

**Hair Regrowth and Increased Hair Tensile Strength**  
**Low-Level Laser Therapy**

**JOHN L. SATINO and MICHAEL MARKOU, D.O.**

The authors wished to confirm the efficacy of low level laser therapy (LLLT) for the stimulation of hair growth and also to determine what effect LLLT had on the tensile strength of hair. Thirty-five patients, 28 males and 7 females, with androgenetic alopecia (AGA) underwent treatment for a six-month period. Both the hair counts and tensile strength of the hair were affected very beneficially in both sexes in the temporal and vertex regions, with the males and vertex areas showing the most improvement.

**INTRODUCTION**

ALTHOUGH LOW-LEVEL LASER THERAPY (LLLT), the therapeutic application of low-energy lasers to medicine, has been used for photobiostimulation for more than thirty years now, in the past it has primarily been used to accelerate the healing of burns or wounds, or alternatively, to ease or relieve pain. Furthermore, LLLT has gained credibility and common usage in some parts of the world, such as Japan, the Scandinavian countries, and Australia, while in other parts of the world, such as North America, a lack of recognition of its efficacy has remained.

Even though there are more than 2,500 papers related to LLLT in the scientific literature, (1) only one printed reference, Professor Pekka Pontinen's text, was found which actually discussed the use of LLLT "to stimulate hair growth." (2) Even in this source, the information was limited to one paragraph, which refers to one paper given in Sorrento in 1982 which reported increased hair growth after LLLT in animals, (3) and a foreign language publication in 1983 which reported favorable results with LLLT in the treatment of Alopecia areata. (4) The authors heard about Dr. Martin Unger's paper in Puerto Vallarta, Mexico, discussing the use of LLLT for hair biostimulation. It was at this time that the authors decided to carry out their own study to determine whether the LLLT - Photomedicine was effective with regard to stimulating hair growth. The authors also wished to determine what affect LLLT had on the tensile strength of hair and undertook to determine this during the same study.

**MATERIALS AND METHODS**

The devices were composed of closely spaced 650 nm, 5mW laser diodes. The specific parameters were selected for many important reasons.

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Hair for the hair counts. Accordingly, they created a clear acrylic mold of each patient's head, with the front of the mold positioned at the hairline, and a one-centimeter square removed from the mold in the area of greatest alopecia in either the temporal or vertex region (Fig. 3). For the hair count, the hairs within the one square centimeter space were pulled through the opening, and then counted using a surgical skin hook and a lens with five times magnification. Hair counts were carried out by both authors to confirm the accuracy of the data. To test the tensile strength of the hair before treatment and after six months of treatment, three typical terminal hairs were removed from the one square centimeter area and a VIP HairOScope (Belson Imports, Hialeah, FL) used to determine the tensile strength (Fig. 4).

## **RESULTS**

The scientific data for the hair counts is demonstrated in Table 1, and the data for the tensile strength of the hair recorded in Table 2. One-third of the patients did report some temporary slightly increased hair shedding during the first one or two months of treatment, but after two months, this no longer occurred. In summary, Table 1 shows that the hair counts increased in the temporal area an average of 55.2% in women, 74.1% in men, and 69.1% for all patients. In the vertex area, the corresponding percentages were 64.9% for women, 120.1% for men, and 111.9% for all patients.

There was a hair count increase of 93.5% when all temporal and vertex patients were combined. In general, males and the vertex area did the best, but both sexes and all areas did demonstrate significant improvement.

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Similarly, in Table 2, the hair tensile strength increased in the temporal area 82.6% in women, 64.4% in men, and 69.3% in both sexes. In the vertex area, the percentages were 71.1% for women, 89.3% for men, and 86.4% for both sexes. The hair tensile strength was increased 78.9% when all temporal and vertex patients were considered. There was greater improvement in the vertex area in males, but more improvement in the temporal area in females. Both sexes and all areas did benefit significantly.

## **DISCUSSION**

In general, the results far exceeded the expectations of the authors, and they were pleased to be able to document the benefits that LLLT with laser hair restoration can achieve for both men and women in both the temporal and vertex regions. Although there were four times as many men as women patients in the study, each sex did demonstrate significant benefits from the LLLT.

The mechanism or mechanisms of action of LLLT are unknown with regard to the stimulation of hair growth or how the hair tensile strength is increased so greatly. From wound healing studies, it is known that LLLT causes an increase in the microcirculation of tissue and a reduction in inflammation.(2) The amount of cellular energy in the form of adenosine triphosphatase (ATP) is also increased following LLLT.(2) Perhaps one or more of these beneficial effects are responsible for the results that we were able to achieve. The authors hypothesized that the early temporary hair shedding experienced by some patients was most likely related to an accelerated hair cycle in general. Obviously, more research is required if we are to fully understand the scientific findings noted in this paper.

## **CONCLUSION**

LLLT – Photomedicine is an effective treatment for stimulating hair growth and increasing the tensile strength of hair in both sexes in both the temporal and vertex regions. In the authors' opinion, LLLT should be given serious consideration as an option in the treatment of AGA in view of its safety, ease of patient home administration, and the benefits documented in this study.



## International Society of Hair Restoration Surgery

### Low-Level Laser Therapy is Now a Do-It-Yourself Hair Loss Treatment

**NEW YORK (October 16, 2003)**- While lasers are best known as high-energy beams of coherent light that can cut through a variety of materials including human tissue, low-energy laser light has been found to be capable of modulating beneficial biologic effects in human, animal and plant cells. The biomodulating effects of low-level laser light on human cells has been adapted to medical uses such as enhanced wound healing and treatment of some types of pain, and to cosmetic uses associated with effects on human skin.

Low-level laser light has also been found to have biomodulating effects on human hair and hair follicles. The effectiveness of low-level laser light in hair restoration was described today by Martin Unger, MD, Toronto, Canada, in a presentation at the 11th Annual Meeting of the International Society of Hair Restoration Surgery (ISHRS). The ISHRS is meeting October 15-19, 2003, at the Marriott Marquis Hotel, New York City.

In clinical trials, 97% of patients have had some benefit in improvement of hair characteristics, stabilization of hair loss, or hair regrowth, Dr. Unger said. Hair regrowth is defined by Dr. Unger and colleagues as an increase of hair count of 11% or more from baseline count.

In the most recently conducted FDA clinical trials of the device, patients studied were men and women with thinning hair in the scalp area. The patients received two low-level laser light treatments per week over a six-month period. Results have shown:

- ❖ **100%** of men had stabilization of hair loss in frontal and vertex (top of the head) areas;
- ❖ **84.6%** of men had hair regrowth (11% or more from baseline) in the frontal area;
- ❖ **82.8%** of men had hair regrowth (11% or more from baseline) in the vertex area;
- ❖ **87.5%** of women had stabilization of hair loss in the frontal area;
- ❖ **100%** of women had stabilization of hair loss in the vertex area;
- ❖ **75%** of women had hair regrowth (11% or more from baseline) in the frontal area; and,
- ❖ **96.4%** of women had hair regrowth (11% or more from baseline) in the vertex area.

No side effects of low-level laser therapy have been observed, Dr. Unger said. There have been no reports of eye damage from exposure to low-level laser light.

Patients with medical conditions such as a history of skin cancer, persistent scalp infections, and photosensitivity to laser light were excluded from the study.

The ISHRS is the world's largest not-for-profit professional organization in the field of hair restoration surgery, with 512 physician members in 45 countries. The organization was founded in 1992 to promote the enhancement of the specialty of hair restoration surgery through education, information-sharing, and observance of ethical standards