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Characterization and Quantification of Fibrin Gel Mechanics with Fibroblast Invasion

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ABSTRACT

Cutaneous wounds undergo an intricate healing process stimulated by a variety of local mechanical and biological stimuli that lead to patterns of growth and remodeling. Despite significant research in dermal wound healing, pathological scarring is still common particularly in wounds closed under mechanical stress, or large wounds left to heal by secondary intention. The purpose of this study is to utilize previously established wound healing models using fibrin gels and fibroblasts to better understand the functional relationships of the biological processes of normal compared to abnormal wound healing. Increases in uni-axial strain and transforming growth factor beta-1 concentration have been shown to have an increased effect on fibroblast action, leading to increased collagen deposition and overall gel stiffness. This in vitro model will help in the construction of a computational model to be used in future research.

KEYWORDS

wound healing, fibrin network, mechanical properties, biomechanics, remodeling, fibril alignment