Pulsed Light Handpiece (650-950nm) with Advanced Fluorescent Technology for Long-Term Hair Removal

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BACKGROUND

This study was designed to evaluate the safety and efficacy of the Advanced Fluorescent Technology (AFT) pulsed light technology Hair Removal Module of the Harmony system (Alma Lasers Ltd., Caesarea, Israel) for permanent hair reduction. Efficacy was measured by before and after photographs and hair count which was performed at one, three and six months after the last treatment.

STUDY DESIGN

One hundred and seven consecutive patients (ages ranging from 16-51; skin types I-V) were treated with the Harmony system for unwanted hair on different parts of the body between September 2003 – February 2004. Patients were re-examined one month, three months and six months after the last treatment. The total number of treatments was 563 with the mean number of treatments per patient 5.1. Single treatment intervals were on average 7.2 weeks. Patients with skin types IV-V received an average of 5.3 while patients with skin type I-III received an average of 4.7 treatments.

RESULTS

The average hair reduction after last treatment was 79%, 74%, 75% (one month, three months and six months after the last treatment respectively (Fig. 1). Side effects were clinically non-significant and transient (i.e. perifollicular erythema, transient erythema, crusting (1%). There were no patients with scarring or discoloration.

SCIENTIFIC BACKGROUND

The basis for hair removal with light-based technology is the specific targeting of melanin by wide range of wavelengths in the visible range in the hair bulb. Melanin absorbs the light emitted these wavelengths. The energy of the light is converted into heat, causing the selective destruction of the hair bulb. However, melanin in the surrounding epidermis can also be targeted, which may limit the success of the procedure.[1]

The growth of each of the estimated 5 million follicles of the body is cyclic, involving phases of active growth (anagen) and quiescence (telogen). Between 85-90 percent of hairs are in the anagen phase at any one time, with the reminder in telogen. Depending on the site of the hair, the time spent in each phase differs considerably, from an anagen phase of two to six years for scalp hair to one to two months for leg hair. Hairs that are in the anagen phase during removal are more sensitive to the treatment; alteration of matrix cell activity during anagen, increases the amount of time from removal to regrowth. Essentially, there are three basic groups of hair based on hair follicle size: lanugo, vellus, and terminal. Terminal hair comes from larger hair follicles. A hair follicle is capable of switching from vellus hair production to terminal hair and switching back again.[2,3]

DISCUSSION

Light based technology has been used for the past decade to provide permanent long term hair reduction with varying results. Efficacy has been proven to be dependant on wavelengths, the type of system, hair color and hair type, and operator technique. The light and laser systems introduced for medical professionals which require extended learning curves were rejected by our office, as it was discovered that the complexity offered no clinical advantage for efficacy and could potentially increase opportunities for operator error. Photoepilation systems are required to deliver sufficient energy (absorbed by the melanin in the hair shaft) to achieve conductive temperatures in excess of 55° C to the follicle itself. Several systems were reviewed and all claimed similar rates of success at achieving permanent hair reduction.

Of the systems tested, the Harmony system's Advanced Fluorescent Technology (AFT™) pulsed light technology met the requirements of our office for safety, ease of use and patient satisfaction. AFT™ is a novel pulsed light technology which optimizes the light emitted from the lamp. The 650-950nm AFT handpiece has a special filtering system which converts the lamp's clinically insignificant, shorter wavelength into a clinically optimal spectrum by selectively amplifying emission in the red spectrum, see Fig. 2. This unique filtering enhances dermal penetration without using excessive energy levels, thus protecting the epidermis while yielding safer and more effective clinical results.

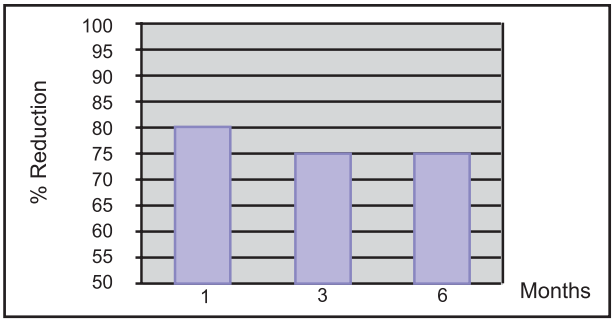

Fig. 1. Mean hair reduction (%) 1, 3 and 6 month after the last treatment

Delivery of AFT pulsed light is accomplished through one of several handpieces that connect to the Harmony system (handpiece selection is determined by the application). The hair removal (HR) handpiece which emits AFT pulsed light between 650-950nm, provides three different pulse widths (30 msec. = short, 40 msec. = medium, and 50 msec. = long) and delivers fluences of (up to) 20 J/cm^2.

Using the proprietary Equally Distributed Fluence (EDF), the Harmony system delivers lower peak power but at a consistent energy level. With EDF, since the optical energy delivered to the target tissue is distributed equally during the entire pulse duration, light-skin interaction conditions are ideal and the amount of energy needed to destroy the hair follicle is optimized. Using both EDF and AFT pulsed light technologies, the Harmony system increases efficacy and safety for hair removal on all skin types, I-VI. The spot size for the Harmony system is very large, 6.4 J/cm^2, which means that treatments can be performed more quickly. During treatment, the light guide aperture is placed against the skin in full contact with a thin layer of clear ultrasound gel interface. In practice, it became evident that longer pulse width and moderately delivered energy parameters are the best combination of safety and efficacy.[4] Results will likely improve with experience as we were conservative with the device.

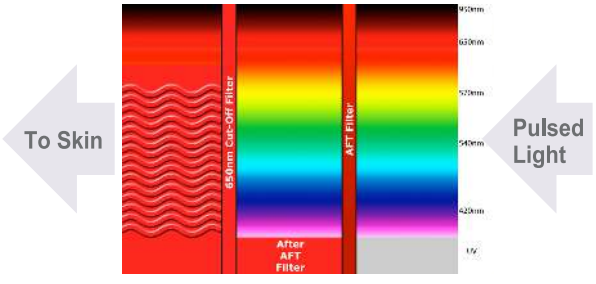

Fig. 2. With the unique filtering system of the AFT pulsed light module for hair removal, there is a dual filtering system in the handpiece. The first filter, the AFT filter, converts unused UV light into visible red light. The second filter is the 650nm cut-off filter which cuts off all the optical energy below 650nm delivering only the optical energy which is effective for hair removal.

CONCLUSIONS

It is our finding that the Harmony hair removal system using the AFT pulsed light handpiece for hair removal is both efficacious for permanent hair reduction and safe for our patients. Our patients were satisfied with the clearances achieved. This office will continue to monitor as many of the initial patients as possible at both 12 months and 18 months and will report our findings at a later date.

Before *After*

Photos Courtesy: Mira Volvovsky, M.D., Sheba Medical Center, Class Clinic, Tel Hashomer, Israel
AFT 650 HR Module after 3 Tx. 18J/cm^2

References

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