

Combination effects of Azelaic acid and Minoxidil on gene expression in anagen phase of mouse hair follicle

Abstract

Background and Objective: Several important signals including Wnt and Shh participate in the hair follicle cyclic changes. Hair loss can be caused by genetics and androgens. Interestingly, there is evidence that azelaic acid could have a biological effect on androgenetic alopecia, but **there are little studies to prove mechanisms of action of azelaic acid on hair growth.**

Methods: ***In this study,*** the mouse whisker follicles were isolated at day 10 after depilation. The hair follicle treated with minoxidil and azelaic acid for 10 days and then bulge or bulb regions were dissected. Immunoassay and real-time polymerase chain reaction (PCR) analysis were performed to examine the expression of ***Shh, Gli1, Gli2, Axin2, and PPAR γ*** mRNA levels in the treated bulge and bulb regions.

Results: Here, we found that azelaic acid alone influence ***Ppar γ*** expression ***and*** in combination with minoxidil affects Shh and Wnt

signaling pathways in the bulge and bulb cell. In addition, Minoxidil alone increased Gli1, axin-2 and Ppar γ mRNA levels in bulb cells. Shh protein

was also significantly increased in the minoxidil (100 μ M) - and azelaic acid (25mM)/minoxidil (100 μ M)-treated hair follicles.

Conclusion: *This newly mechanism of anagen promoting action of azelaic acid combination with minoxidil provides further evidence for their efficacy in alopecia treatment.*

Keywords: *Minoxidil, Azelaic acid, Hair follicle, Anagen, Bulge region, Shh, Wnt*