

Adenosine-loaded Silk Fibroin Aerogel Particles for Wound Healing

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Introduction

Chronic wounds are one of the major therapeutic and healthcare challenges. A natural healing response is the production of exudate from a wound. However, its overproduction can compromise and delay the inflammatory phase, resulting in chronicity. Bio-based aerogels, from natural polymer sources, can provide advanced performance for wound healing due to their high porosity and large surface area, which can be tailored for a fast and directional fluid transfer of the exudate; also, they can act as carriers for bioactive compounds. Silk fibroin (SF) protein is an excellent carrier of bioactive compounds while supporting cell proliferation, being presently used in wound healing and regeneration. In this work, we propose the use supercritical CO₂ technology to develop SF aerogel particles as a controlled release system of adenosine, a protein that is herein proposed for the first time being expected to trigger the healing process of chronic wounds, promoting angiogenesis and regeneration. For the aerogel particles' production, SF aqueous solutions at different concentrations (3, 5 and 7 % (w/v)) loaded with adenosine at different ratios were dispersed in a solution of ethanol/Span 80 (3 wt.% with respect to SF), followed by supercritical CO₂ drying (120 bar, 39°C, 3.5 h). Physico-chemical characteristics, drug release and cytotoxicity activity of bioactive SF particles will be explored.

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