chitosan-based nanofibers as wound dressing

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Introduction

Chitosan, have been examined and used in a wide variety of biomedical application, such as drug delivery carriers, surgical sutures, bone healing materials, and especially wound dressings. Chitosan could achieve hemostasis and promote normal tissue regeneration. Besides, the biodegradable chitosan itself provided bacteriostatic and fungistatic activities. These characteristics in conjunction with the beneficial effects of increased surface area from its nanofiberous form make electrospun chitosan one of the important biomaterials for wound management in recent years.

Nanofiber matrixes have shown tremendous promise as tissue engineering scaffolds for skin substitutes. The advantages of a scaffold composed of ultrafine, continuous fibers are oxygen-permeable high porosity, variable pore-size distribution, high surface to volume ratio, and most importantly, morphological similarity to natural extracellular matrix (ECM) in skin, which promote cell adhesion migration and proliferation. A number of techniques, such as phase separation, self-assembly, and electrospinning have been developed to fabricate nanofibrous scaffolds with unique properties. Among these techniques, electrospinning technology has become popular for the fabrication of tissue engineering scaffolds in recent years because it is a simple, rapid, efficient, and inexpensive method for producing nanofibers by applying a high voltage to electrically charged liquid. In this work, the potential use of the chitosan /PEG (CS/PEG) electrospun fiber mats as scaffolding materials for skin regeneration was evaluated in vitro using mouse fibroblasts as reference cell lines.