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Nanosponge as a novel delivery modulator of retinoic acid

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Abstract
Retinoic acid is a derivative of vitamin A known for its use in the management of acne. The major limitations of retinoic acid application are its low solubility and instability in water, light, and heat. It also causes irritating side effects on the skin when used topically. In the current work, we demonstrated the entrapment of retinoic acid into nanosponge to improve the solubility and delivery of retinoic acid for skin application. The entrapment of retinoic acid into nanosponge was investigated by varying polymer: crosslinker ratio, duration of homogenization, and drug: nanosponge ratio. High entrapment efficiency was achieved with nanosponge at 73.90%. The entrapment was confirmed through several characterizations including Attenuated Total Reflection Fourier Transform Infrared (ATR-FTIR), Differential Scanning Calorimetry (DSC), and Field Emission Scanning Electron Microscopy (FESEM). Higher solubilization was achieved with retinoic acid-loaded nanosponge compared to free drug. Franz cell studies show that the entrapment of retinoic acid in nanosponge slowed the release of retinoic acid and allowed it to remain within the skin layers longer. Pharmaceutical Sciences Asia © 2024 by Faculty of Pharmacy, Mahidol University, Thailand is licensed under CC BY-NC-ND 4.0. To view a copy of this license, visit https://www.creativecommons.org/licenses/by-nc-nd/4.0/

Author Keywords
Cyclodextrin; Nanosponge; Retinoic Acid; Tretinoin

Index Keywords
retinoic acid; acne, animal tissue, Article, attenuated total reflectance Fourier transform infrared spectroscopy, cell density, complex formation, controlled study, cross linking, differential scanning calorimetry, diffusion, dispersity, drug delivery system, drug efficacy, drug solubility, field emission scanning electron microscopy, human, human tissue, in vitro study, melting point, melting temperature, morphology, nonhuman, particle size, quantitative analysis, rat, skin irritation, solubilization, surface property, thermography, topical treatment, water content, zeta potential

Chemicals/CAS
retinoic acid, 302-79-4

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