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The effect of cilostazol on hair growth: A type of drug repositioning for the treatment of alopecia with the mechanism of vasodilatation

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Background: Cilostazol, a phosphodiesterase3 (PDE3) inhibitor, increases the intracellular cyclic adenosine monophosphate (cAMP) level in vascular smooth muscle cells causing vasodilation and is widely used for the supportive treatment of chronic peripheral vascular diseases. Topical application of cilostazol is reported to improve local blood flow in rabbit skin and enhance wound healing.

Objective: Herein, we introduce the promotive effect of cilostazol on hair growth for the first time.

Methods: To validate the effects of cilostazol on hair growth, we treated cilostazol to human dermal papilla (DP) cells and to outer root sheath (ORS) cells, and performed *ex vivo* hair follicle organ culture. Also, we demonstrated the effect of cilostazol on C57BL/6 mice model.

Results: As a result, we confirmed that the mRNA levels of PDE3A and PDE3B were highly expressed in human DP cells, but almost absent in ORS cells. Cilostazol significantly enhanced the viability of DP cells and increased phosphorylated extracellular signal-regulated kinase (ERK) levels proven by western blot analysis. Additionally, cilostazol promoted hair shaft elongation with increased proliferation of matrix keratinocytes in hair follicle organ culture. Furthermore, cilostazol treatment accelerated the anagen hair induction when topically applied on 7-week-old C57BL/6 mice.

Conclusion: Our results show that cilostazol promoted hair growth and may serve as an alternative therapeutic target for the treatment of alopecia.