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Effects of Mesoglycan on Tissue Repair by Modulating Keratinocytes, Fibroblast and Endothelial Cells Functions

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Glycosaminoglycans are polysaccharides of the extracellular matrix supporting skin wound closure. Mesoglycan is a mixture of glycosaminoglycans such as chondroitin-, dermatan-, heparan-sulfate and heparin. Glycosaminoglycans may contribute to the re-epithelialization in the skin wound healing, as components of the extracellular matrix. Here we describe, for the first time, the effects of mesoglycan in vitro cultures of adult epidermal keratinocytes and dermal fibroblasts. Once confirmed the lack of cytotoxicity by mesoglycan, we have shown the increase of S and G2 phases of fibroblasts cell cycle distribution. We further report the strong induction of cell migration rate and invasion capability on both cell lines, two key processes of wound repair. In support of these results, we found significant cytoskeletal reorganization, following the treatments with mesoglycan, as confirmed by the formation of F-actin stress fibers. Additionally, together with a significant reduction of E-cadherin, keratinocytes showed an increase of CD44 expression and the translocation of ezrin to the plasma membrane. Furthermore, as showed by immunofluorescence assay, fibroblasts treated with mesoglycan exhibited the increase of Fibroblast Activated Protein α and a remarkable change in shape and orientation, two common features of reactive stromal fibroblasts. Finally, we show the in vitro effects of mesoglycan in the new vessels formation by endothelial cells, since angiogenesis represents a key moment in wound healing. We found a strong increase of migration and invasion rates of these cells treated with mesoglycan, which mediate the activation of the pathway triggered by CD44 receptor. Interestingly, endothelial cells form longer capillary-like structures with a great number of branches, in the presence of the same treatments. Thus, the device, thanks to the mesoglycan, leads the cells to the Endothelial-to-Mesenchymal Transition, suggesting the switch to a fibroblast-like phenotype, as shown by immunofluorescence assays. In conclusion, based on these findings we suggest that mesoglycanmay be able to accelerate the healing process in venous skin ulcers, principally enhancing re-epithelialization granulation processes.

Biography:

Dr. Antonello Petrella is a Professor of Pharmacology in the Department of Pharmacy at the University of Salerno, Italy. His professional interests involve the role of Annexin A1 in migration and invasion of human pancreatic carcinoma cells and in prostate cancer progression. Moreover studying the role of mesoglycan in skin wound healing. He is the Author, and has published about 60 scientific papers in refereed journals.