Abstract:

Minoxidil effects on anagen-related gene expression in Bulge stem cells and Bulb cells of the mouce hair follicles

It is believed that different signaling pathways to be expressed in the bulge and bulb regions of hair follicle during anagen. Hair follicle morphogenesis depends on *Wnt, Shh, Notch, BMP* and other signaling pathways. We hypothesized that the bulge and bulb cells express specific genes and possess distinctive behavior after exposure to minoxidil. Minoxidil effects on hair loss well-known and it induces telogen to anagen transition, however, the possible mechanism by which it acts are largely unexplored. In this study, we investigated whether minoxidil activate *Kras, BMP4, Shh,* and *β-catenin* in the bulge or bulb cells. Whisker follicles were isolated and bulge and bulb regions dissected under an invert microscope, and the cell viability evaluated using acridine orange/ ethidium bromide (AO/EB) and DAPi staining. Then, the bulge and bulb cells treated with 100 µg minoxidil, and reverse transcriptase (RT) and real time polymerase chain reaction (PCR) were performed to examine the expression of *Kras/ERK1/Akt1, BMP4, Shh* and *β-catenin* in the presence or absence of minoxidil. cultured bulge and bulb cell viability were observed by application of various concentration of minoxidil in mice. Minoxidil stimulated the cell survival. *Kras/ ERK1, Shh* and *β-catenin* genes expression were upregulated in response to minoxidil treatment. This new function for minoxidil does not require the vascularization of dermal papilla and therefore operates through a mechanism independent of its activity in dermal papilla cells. These data indicate that, in addition to its established role in β-catenin activation in the dermal papilla, minoxidil can promote proliferation of resting hair follicle stem cells (HFSCs) and bulb cells through different signaling pathway.

Keywords: Bulge region ; Hair follicle Stem cells; Bulb cells; All trans retinoic acid; Minoxidil