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Acceleration of Hair Growth Rate by Topical Liposomal Cepharanthine in Male Androgenetic Alopecia

Inui S[1] , **Tohyama C and Itami S**[1*]

[1]*Department of Regenerative Dermatology, Osaka University School of Medicine, Osaka, Japan*

[*]**Corresponding author:** Itami S, Department of Regenerative Dermatology, Osaka University, Osaka, Japan; E-mail: itami@r-derma.med.osaka-u.ac.jp

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Abstract

Because we previously found that cepharanthine (CEP) induces production of IGF-I, one of anagen inducers, from dermal papilla cells, we investigated clinical effect of topical lipoid CEP (lipo-CEP) on hair growth of male androgenetic alopecia (AGA). Twenty-three males with early AGA applied 0.1% lipo-CEP lotion once a day on the vertex area for 6 months. As a result, hair growth rate was significantly accelerated from 0.243 to 0.281 mm/day ($p<0.01$). Likewise, hair density and thickness increased but the changes were not statistically significant ($p<0.1$). From these results, lipo-CEP lotion can stimulate hair growth mainly through accelerating growth rate, representing a hopeful reagent for treating AGA.

Keywords: Alopecia; Androgenetic; Male pattern baldness; Cepharanthine

Introduction

Cepharanthine (CEP) is a biscoclaurine alkaloid extracted from the plant *Stephania cepharantha* Hayata. Japanese Ministry of Health approved oral CEP as a therapeutic reagent for radiation-induced leukopenia, alopecia areata and pityrodes and it has been clinically utilized for more than 40 years [1]. Although CEP has been suggested to have simulative effect on hair growth, its mechanism was yet unknown. Then, we found that CEP induces production of IGF-I, one of anagen inducers, from dermal papilla cells [2]. Because IGF-I is an androgen-inducible positive growth mediator for beard growth stimulation [3] and an increased expression of IGF-1 mRNA in the DPCs positively correlates with patient response to finasteride [4], we investigate here clinical effect of topical lipoid CEP (lipo-CEP) on hair growth of male androgenetic alopecia (AGA).

Methods

Twenty-three males from twenties to fifties with early AGA (Norwood-Hamilton scale II or III, median age: 39.5 year-old) were enrolled in this study after informed consents were obtained. They applied 0.1% lipo-CEP lotion once a day on the vertex area for 6 months. Hair density, growth rate, thickness and anagen ratio were analyzed using Folliscope® system (Lead M Corporation, Seoul, Korea) before and after the 6-month treatment. Statistical analysis was performed by paired t-test.

Results

Hair growth rate was significantly accelerated from 0.243+0.054 to 0.281+0.049 mm/day ($p<0.01$, Figure 1) by the application of lipo-CEP lotion. Hair density and thickness increased from 161.3+19.5 to 167.2+17.0/cm^2 and 79.0+13.4 to 81.4+15.2 μm, respectively, while these changes were not statistically significant ($p<0.1$). From these results, lipo-CEP lotion can stimulate hair growth mainly through accelerating growth rate. On the other hand, there was no significant effect on anagen ratio probably because the enrolled patients had early stage of AGA.

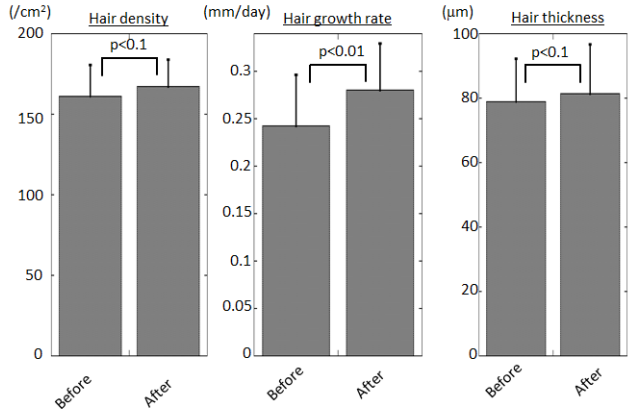

Figure 1: Effect of topical application of 0.1% lipoid cepharanthine on the vertex for 6 months on hair density, growth rate and thickness.

Discussion

Our previous study showed that the concentration of CEP was 0.1 and 1.0 μg/ml stimulated IGF-I production from dermal papilla cells. However, serum concentration after taking 10 mg oral CEP is only 1 ng/ml [5] and therefore topical application of CEP is more likely to be effective for AGA. Accordingly, our trial here tested the effect of topical CEP. To achieve high concentration of CEP in the skin, enhancement of its penetrance is necessary. For this purpose, we synthesized lipo-CEP and resultantly found that lipo-CEP solution is a hopeful reagent for treating AGA. Although standard therapies such as finasteride [6],

dutasteride [7] and minoxidil [8] significantly increased hair density of AGA patients, lipo-CEP did not alter it. Therefore, its effect may be mild and additive compared with the standard therapies.

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