
Long-Term Laser Hair Reduction Efficacy

A Report on the Use of Long-Pulse Alexandrite Lasers for Hair Reduction

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ABSTRACT

Background. Laser-assisted hair removal has become an accepted procedure in the medical community. The long-term effectiveness and safety of this method of epilation has been acknowledged.

Objective. The purpose of this study was to determine the long-term efficacy of epilation using a long-pulse alexandrite laser.

Methods. Over a period of 1.5 years, 29 subjects age 16 to 63 years (mean age = 36) were studied at two clinical centers for hair removal. A total of 30 cosmetic sites were treated (15 groins, 5 heads (general), 3 chins, 2 lips and 5 miscellaneous). Each cosmetic site was treated from 1 to 7 times (mean = 4 treatments). Skin types from I to IV were represented. Subjects were treated with the

Cynosure long-pulse alexandrite laser at a 755 nm wavelength: single pulse with minimal overlap, 10 mm spot size, 20 ms pulse width, and fluences ranging from 19.8 to 28.0 J/cm². Objective, blind evaluation of hair counts was assessed from 6 to 28 months post-final treatment (mean = 14.4 months).

Results. Objective evaluation showed that the study group as a whole had an average hair reduction of 79.3%, at an average of 14.4 months after the final treatment. All adverse effects reported during the study were transient and minor.

Conclusion. The long-pulse alexandrite laser is a safe and effective modality for long-term hair reduction, when used in accordance with recommended guidelines.

Background

Hair growth in unwanted areas can be problematic for many individuals. The use of lasers for hair removal has emerged as a viable treatment method. Hair removal treatments are complicated by the presence of melanin in both the epidermis and the hair follicle. Cynosure's lasers resolve this complication through the use of an extension of the theory of selective photothermolysis; Thermokinetic Selectivity (TKS). TKS theory is based on the fact that large targets retain heat longer than small targets, because of the ratio of volume to surface area. With TKS treatments using a pulse width between 10 ms and 40 ms, the intended large target (hair follicle) is heated and destroyed, while the smaller collateral target (the epidermis) remains cool and unaffected. This study examines long-term hair reduction using the Cynosure long-pulse alexandrite laser.

Materials and Methods

Twenty-nine study subjects were enrolled in the two clinical centers to evaluate the long-term efficacy of the Cynosure long-pulse alexandrite laser for hair removal. The average age of study subjects was 36 years (age range of 16 to 63 years). Fitzpatrick skin types included

four type I, twelve type II, eleven type III, three type IV. Hair color distribution was black (15) and brown (14).

The 30 cosmetic study sites treated included groins (15), general head (5), chins (3), upper lips (2), leg, abdomen, back, axilla and breast. Twenty-eight subjects were female; one was male. Standard pre-treatment precautions associated with laser therapy were followed.

The physicians determined operating parameters (fluence and number of treatments) needed to achieve optimal hair reduction. A spot size of 10 mm and pulse width of 20 ms were standard in all treatments. Physician Evaluation Forms were completed, including laser parameters, subject ID, date, treatment location, complications and physician's comments. Prior to each treatment, a photo was taken of the treatment site using standardized photography settings (f-stop, shutter speed, film type and speed). Hair counts based on these photos established the baseline for each study site.

The 29 subjects were treated between 1 and 7 times (average = 4.1 treatments). Minimal overlap of approximately 10% was maintained. Fluences ranged from 19.8 to 28 J/cm². The average treatment fluence was 22.7 J/cm².

Average Hair Reduction

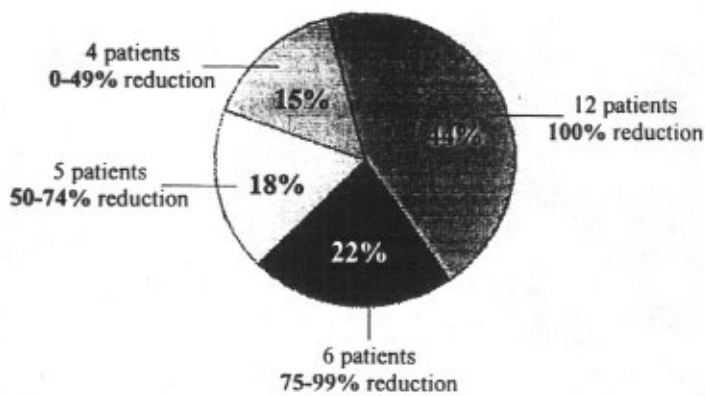


Figure 1. Average hair reduction

Treatments ended when there was a sufficient reduction of hair from the treatment site to satisfy the physician and patient. The subjects returned for at least two follow-up evaluations, 6 months or more after the final treatment. Photographs were taken during each follow-up evaluation, and any complications were noted.

Subjects were evaluated by an outside source using the initial and follow-up photographs to establish hair counts for each treatment site. The count method utilized digital image editing performed on Adobe PhotoDeluxe 3.0 Home Edition. All subjects were included in the statistical analysis for pre-treatment hair counts, number of treatments and complications. Three subjects were eliminated from sections of the analysis (post-final treatment hair counts, percentage hair reduction, and months post-final treatment) due to insufficient follow-up data.

Participating physicians analyzed patient data individually. The factors contributing to the outcome is weighted for effect or influence. Study data from each clinical center was entered into a statistical program. Predictive variables and covariables are evaluated as to their degree of influence upon the successful end point. Considering the types of measurements and underlying distribution, non-parametric tools were used to analyze the data.

Results

Complications reported during this study were minor and resolved spontaneously before the study was completed. Seven subjects (24%) developed transient hyperpigmentation. One subject also had purpura and erythema

Stable Hair Reduction Subjects

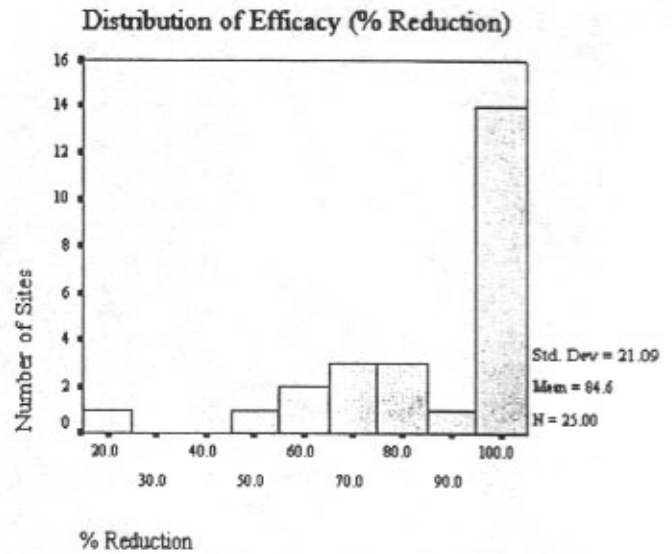


Figure 2. Long-term stable hair reduction

Photographs were taken at each of several post-final treatment follow-up visits. Hair counts using the photographs were performed to monitor each subject's progress. The average hair reduction for all subjects was 79.3%. The majority of subjects, 66%, achieved hair reduction of 75% or greater. See Figure 1 for details. Post-treatment evaluation visits occurred from 6 to 28 months post-final treatment, with an average of 14.4 months.

Twenty-five study subjects (out of 27) achieved long-term stable hair reduction. See Figure 2. Those subjects with stable hair reduction (no regrowth) achieved slightly higher average hair reduction than the study group as a whole, 84.6% vs. 79.3%.

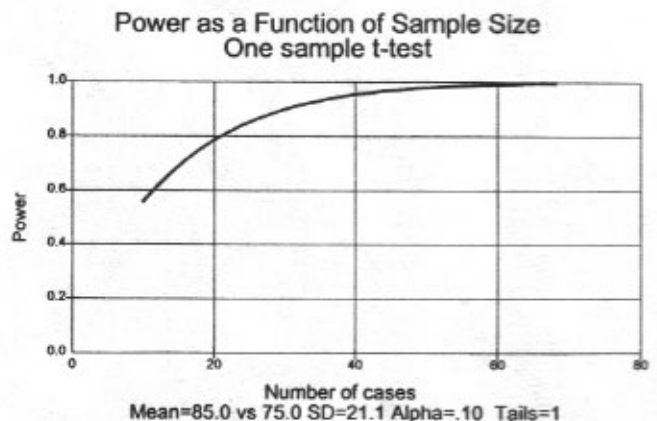


Figure 3. Statistic test of sample size validity

Discussion

The object of this study was to assess the long-term efficacy of long-pulse alexandrite laser hair removal. To achieve the desired treatment endpoint of no hair, participating physicians established individual treatment end points based on their clinical experience. Thus, the study is representative of results which would be achieved by general laser hair removal practices.

Overall, the patients in this study achieved excellent results. Consistent with other studies, black and brown hair responds the best to laser therapy. Fine hair, such as found on the breast and side burns/neck region, did not respond as well as coarse hair found in the groin and axilla.

A power study was performed to determine if the study sample size is statistically significant. 'Power' is the proportion of studies that will yield a statistically significant effect (hair reduction in this study). See Figure 3. With the sample size of 30 study sites, the power study has a power of 0.899 (89.9%) for a confidence level of 90%. Hair color and Fitzpatrick skin type were not statistically significant in affecting the treatment outcome. See Figures 4 and 5.

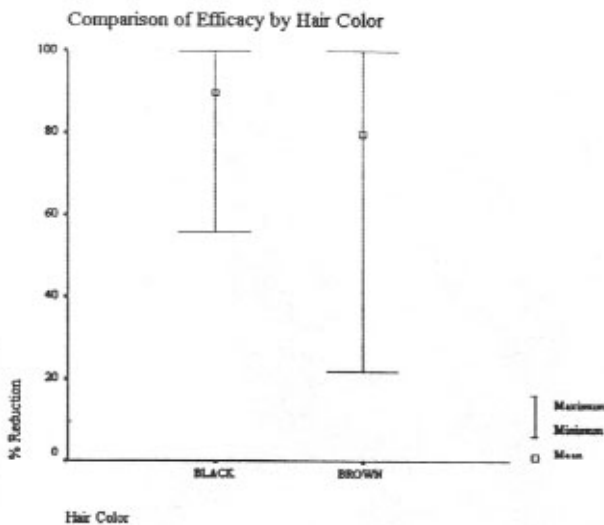


Figure 4. Efficacy vs. hair color

Long-term hair reduction efficacy is judged by stable hair counts based on two consecutive post-final treatment visits of greater than 6 months. This is to allow ample time for a complete hair growth cycle anywhere on the body.

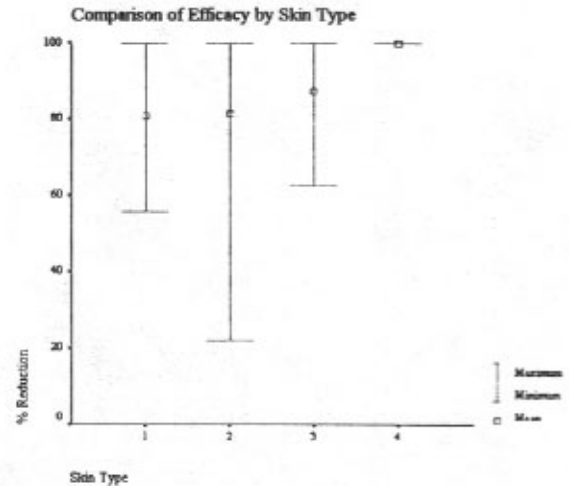


Figure 5. Efficacy vs. skin type

Conclusion

This study demonstrated the efficacy of the Cynosure long-pulse alexandrite laser for long-term hair removal. Hair color and Fitzpatrick skin type had no appreciable effect on long-term outcomes. Ninety three percent of the subjects studied achieved long-term stability of hair reduction.

References

1. Grossman MC, Dierickx CC, Farinelli W, Flotte T, Anderson RR. Damage to hair follicles by normal-mode ruby laser pulses. *J Am Acad Dermatology* 1996;35:889-94.
2. Nanni CA, Alster TS. A practical review of laser-assisted hair removal using the Q-switched Nd:YAG, long-pulsed ruby, and long-pulsed alexandrite lasers. *Dermatology Surg* 1998;24:1399-405.
3. Connolly CS, Paolini L. Study reveals successful removal of unwanted hair with LPIR laser. *Cosmet Dermatology* 1997;10(12):38-40.