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Freeze-dried wafers for anti-inflammatory topical delivery

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Statement of the Problem: Damage to the skin, like wounds, triggers the cascade of events that generally culminate in tissue repair. In some severe conditions, the complete repair of skin is prolonged or impaired due to excessive inflammation. These cases requires wound dressings, generally carrying drugs to prevent contamination and other properties. Curcumin, a major component of the rhizomes of Curcuma longa, has anti-inflammatory and antimicrobial properties known for centuries in Indian medicine, but is undervalued as a dressing active. Concerning the dressing matrix, natural biopolymers are biocompatible, biodegradable and allows sustained active release. Although they are extensively studied, freeze-dried formulations are practically inexistent. Therefore, the objective of this study was to develop and characterize physicochemical aspects of a bio-polymeric topical wafer for sustained release of curcumin.

Methodology & Theoretical Orientation: The wafers were obtained by freeze-drying alginate and gelatin gels in micro-well plates under a product temperature driven process (Lyostar 3 pilot freeze-drier). Characterization consisted on evaluation of critical quality attributes pre and post freeze-drying. Pre evaluation considered pH, zeta potential and gel rheology. Post evaluation included visual appearance, residual moisture and drug release profile.

Findings: Gels presented pH of 6.4, adequate to topical application, zeta potential of -30.2 mV (± 2.7 mV) and a rheological profile showed in figure 1. Wafers showed a uniform yellowish color, adequate residual moisture and easy detachment of the well. Preliminary drug dissolution studies over a 2-hour period showed 37.8 % (± 4.2 %) cumulative drug release for the wafers obtained from gels containing curcumin.

Conclusion & Significance: These results show the physicochemical feasibility of developing a sustained delivery system for curcumin by combining gelatin and sodium alginate, which allows further in vitro/in vivo studies of wound repair.

Biography

Laura de Oliveira Nascimento is a pharmacist (USP, Brazil -2007), with PhD in Pharmaceutical Sciences (USP, Brazil - 2011) and doctorate Sandwich at Boston University, MA, USA (2009). She is currently Professor of Pharmaceutical Technology of the University of Campinas (Unicamp, Brazil). Her research focus is the delivery of pharmaceutical active ingredients by nanostructured and lyophilized systems.

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