

Water absorbing and antibacterial properties of N-isopropyl acrylamide grafted and collagen/chitosan immobilized polypropylene nonwoven fabric and its application on wound healing enhancement

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摘要

Abstract

A durable sandwich wound dressing system with high liquid absorbing, biocompatibility, and antibacterial properties was designed. Various solution weight ratios of collagen to chitosan were used to immobilize on the polypropylene nonwoven fabric, which were pregrafted with acrylic acid (AA) or N-isopropyl acrylamide (NIPAAm) to construct a durable sandwich wound dressing membrane with high water absorbing, easy removal, and antibacterial activity. Swelling properties and antibacterial activity of the membranes were measured, and wound healing enhancement by skin full-thickness excision on animal model was examined. The results indicated that NIPAAm-grafted and collagen/chitosan-immobilized polypropylene nonwoven fabric (PP-NIPAAm-collagen-chitosan) showed a better healing effect than AA-grafted and collagen/chitosan-immobilized polypropylene nonwoven fabric (PP-AA-collagen-chitosan). The wound treated with PP-NIPAAm-collagen-chitosan demonstrated the excellent remodeling effect in histological examination with respect to the construction of vein, epidermis, and dermis at 21 days after skin injury. The values of water uptake and water diffusion coefficient for PP-NIPAAm-collagen-chitosan were higher than that for PP-AA-collagen-chitosan under a given solution weight ratio of collagen/chitosan. Both PP-NIPAAm-collagen-chitosan and PP-AA-collagen-chitosan demonstrated antibacterial activity. (C) 2007 Wiley Periodicals, Inc.