HAIR DISORDERS

HR007 INDUCES THE PROLIFERATION OF HUMAN HAIR FOLLICLES EX VIVO

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HR007 is a high-purity (> 95%) mixture of non-crosslinked glycosaminoglycans. We have previously demonstrated that a HR007 1.5% induces proliferation and motility of human primary fibroblasts and keratinocytes. In a step further, the aim of this study was to evaluate and characterize the effects of HR007 on human resting hair follicles grown in ex vivo cultures.

Individual human resting (telogen) hair follicles were obtained as remnants of hair transplant and routinely grown in Williams E medium. For morphological analysis, 6-10 um histological sections were stained with H & E. The expression and localization of the cell proliferation marker Ki67, the stem cell marker CK15 (Cytokeratin 15) and the Wnt/β-catenin gene target CCND1 (Cyclin D1) was analyzed by inmunofluorescence/inmunohistochemistry and evaluated by confocal microscopy. The gene expression of components/targets of BMP/Smad and Wnt/β- catenin signaling pathways and of different telogen-anagen transition factors was quantified by qRT-PCR.

Here we report that treatment of hair follicles with HR007 promotes a rapid thickening of the dermal papilla/hair bulb region and of the outer and inner root sheaths. This stimulatory effect is associated with the induction of KI67 all along the hair follicle, with a strong increase in the number of CK15 positive cells and with the activation of Wnt/β-catenin signaling (induction of CCND1 target and repression of the inhibitors/antagonists GSK3β and DKK1). Significantly, the activation of Wnt/β-catenin signaling occurs even when BMP2/BMP4 signaling, essential to maintain the telogen phase is still active. Interestingly, HR007 positively modulates the expression of TGFβ2, a factor involved in the telogen/anagen transition, but not of FGF7. As a whole, these results indicate that HR007 1.5% promotes very efficiently the entry of human resting hair follicles grown ex vivo into the growing phase through the activation of Wnt/β-catenin signaling.