Subject: TGF-beta1
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A cell-based system for screening hair growth-promoting agents.
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Androgen-inducible transforming growth factor beta (TGF-beta1) derived from dermal papilla cells (DPCs) is a catagen inducer that mediates hair growth suppression in androgenetic alopecia (AGA). In this study, a cell-based assay system was developed to monitor TGF-beta1 promoter activity and then used to evaluate the effects of activated TGF-beta1 promoter in human epidermal keratinocytes (HaCaT). To accomplish this, a pMetLuc-TGF-beta1 promoter plasmid that expresses the luciferase reporter gene in response to TGF-beta1 promoter activity was constructed. Treatment of HaCaT with dihydrotestosterone, which is known to be a primary factor of AGA, resulted in a concentration-dependent increase in TGF-beta1 promoter activity. However, treatment of HaCaT with the TGF-beta1 inhibitor, curcumin, resulted in a concentration-dependant decrease in TGF-beta1 expression. Subsequent use of this assay system to screen TGF-beta1 revealed that HaCaT that were treated with apigenin showed decreased levels of TGF-beta1 expression. In addition, treatment with apigenin also significantly increased the proliferation of both SV40T-DPCs (human DPCs) and HaCaT cells. Furthermore, apigenin stimulated the elongation of hair follicles in a rat vibrissa hair follicle organ culture. Taken together, these findings suggest that apigenin, which is known to have antioxidant, anti-inflammatory, and anti-tumor properties, stimulates hair growth through downregulation of the TGF-beta1 gene. In addition, these results suggest that this assay system could be used to quantitatively measure TGF-beta1 promoter activity in HaCaT, thereby facilitating the screening of agents promoting hair growth.

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