

# Sucrose stearate-based proniosome-derived niosomes for the nebulisable delivery of cromolyn sodium

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## **Abstract**

A Novel approach was developed for the preparation of controlled release proniosome-derived niosomes, using sucrose stearates as non-ionic biocompatible surfactants for the nebulisable delivery of cromolyn sodium. Conventional niosomes were prepared by a reverse phase evaporation method followed by the preparation of proniosomes by spraying the optimized surfactant–lipid mixture of sucrose stearate, cholesterol and stearylamine in 7:3:0.3 molar ratio onto the surface of spray dried lactose powder. Proniosome-derived niosomes were obtained by hydrating proniosomes with 0.9% saline at 50 °C and mixing for approximately 2 min. All vesicles were evaluated for their particle size, morphological characteristics, entrapment efficiency, in vitro drug release, nebulisation efficiency and physical stability at 2–8 °C. In addition, coating carrier surface with the surfactant–lipid mixture, during preparation of proniosomes, resulted in smaller, free flowing, homogenous and smooth vesicles with high drug entrapment efficiency. Compared to a standard drug solution, a successful retardation of the drug release rate was achieved with the proniosome-derived niosomes, where the t50% value of the release profile was 18.1 h compared to 1.8 h. Moreover, high nebulisation efficiency percentage and good physical stability were also achieved. The results are very encouraging and offer an alternative approach to minimize the problems associated with conventional niosomes like degradation, sedimentation, aggregation and fusion.

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