

### 전통식물 추출물이 모발 성장 및 물리적 특성에 미치는 효과

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#### Experimental Studies of Korean Medicinal Plant Extracts on the Effects of Hair Growth Activity and Physical Properties

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#### Objectives

Korean medicinal plants *including Thuja occidentalis* have been widely used for treatment of relaxing of smooth muscle, gastrointestinal hemorrhage and alopecia in Korean Oriental Medicine. In this research, we examined the effect of the extracts, obtained from medicinal plants, on physical properties and hair growing activity of the DP6 cell.

We investigated the hair growth activity of *Thuja occidentalis* semen extract as a 5 $\alpha$ -reductase inhibitor and also developed a new shampoo formulation, in which contained amine oxide as a secondary surfactant and some biological active ingredients. We aimed to observe clinical efficacies of the retardation of alopecia with formulated a shampoo.

#### Materials and Methods

On the basis of oriental pharmacognosy, some traditional plants were selected and we extracted them to evaluate their biological effects. The inhibitory effect of *Thuja occidentalis* semen extract for 5 $\alpha$ -reductase was compared with unsaturated fatty acid and medical drug using stable cell-based metabolic assay. The enzyme activity was exhibited as DHT conversion ratio ( $T/(T+DHT)*100$ ). In situ metabolic incubation time for assay was determined at 2h, which showed a linear conversion rate (Mean  $\pm$ SD). Now clinical approach for evaluation of retardation of hair loss by the described shampoo formulation is in progress for 24 weeks. The shed hair count during shampoo, and phototrichogram parameters (total hair count, anagen/telogen ratio) would be obtained at three points with initial baseline. Statistical analysis was performed with wilcoxon signed-rank test or two sample T test using MINITAB software. We also compared the tensile strength, shininess and color appearance between the virgin hair (untreated) and the hair after applying formulation. To analyze the luster and color image, we use the SAMBA hardware and software made by Bossa Nova Technologies.

#### Results

*In vitro* effects of potassium channel openers (minoxidil, triaminodil) and blocker (tolbutamide) were indirectly assessed on NIH3T3 fibroblast in the absence of streptomycin antibiotics & phenol red, and 5% fetal bovine serum-supplemented medium. Tolbutamide inhibited app. 40% proliferation of NH3T3 fibroblast at 2.5mM concentration.

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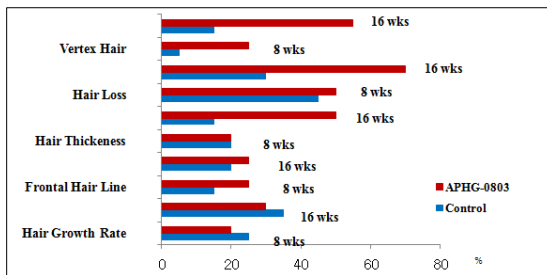
When minoxidil & triaminodil were treated to the fibroblast with 2.5mM tolbutamide, growth inhibition of NIH3T3 fibroblast was suppressed 51.49% by 100uM minoxidil 58.7% by 100uM triaminodil, respectively.

In the comparative test for tensile characteristic between the virgin hair and shampoo-treated hair, tensile distance of shampoo-treated hair was increased by 31.5% or 3.05 mm than the virgin hair. The shininess and color appearance were also increased after using shampoo including natural extracts (shininess: 24.1%, color appearance: 20.9%). We observed the enhancement of hair growth activity in the DP6 and C3H10T1 cell.

When the inhibitory effect of *Thuja occidentalis* semen (TOS) extract for 5 $\alpha$ -reductase was compared with unsaturated fatty acid and medical drug (finasteride), TOS extract showed higher inhibition activity of 5 $\alpha$ -reductase type 2(IC<sub>50</sub> = 2.6 $\mu$ g/ml) than that of  $\gamma$ -linolenic acid, but lower than that of finasteride.

## 시험성적

### 1) *Thuja occidentalis* semen (TOS) extract (백자인 추출물)



### 2) *Scutellaria baicalensis* Georgi and *Glycyrrhiza glabra* L.

