

# LOW FLUENCE MULTIPLE PASS vs HIGH FLUENCE SINGLE PASS DIODE LASER HAIR REMOVAL - TWO YEARS POST TREATMENT

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## Background and Objectives

Laser hair removal (LHR) is the most popular light based therapy in America. High fluence diode lasers with contact cooling have emerged as the gold standard to remove unwanted hair. However, laser hair removal is associated with pain and side effects, especially when treating dark or tanned skin. All of the traditional laser systems used the highest fluence possible without damaging the tissue surrounding the hair follicle with a single pass. Laser and light-based techniques rely on the process of selective photothermolysis. The selective absorption of red and near-infrared wavelengths by melanin in the hair shaft and follicular epithelium confines thermal damage to the hair follicles and, to a point, limits the untoward diffusion of excess thermal energy to the surrounding tissue. The approach of using low fluences with repetitive millisecond pulses to achieve heat stacking in the hair bulb and bulge represents a paradigm shift in laser hair removal methodology. A novel diode laser with low level fluence (5-10 J/cm<sup>2</sup>) with a high repetition rate at 10 Hz (Soprano SHR by Alma Lasers, Chicago) using multiple passes in constant motion technique was compared to traditional one pass high fluence (25-40 J/cm<sup>2</sup>) diode laser (Lightsheer ET, Lumenis, Santa Clara) in a prospective, randomized split-leg study on 25 patients with Fitzpatrick skin types I-V. The results 6 months following the final treatments were presented at the 2009 ASLMS annual meeting in Washington, and published (Braun, M. Permanent laser hair removal with low fluence, high repetition rate versus high fluence, low repetition rate 810 nm diode laser – a split leg comparison study. *J. Drugs in Derm.* Nov. 2009 Vol. 8 Issue 2.) This poster reports results two years following LHR on 22 of the original 25 patients.

## Study Design and Methods

This prospective single-center, bilaterally paired, blinded, randomized comparison study enrolled 33 female subjects (skin types I–V) with hair on the legs who in the opinion of the investigator were viable candidates for laser hair removal. These patients were offered five complimentary laser hair removal treatments performed every 6-8 weeks on their legs as an inducement to enroll in the study. One leg of each patient (randomly determined) was treated with the Soprano diode laser using a technique of maintaining the hand piece in constant motion, fluence up to 10 J/cm<sup>2</sup>, 10 Hz, 20 ms pulse duration. With the constant motion technique, an area of about 200 sq. cm was treated with 6-10 multiple passes. The operator never remains stationary in one spot, and is always moving the laser hand piece on the entire 200 sq. cm. area, similar to ironing. By using this technique, the skin is never subjected to a single diode laser pulse greater than 10 J/cm<sup>2</sup>. Since this is below the threshold of burning, the incidence of adverse effects should be lower, as well as the sensation of discomfort which is directly related to fluence. The purpose of the study was to evaluate the degree of discomfort using this constant motion technique and the amount of permanent hair reduction. With six month post-treatment hair counts, the efficacy of the low fluence-multiple pass technique could be compared to standard high fluence laser hair removal. The other leg was treated with the Lightsheer diode laser using a conventional single pass, fluence to tolerance (20-50 J/cm<sup>2</sup>), 2 Hz, 30 ms pulse duration. The single pass parameters were aggressive so that there could be no criticism that the leg treated with the high fluence had inadequate energy.

## Results and Conclusion

Of the original 33 patients enrolled in the study only 25 completed the five LHR treatments. 7 patients were dismissed from the study for failure to adhere to the 6-8 week re-treatment schedule; one patient left the study due to a laser burn on the high fluence treated leg which healed without any residual complication. Two years following the initial treatment (18 months following the fifth and final LHR) 22 patients returned to have their hairs counted; three could not be contacted. The hairs within a one sq. inch grid were photographed and counted by an independent university student prior to the first treatment, 6 months following the 5<sup>th</sup> treatment, and 18 months following the 5<sup>th</sup> treatment. (Figure 1)

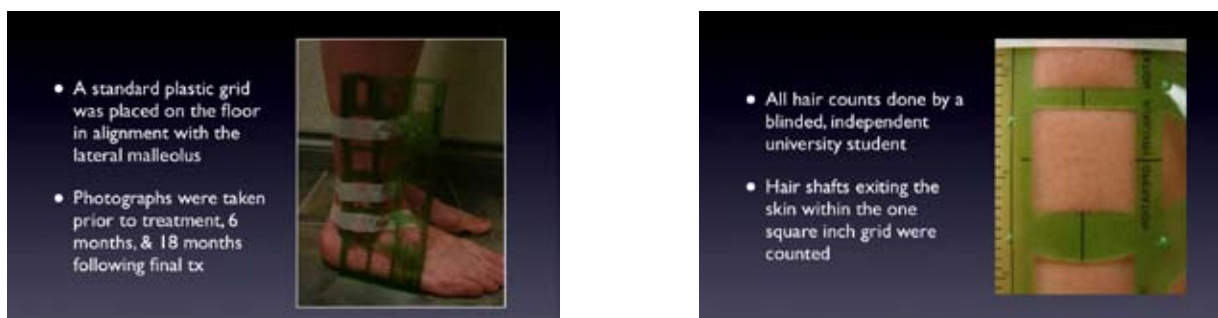


Figure 1 : Digital Photographic Hair Counts

The two year hair counts of these 22 patients were compared to the hair counts six months following the 5<sup>th</sup> LHR treatment (See Figures 2 & 3) Interestingly, the reduction in hair counts improved over time. Both the low fluence, multiple pass and high fluence, single pass diode lasers performed very well with hair reduction counts exceeding 80% following the 5<sup>th</sup> and final laser treatment. We were surprised to see that the 18 month hair counts were even better than the 6 month hair counts. It appears that the amount of hair reduction achieved at 6 months following the final laser treatment is permanent, as it correlates very well with the 18 month hair counts.

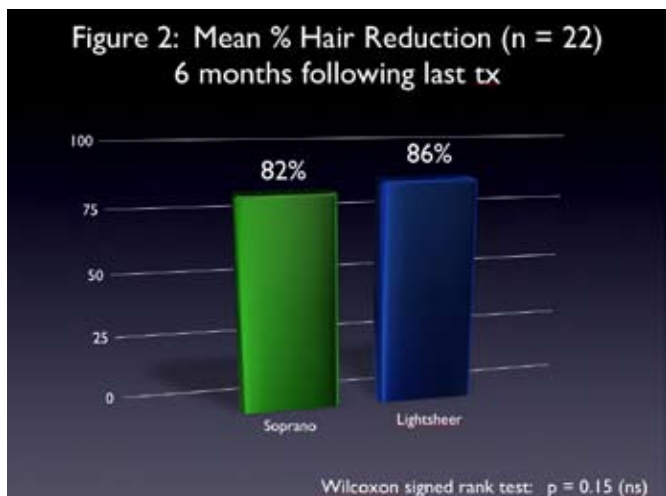


Figure 2 : Six months following the 5<sup>th</sup> laser treatment

Low fluence, multiple pass diode laser (Soprano) resulted in an 82 % hair reduction six months following the final treatment. This improved to 90% one year later.

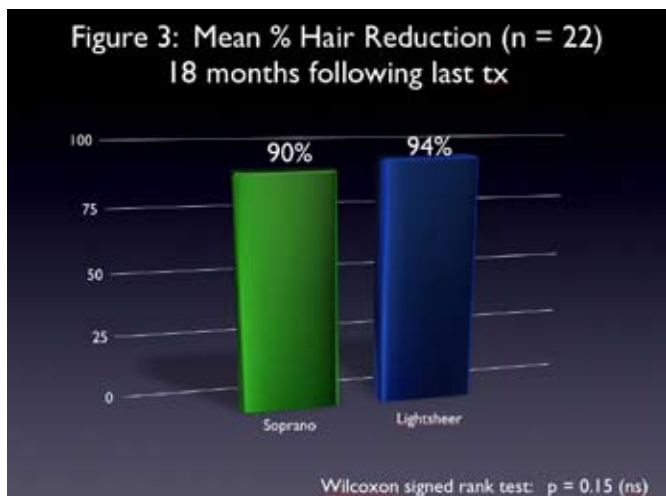


Figure 3 : 18 months following the 5<sup>th</sup> laser treatment

High fluence, single pass diode laser (Lightsheer) resulted in an 86% hair reduction six months following the final treatment. This improved to 94% one year later

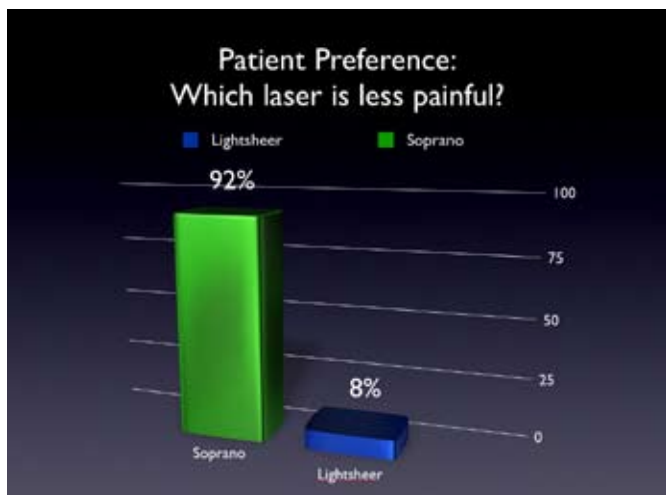
**The differences between hair counts were not statistically significant. Both methods of laser hair removal worked very well.**



Visual Analogue Pain Scores:

Figure 4 : Median pain scores

Visual Analogue pain scores were taken from the patients following each of their five laser treatments. The scale was from 0 (no pain) to 10 (excruciating pain). **The difference in pain scores was highly significant, with the low fluence, multiple pass technique being much more comfortable.** This result is not unexpected, as the low fluence diode pulses were 10 J/cm<sup>2</sup> versus 20-50 J/cm<sup>2</sup> using the single pass diode laser.



Patients were asked the question, “Which laser is less painful?” on their final treatment, and **92% chose the low fluence, multiple pass technique (Soprano ) laser.**