

# Laser Hair Removal with an 800nm Diode Laser–A Retrospective Study of 1000 Women with Skin Types II to VI

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**SUMMARY:** This retrospective study examined hair removal using the LightSheer™ Diode Laser System for the first 1000 women (with Fitzpatrick Skin Types II to VI) treated at the Laserex Skin & Cosmology Clinic in Lahore, Pakistan. Overall, the women achieved satisfactory results within four or five treatment sessions, with apparent hair reduction ranging from 70% to 80% in women treated over their entire face and neck, up to 95% in women treated for

hair on their legs, arms, or bikini line. Minor scabbing or pigmentation changes were observed in a small percentage of women treated, but these adverse effects were transient in nature and resolved after treatment was stopped. This study demonstrates that the LightSheer Diode Laser System provides both safe and effective removal of unwanted hair in patients with Fitzpatrick Skin Types II to VI.

## INTRODUCTION

PAKISTAN IS A COUNTRY OF 140 MILLION PEOPLE WITH skin complexions, hair color, and hair type that vary according to ethnic background. Among Pakistani women, hirsutism is a significant problem, with an estimated 15% to 20% suffering from some degree of the condition.<sup>1</sup> To remove unwanted hair, Pakistani women have commonly used mechanical methods (such as waxing, threading, plucking, or tweezing), depilatory creams and lotions, or electrolysis. Laser hair removal has only recently become available.

The majority of Pakistani women have darker skin types as measured by the Fitzpatrick Scale (Table 1).

**Table 1: Skin Types in Pakistani Women<sup>1</sup>**

Fitzpatrick Skin Type	Estimated Proportion of Pakistani Women
II	5%
III	10%
IV	50%
V	25%
VI	10%

The use of early-generation laser hair removal systems, such as the ruby laser with a wavelength of 694 nm, was limited primarily to patients with lighter skin types.<sup>2-5</sup> Because of the possibility of damage to the epidermis overlying the hair follicle caused by absorption of laser energy by epidermal melanin, most practitioners did not recommend laser hair removal for patients with Fitzpatrick Skin Types IV, V, or VI.<sup>2-5</sup> But as the science and practice of laser hair removal have matured, newer technologies have been developed that enable laser hair removal to be offered safely to patients with a wider range of skin types.<sup>6-9</sup>

Hair removal procedures are now more frequently performed using lasers with longer wavelengths, such as the diode laser which emits a wavelength of 800 nm.<sup>7</sup> The duration of the laser pulse has emerged as another key parameter to minimize the risk of epidermal injury in patients with large amounts of melanin in their epidermis.<sup>8,9</sup> It is critical that treatment energy be applied over a pulse duration that is long enough to allow the heat generated in the epidermis to dissipate before reaching a tissue damage threshold, but short enough to allow the hair follicle temperature to build up to the damage threshold before dissipating.<sup>8,9</sup> As importantly, active cooling of the skin before, during and after the laser pulse (especially in a manner that provides

index matching at the skin surface), has been shown to further reduce the risk of unwanted thermal damage.<sup>10, 11</sup> The development of lasers that provide the combination of longer wavelengths, longer pulse durations, and active cooling, has allowed people with darker skin types to take advantage of the efficacy, convenience, and permanence of laser hair removal.<sup>8,9</sup>

This study was designed to examine the safety and efficacy of laser hair removal using the LightSheer Diode Laser System for the first thousand women treated at the Laserex Skin & Cosmetology Clinic in Lahore, Pakistan, beginning in October 1999.

## STUDY DESIGN

### *Patients*

Between October, 1999 and December, 2000, 1000 women between the ages of 15 and 55 years with Fitzpatrick Skin Types varying from II to VI were treated at the clinic. Table 2 describes the body areas treated, broken out by patient skin type. Most of the women treated had Fitzpatrick Skin Types III or IV, and the large majority had treatment on their face or neck.

### *Treatment*

Two different models of the 800 nm LightSheer Diode Laser System were used during the study. The LightSheer EP (with a 9 mm square spot) was used for

940 women. The LightSheer XC (with a 12 mm square spot) was used for 60 women. The LightSheer XC is a higher powered diode laser that speeds treatment by providing high fluences with a larger spot size. In addition, the LightSheer XC has a longer maximum duration width (100 ms), designed to provide additional flexibility when treating darker skin types. During this time period, the maximum pulse duration for the LightSheer EP was 30 ms.

Patients received between 3 and 7 treatments at fluences between 25 and 45 J/cm<sup>2</sup> (Table 3). When the LightSheer EP was used, the pulse duration was 30 ms for all treatments through the fourth session. In the fifth and sixth sessions, as regrowing hairs became finer in diameter, shorter pulse durations were used by treating with the automatic setting in the OptiPulse™ feature. In automatic mode, the pulse duration (in milliseconds) is automatically set to be one-half of the fluence value. A pulse duration of 100 ms was used for all treatments with the LightSheer XC (Table 3).

### *Treatment Results Assessment*

The estimated percentage of hair reduction was based on visual assessment of the treated area. It included the total apparent decrease in hair density, due both to actual decrease in hair regrowth, as well as regrowth of hair finer in diameter, and lighter in color.

At each treatment session, patients rated their satisfaction with the total appearance of hair reduction including diminished regrowth of hair.

**Table 2: Treatment Areas and Skin Types**

Treatment Area	Patient Number	Skin Type				
		II	III	IV	V	VI
Full Face/Neck	502	40	77	254	113	18
Perioral Area	188	7	33	93	47	8
Chin	220	11	39	106	51	13
Upper Lip	19	1	2	7	9	0
Neck	11	0	3	5	3	0
Breast	12	1	4	5	2	0
Forehead	9	0	2	3	3	1
Arms	8	1	2	4	1	0
Full Body	9	0	2	5	2	0
Legs	7	1	2	3	1	0
Underarms	11	0	2	5	3	1
Bikini Line	4	0	0	3	1	0

**Table 3: Treatment Parameters**

Fluence	Pulse Duration	Comments
25-30 J/cm <sup>2</sup>	30 ms	1st laser session on 940 patients
30-35 J/cm <sup>2</sup>	30 ms	2nd & 3rd laser sessions on 940 patients
38-40 J/cm <sup>2</sup>	30 ms	4th laser session on 700 patients
25-30 J/cm <sup>2</sup>	12.5-15 ms	5th & 6th sessions on 300 patients
40-45 J/cm <sup>2</sup>	100 ms	1st, 2nd, and 3rd sessions on 60 patients

## RESULTS

The number of treatments and percentage of hair reduction for the various treatment areas are summarized in Table 4. For the 500 women treated on their entire face and neck, apparent hair reduction was estimated to be 70% to 80% after five or six treatment sessions. In the other areas treated, apparent hair reduction was higher, ranging from 80% to 95% (Table 4), and for most treatment areas, the women achieved satisfactory results within four or five treatments.

In most cases, patients achieved 25% to 30% hair reduction with each treatment session, and within three to four sessions hair reduction was approximately 80%, with any remaining hair thin and colorless. Overall, patient satisfaction was high with approximately 90% to 95% of patients satisfied with their results.

Approximately 5% of the patients treated over their entire face and neck did not achieve satisfactory results after six treatments. These women underwent an additional seventh treatment (30-35 J/cm<sup>2</sup>, 15 - 17.5 ms). A few of these patients who originally had dense, coarse hair on their face and neck had fine hair visible even after seven treatment sessions.

In terms of safety, a total of 20 patients reported hyperpigmentation or hypopigmentation after treatment, but these changes were transient in nature. In all the cases, the pigmentation changes resolved within four weeks.

In 20% of the women treated with the LightSheer EP using a maximum pulse duration of 30 ms, crusting appeared on the second day after the treatment session. Crusting was most common among women with thick black hair who were treated over their entire face. In all the cases, however, these side effects disappeared within three days without causing any hypopigmentation or hyperpigmentation. No crusting was observed in women treated with the LightSheer XC using a pulse duration of 100 ms.

## DISCUSSION

Laser hair removal represents a significant advance in the treatment of hirsutism and other types of unwanted hair. It is effective, fast, convenient, and safe. Until recently because of safety concerns, its use was limited primarily to patients with lighter skin types. The advantages of laser hair removal should be available to patients with all skin types. Therefore, the development of laser systems and techniques designed to work safely and effectively with darker complexions has been encouraging. The experience with the LightSheer Diode Laser System in Lahore was uniformly positive. Based on good results and a high level of patient satisfaction demonstrated in the Lahore clinic, a second LightSheer XC was installed in Karachi, and a third LightSheer in Islamabad, the capital city of Pakistan.

**Table 4: Treatment Number and Hair Loss**

Number of Patients	Treatment Area	Total Number of Sessions	% Hair Reduction
502	Full Face/Neck	5-6	70-80%
438	Perioral/Chin/Upper Lip/Neck	3-4	80-90%
19	Legs/Arms/Bikini Line	4-5	90-95%
32	Breast/Forehead/Underarms	4	90-95%
9	Full Body	5	80-90%

## REFERENCES

1. Kazmi AH, Bajwa UB, Mahmood K. The prevalence of hirsutism in Pakistani females. *Journal of Pakistan Institute of Medical Sciences* 1993;4:195-197.
2. Anderson RR, Parrish JA. Selective photothermolysis. Precise microsurgery by selective absorption of pulsed radiation. *Science* 1983. 220:524.
3. Anderson RR. Laser-tissue interactions, in cutaneous laser surgery: Goldman MP, Fitzpatrick RE, editors. *The Art and Science of Selective Photothermolysis* St. Louis: Mosby; 1998:p1-18.
4. Dierickx CC, Grossman MC, Anderson RR. Long pulsed ruby laser hair removal. *Lasers Surg Med* 1997;S9:167.
5. Dierickx CC, Grossman MC, Farinelli WA, Anderson RR. Permanent hair removal by normal-mode ruby laser. *Arch Dermatol.* 1998;134:837-844.
6. Dierickx CC, Alora MB, Dover JS. A clinical overview of hair removal using lasers and light sources. *Dermatologic Clinics* 1999;17:357-366.
7. Dierickx CC, Anderson RR, Campos VB, Grossman MC. Effective, long-term hair removal using a pulsed, high-power diode laser. Coherent Medical, Pleasanton, CA, 1999.
8. Battle E. Study of very long-pulsed (100 ms) high-powered diode laser for hair reduction in all skin types. . Coherent Medical, Pleasanton, CA, 2000.
9. Adrian RA and Shay KP. 800 nanometer diode laser hair removal in African American patients: A clinical & histologic study. *J Cutan Laser Ther* 2000. 2:183-190.
10. Klavuhn KG. Epidermal protection: a comparative analysis of sapphire contact and cryogen spray cooling. *Laser Hair Removal Technical Note.* Coherent Medical, Pleasanton, CA, 2000.
11. Klavuhn KG and Green D. Importance of Cutaneous cooling during photothermal epilation: Theoretical and practical considerations. Accepted for publication in *Lasers Surg Med*, 2002.