
Subject: L-Ascorbic acid 2-phosphate

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: Br J Dermatol. 2009 Jun;160(6):1157-62. Epub 2009 Mar 26.

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L-Ascorbic acid 2-phosphate promotes elongation of hair shafts via the secretion of insulin-like growth factor-1 from dermal papilla cells through phosphatidylinositol 3-kinase.

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BACKGROUND: L-Ascorbic acid 2-phosphate (Asc 2-P), a derivative of L-ascorbic acid, promotes elongation of hair shafts in cultured human hair follicles and induces hair growth in mice.

OBJECTIVES: To investigate whether the promotion of hair growth by Asc 2-P is mediated by insulin-like growth factor-1 (IGF-1) and, if so, to investigate the mechanism of the Asc 2-P-induced IGF-1 expression. **METHODS:** Dermal papilla (DP) cells were cultured and IGF-1 level was measured by reverse transcription-polymerase chain reaction and enzyme-linked immunosorbent assay after Asc 2-P treatment in the absence or presence of LY294002, a phosphatidylinositol 3-kinase (PI3K) inhibitor. Also, hair shaft elongation in cultured human scalp hair follicles and proliferation of cocultured keratinocytes were examined after Asc 2-P treatment in the absence or presence of neutralizing antibody against IGF-1. In addition, keratinocyte proliferation in cultured hair follicles after Asc 2-P treatment in the absence or presence of LY294002 was examined by Ki-67 immunostaining. **RESULTS:** IGF-1 mRNA in DP cells was upregulated and IGF-1 protein in the conditioned medium of DP cells was significantly increased after treatment with Asc 2-P. Immunohistochemical staining showed that IGF-1 staining is increased in the DP of cultured human hair follicles by Asc 2-P. The neutralizing antibody against IGF-1 significantly suppressed the Asc 2-P-mediated elongation of hair shafts in hair follicle organ culture and significantly attenuated Asc 2-P-induced growth of cocultured keratinocytes. LY294002 significantly attenuated Asc 2-P-inducible IGF-1 expression and proliferation of follicular keratinocytes in cultured hair follicles. **CONCLUSIONS:** These data show that Asc 2-P-inducible IGF-1 from DP cells promotes proliferation of follicular keratinocytes and stimulates hair follicle growth in vitro via PI3K.

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