

## LED PHOTOMODULATION INDUCED HAIR GROWTH STIMULATION

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**Background & Objective:** The ability to stimulate human scalp hair growth is well established. Oral finasteride inhibits 5-alpha reductase. Topical minoxidil stimulates vascular endothelial growth factor (VEGF), hepatocyte growth factor (HGF), and matrix metalloproteinase (MMP-2). LED photomodulation modulates the activity of genes in human skin. This study investigates the effects of LED photomodulation on human dermal papillae cells (HDP) in culture and in clinical trials.

**Study Design/Materials & Methods:** Male and female HDP cells were exposed to LED arrays. Variables included wavelength, energy, and pulse duration. Gene expression of 5-alpha reductase, HGF, MMP-2 and others were measured using RT-PCR and microarrays.

**Results:** Different protocols produced significant distinctive effects on gene expression. Relative expression of 5 alpha reductase by RT-PCR ranged from -3.6 to +2.0 depending on the LED parameters. For example, one LED array produced VEGF (+1.8), HGF (+2.0), MMP-2 (+2.7) and 5-alpha reductase (0). This pattern resembled minoxidil rather than finasteride and was selected for a pilot clinical trial. Hair growth stimulation was observed.

**Conclusions:** LED photomodulation using visible light can alter the expression of genes associated with stimulation of hair growth. This effect is dependent upon treatment parameters.

Published online in Wiley InterScience  
([www.interscience.wiley.com](http://www.interscience.wiley.com)).  
DOI 10.1002/lsm.20164

Presented at ASLMS Annual Meeting--Orlando, April 1<sup>st</sup> 2005