

SCIENTIFIC STUDIES

The Principles of Low Level Laser Therapy

The Principles of Low Level Laser Therapy or photo-biotherapy are as old as sunlight itself. Harnessing and refining the therapy with low reactive lasers is relatively new. Low-level lasers are "soft" lasers, often referred to as "cold" lasers, and do not have the thermal-component to cut, burn or vaporize tissue. Low Level Laser Therapy (LLLT) is based on the scientific principal of photo-biotherapy. Photo-biotherapy occurs when laser light is absorbed by cells stimulating cell metabolism and causing damaged cells to repair themselves. Photo-biochemical changes in cells can only be achieved with the correct amount of light energy, delivered at the appropriate wavelength. According to laser researcher, Dr. David G. Williams, "Low Level Laser Therapy, or LLLT, is a miraculous healing tool."

Light Energy Explained

Normal white light produces a thermal effect in the skin. This is due to its relatively high-energy output, with a large share of it's light in the infrared spectrum being absorbed by the water in the outer cell structures. Laser light, with one specific wavelength, penetrates deep into the layers of skin and is absorbed, provoking a photo-biochemical chain reaction. Laser energy (photons), penetrates deep into these tissues and is absorbed by deeper cell structures, resulting in a photo-biochemical chain of cellular and sub-cellular events. Laser hair therapy is clinically proven, in European studies, to stimulate these cellular and sub cellular events, leading to a dramatic increase in microcirculation of blood supplies, cessation of hair loss and stimulation of hair re-growth.

- In 1969, Dr. Brian E. Johnson, reported his attempt to stimulate hair growth on C57B mice by 260 nm irradiation. Inhibitions were reported in the wavelength range 280-310 nm.
- Professor E. Mestor reported in 1968 that unfocused 694 nm Rubin laser-light initially increased hair growth in C57B mice.
- In 1984 Dr. Trelles showed in one study that patients with alopecia areata who were treated with HeNe Laser 632.8nm showed a good response. Dr. Trelles reported that most of the patients with alopecia areata responded well after only 6 to 8 treatments administered twice a week for four weeks. The HeNe laser was placed 30 centimeters from the alopecia area with dosages ranging from 3-4 joule per sq. cm. No fibers or lenses were used. In the same study, microscopic evaluation of the hair shaft structure on the alopecia areata irradiated areas showed a clear modulla rich in Keratin after treatment. Daily treatments appeared to prevent re-growth, causing irritation with a probable increase in hair loss.

- At the 4th annual Meeting of the Japan Laser Therapy Association in 1992, success was reported with an increase in both hair growth and the density of the hair follicle in the laser treated areas of both male and female stress alopecia and alopecia areata patients, with only one failure out of 40 cases reported in two papers.

Various light sources including lasers have been used in attempts to stimulate hair growth and stop the progression of hair loss since the 1950's. Some of these studies have included light sensitive drugs. Such studies are not presented here.

Two Clinical Double Blind Controlled Studies Have Been Completed on Laser Hair Therapy 3000

1. Cessation of hair loss, increased re-growth of hair with improved hair quality.
2. Increased circulation in scalp blood flow.

The results of these clinical studies are to be published in scientific journals.

Hair Loss, Re-growth (Study #1)

A double blind comparative study of laser treatment with placebo laser (LED) 5 for treatment of Hereditary Androgenetic Alopecia in young males. Abstract: A double-blind placebo controlled study was carried out to evaluate at the effect of laser therapy by comparing Laser Hair Therapy (InGaAl, 670 nm) and a placebo laser (LED). The duration of hair loss and baldness, according to Hamilton Classification, were recorded. A skin biopsy for histological examination was taken before and after treatment. In addition a photograph was taken of the patient at the same time. Hair shaft thickness was measured with hair stretching equipment where the hairs were stretched on a graded scale from 0-10, normal value of hair shaft being 0.5.

Results

The results were confirmed by histological examination. All patients with the exception of one in the laser-treated group showed a complete cessation of hair loss. All patients except 3, showed a clear re-growth of hair with a reduction of at least one category in the Hamilton classification. Pre-treatment typically showed the dermis with large, relatively normal amounts of follicles. Most of them were in the telogen phase and did not show any real hair. Some of the follicles were widened with keratin taps at the follicle opening. Post-treatment showed the dermis with almost the same amount of hair follicles as pre-treatment, although a number of new follicles could be seen with clearly noticeable hair growth. 50% of the follicles were now in the

anagen phase. A clearly visible re-growth of hair was found in post-treatment sample comparison. When comparing the histological findings, transformation into more anagenic hair follicles could be observed in 83% of the patients on laser treatment, but in none of the placebo patients.

Out of 18 patients, 14 showed an increase in hair thickness, and all 18 patients showed improvement in general hair shaft quality. When measured with the hair stretcher, the results showed no improvement in the placebo group or any adverse effects of the treatment. The present double-blind study definitely showed that re-growth of new hair can be achieved in most middle-aged and younger males, with typical male pattern baldness, when the scalp is irradiated with Laser Hair Therapy 3000 for 15 minutes twice weekly for 5 weeks, with follow-up maintenance treatments.

Scalp Blood Flow (Study #2)

The effect of hair lasers on skin blood flow. Abstract: The effect of hair lasers on skin blood flow were measured on three different devices to establish the effect of scalp blood flow. The hair lasers used were Laser Hair Therapy 3000 (InGaAl, 670 nm) with 30 rotating diode lasers, an Italian manufactured laser (HeNe, 632.8nm) marketed as the Boston Laser, and containing a single laser transferring light via lenses to the patient, and a laser identical to Laser Hair Therapy 3000 in which the 30 diode lasers were replaced with (placebo) Light Emitting Diodes (LED).

Results

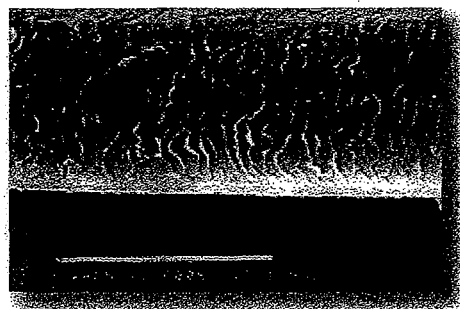
The difference in the laser systems are illustrated by the fact that Laser Hair Therapy 3000 increased scalp blood flow rate by 54%. The HeNe laser, or Boston laser, had no effect, and the LED (placebo) decreased the blood flow rate by 36%. In addition, skin temperatures measured before and after the treatment showed little change.

Note: These studies have not been evaluated by the FDA.

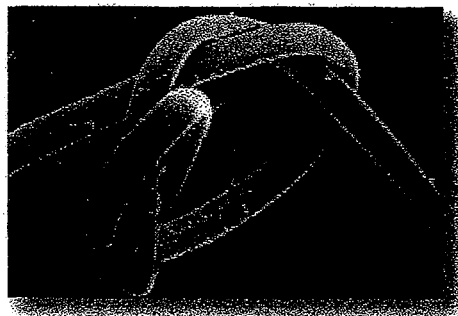
Laser Science AB's comment (manufacture)

Client/patient undergoing treatment with Laser Hair Therapy 3000 may experience a sensation of heat, accompanied by a tingling feeling from the scalp to the neck during treatment. Laser Hair Therapy 3000 has no thermal component, and the warm feeling can be attributed to stimulation of microcirculation of blood supply. Furthermore, initially an oilier scalp is often noticed. The scalp that was oily before treatment will normalize in the same way. This condition has not been fully explained, but is believed to be the result of the normalization of the sebum (lipid) secretion from the sebaceous gland during treatment, after inactive hair follicles have been stimulated, the sebum (5 α -reductase) is thought to play a role in hair loss and re-growth. The described reaction to treatment is a natural reaction, which indicates that the therapy is working.

Before:

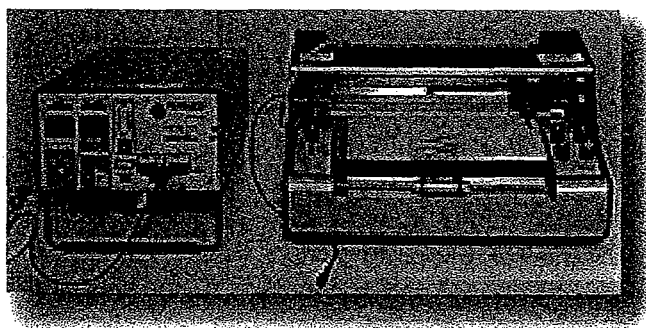
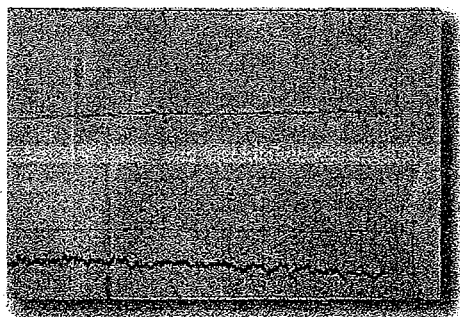


After:



Scalp Blood Flow (Study #2)

The effect of hair lasers on skin blood flow. Abstract: The effect of hair lasers on skin blood flow were measured on three different devices to establish the effect of scalp blood flow. The hair lasers used were Laser Hair Therapy 4000 (InGaA1,670nm) with 30 rotating diode lasers, an Italian manufactured laser (HeNe,632.8nm) marketed as the Boston Laser, and containing a single laser transferring light via lenses to the patient, and a laser identical to Laser Hair Therapy 4000 in which the 30 diode lasers were replaced with (placebo) Light Emitting Diodes (LED).



Results

The difference in the laser systems are illustrated by the fact that Laser Hair Therapy 4000 increased scalp blood flow rate by 54%. The HeNe laser, or Boston laser, had no effect, and the LED (placebo) decreased the blood flow rate by 36%. In addition, skin temperatures measured before and after the treatment showed little change.