WOUND HEALING

PROXYLANE, A PLANT SUGAR DERIVATIVE, IMPROVES WOUND HEALING BY BIOMIMETIC MECHANISM

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In the skin, the repair after wounding requires dermal fibroblasts, keratinocytes and endothelial cells. Together, they orchestrate mediator signaling and paracrine interactions, both required to regulate the size and the timing of the repair process. Extracellular molecules like proteoglycans (PG), glycosaminoglycans (GAGs) and hyaluronan are fundamental. Most PG activities are due to the large interactive properties of their GAG polysaccharide chains, which regulate natural endogenous growth factor functions among which tissue morphogenesis, epidermal renewal and wound healing.
Xylose is a plant sugar, constituting the hemicellulose. Xylose is pervasive, found in the embryos of most edible plants. Surprisingly, in human, it is involved in the biosynthetic pathways of most anionic polysaccharides of connective tissue such as heparan sulfate and chondroitin sulfate.
O-xylosides, bioinspired xylose derivatives, are known to bypass PG-associated GAG biosynthesis and prime the biosynthesis of free polysaccharide chains. They are initiators of the synthesis of GAG, e.g. of Dermatan-sulfate, which are closely intertwined with the regulation of growth factor function and distribution.
An original xyloside derivative (C-xyloside, hydroxypropyl tetrahydropyrantriol, Proxylane®, -Px,) was developed, sharing natural GAG-inducing xyloside activity while exhibiting improved metabolic stability.
This C-xyloside strongly enhanced the synthesis of free GAG chains and the level of a specific population of PG (heparan-sulfate proteoglycans). Linked to this activity, Px improves the availability of paracrine growth factors such as FGF-7 without affecting their transcript levels in skin dermal cells. Furthermore, the conditioned medium of Px-treated fibroblast containing increased level of FGF-7 is able to enhance FGF signaling in cultured keratinocytes as shown by FRS2 and Akt activation (Muto.J, et al. PLoS One. 2011).
Testing the clinical efficacy of Px on wound healing confirmed the findings identified in the in vitro models. By serving as a protective effect of endogenous growth factors, Px may thus enhance epithelial repair and wound healing.