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Design, optimization and characterization of coenzyme Q10 and D-panthenyl triacetate loaded liposomes

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Statement of the Problem: Coenzyme Q10 (CoQ10) is a lipid soluble molecule that is found naturally in many of the eukaryotic cells that is essential for electron transport chain and energy generation in mitochondria. It has strong antioxidant, skin protecting and wound healing properties, therefore used widely in topical formulations. D-panthenyl triacetate (PTA) is an oil soluble derivative of D-panthenol, which is essential for coenzyme A synthesis in the epithelium. PTA slowly deacetylate into D-panthenol inside the skin acting as a reservoir which is necessary for cutaneous wound healing, protection and rejuvenation of the skin.

Methodology & Theoretical Orientation: Liposomal formulations that encapsulate both ingredients were prepared and optimized by applying response surface methodology, for the purpose of increased stability and skin penetration Findings: The optimum formulation composed of 4.17 mg CoQ10, 4.22 mg PTA and 13.95 mg cholesterol per 100 mg of soy phosphatidylcholine. The encapsulation efficiency (EE %) of the optimized formulation for CoQ10 and PTA was found $90.89\% \pm 3.61$ and $87.84\% \pm 4.61$, respectively. Narrow size distribution was achieved with an average size of 161.6 ± 3.56 nm, while spherical and uniform shape was also confirmed from scanning electron microscopy (SEM) and transmission electron microscopy (TEM) images. Cumulative release of 90.93% for PTA and 24.41% for CoQ10 was achieved after 24 hours of *in vitro* release study in sink conditions. Physical stability tests indicated that the optimized liposomes were suitable for storage at 4°C over at least 60 days.

Conclusion & Significance: It can be concluded that encapsulating both PTA and CoQ10 is a promising way for prolonged effect and simultaneous delivery of both ingredients. Based on these findings, possible effects of our optimized liposomal formulation on wound healing mechanism will be further investigated in cell culture studies.

Figure 1 In vitro release profiles PTA and CoQ10 from the optimized liposomes along with free PTA and CoQ10 solutions as controls Notes: Each data represents the mean ± SD (n=3) Abbreviations: PTA, D-panthenyl triacetate; CoQ10, coenzyme Q10 100 80 release (%) 60 - PTA (Free) -PTA -CoQ10 (Free) -CoQ10 40 nulative 12 24 16 20 Time (hours)

Biography

Ali Asram Sagiroglu is PhD student in Pharmaceutical Technology. His research areas are: Nano Particle Characterization, Modification and Characterization of Polymers, Polymeric Drug Delivery Systems, and Nano Drug Delivery Systems.

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