocrystals to enhance the pharmaceutically relevant properties of curcumin.

Liposomes were prepared using reverse-phase evaporation method, thin-film hydration method and/or proliposome method. *In vitro* release studies were carried out using the dialysis bag method while *ex vivo* skin permeation experiments with pig ears were carried out using a Franz-diffusion cell. The encapsulation efficiency and loading capacity were dependent on the lipid composition. Liposomes encapsulating the highly antioxidant methanol extract of stem-bark of *Schumacheria castaneifolia*, ferulic acid and curcumin were prepared separately. Presence of cholesterol in the lipid bilayer may have affected lipid packing and encapsulation of methanol extract of stem-bark of *Schumacheria castaneifolia*. Similarly, interactions between stearylamine in the lipid bilayer and ferulic acid may be the reason for its high encapsulation efficiency. Encapsulation efficiencies of curcumin encapsulated liposomes also appeared to be dependent on the interactions of curcumin and lipids. This study revealed that the release kinetics of encapsulated species may be modulated by changing the lipid composition. Skin permeation of ferulic acid and curcumin showed dependance on lipid composition and charge of liposomes. Thus negatively charged liposomes showed higher skin permeation properties while ferulic acid and curcumin encapsulated positively charged liposomes exhibited slower release.

Cocrystal formation using curcumin and ferulic acid was attempted using solvent evaporation, liquid-assisted grinding and neat-grinding. The products were characterized using SEM, PXRD, FT-IR, TGA, and DSC. Solvent evaporation yielded either a solid solution or a eutectic while the grinding methods yielded eutectics. Dissolution studies revealed that solid solution or eutectic formation increases the dissolution rate of curcumin and that the three methods used are equally effective. Furthermore, using a mixture of curcumin and ferulic acid confers photostability to curcumin. Also, a 1:1 (mol/mol) mixture of curcumin and ferulic acid exhibits synergistic antioxidant potential even after exposure to UV radiation.

Curcumin and ferulic acid, when used as a binary system, improves significant properties such as the dissolution rate and antioxidant potential. Basically, this study portrays the ability of liposomes and binary systems such as solid solutions and/or eutectics to enhance pharmaceuticaly and cosmeceutically relevant physical properties of antioxidants.