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Hair Removal Using a New Intense Pulsed Light Source in Chinese Patients

YU-MIAO FENG[1], ZHAN-CHAO ZHOU[1] & MICHAEL H. GOLD[2]

[1]*Institute of Dermatology, Chinese Academy of Medical Sciences, Nanjing 210042, China, and* [2]*Gold Skin Care Center, Nashville, TN 37215, USA*

Abstract

Background: Unwanted hair is a widespread cosmetic problem. Several lasers and intense pulsed light (IPL) have been utilized for this purpose. A new IPL device (Lumenis One^{TM}) with OPT is one of the newer modalities to be studied in Chinese patients. *Objective:* This study evaluates the short-term efficacy and side effects of the new IPL device for epilation in Chinese patients. *Methods:* Eighteen Chinese women with Fitzpatrick skin types III–V and black hair, were treated four times at 4 to 6-week intervals using IPL (Lumenis One^{TM}) on the axillae ($n=13$) and the upper lip ($n=5$). The energy density for treatment ranged from 14 to 22 J/cm^2. Parameters utilized were 695-/755-nm filters, triple pulse for patients on the axillae, and 640-/695-nm filters, double pulse for patients on the upper lip (3.5- to 7-ms pulse, 30- to 90-ms pulse delay, 15×35 mm spot size). Hair reduction was assessed at baseline, immediately before each treatment session, and at 4 weeks after the fourth treatment. Patient's satisfaction on a 5-point scale was also evaluated. *Results:* The average hair reduction for all sites was 49.9% after one session, 58.6% after two sessions, 79.3% after three sessions, and 83.8% after four sessions ($p<0.001$). The hair reduction of 44.1%, 52.1%, 81.1%, and 86.0% were achieved after each treatment for axillae, with 65.1%, 75.7%, 74.6%, and 78.0% for upper lip. Patients got more satisfaction after four sessions (score 3.1) than that after two sessions (2.0) ($p=0.001$). In both the assessments, upper lip appeared to show a better response than axillae after two IPL treatments, which reversed after four treatments. No significant complications or adverse events were reported. *Conclusion:* The new IPL device provides a safe and effective means of hair removal for Chinese patients. Treatment efficacy varies with the anatomic location and number of treatments. However, further study is necessary to determine the long-term clinical efficacy in Chinese patients.

Key Words: *Hair removal, Intense pulsed light (IPL), Treatment outcome*

Traditional hair removal methods include shaving, waxing, tweezing, chemical depilation, and electrolysis. However, all these methods are temporary and some may be associated with pain, pigmentary changes, irritation, or even scarring (1). Recently, Lasers and intense pulsed light (IPL) devices have become increasingly used as these produce longer term benefits with a low risk of complications (2). They all work on the principle of selective absorption using melanin as the target chromophore. Dark-skinned patients have a high epidermal melanin content to competitively absorb light, so they are prone to adverse effects ranging from immediate pain and pigmentary disturbances to scarring.

A new IPL source (Lumenis One, USA), emits 3–100 ms pulses at a broad spectrum (515–1200 nm) with a fluence range of 10 to 40 J/cm^2. Pulses can be administered as a single, double or triple pulse string, with possible inter-pulse delays of 1–120 ms. The seven ExpertFilters^{TM} (515, 560, 590, 615, 640, 695 and 755 nm) and two SapphireCool^{TM} light guides (15×35 mm and 8×15 mm) are available. More importantly, it incorporates a genuine breakthrough in the form of Optimal Pulse Technology (OPT). The essence of OPT is the system's ability to control the pulse shape and to deliver homogenous "squared-off" pulses, resulting in more even distribution of the energy within each individual pulse and between sub-pulses. This novel pulse shape control mechanism enables use of lower fluency levels and can result in safer, more effective, and more reproducible treatments. In this study we evaluate the short-term efficacy and side effects of this new IPL device for epilation in Chinese patients.

Materials and Methods

Eighteen consenting Chinese female subjects participated in the study over 1-year period. The mean age was 27.5 years (range 18–43 years).

Correspondence: Michael H. Gold, M.D., Gold Skin Care Center Tennessee Clinical Research Center, 2000 Richard Jones Road, Suite 220, Nashville, TN 37215 Phone: 615-383-2400. Fax: 615-385-0387. E-mail: goldskin@goldskincare.com

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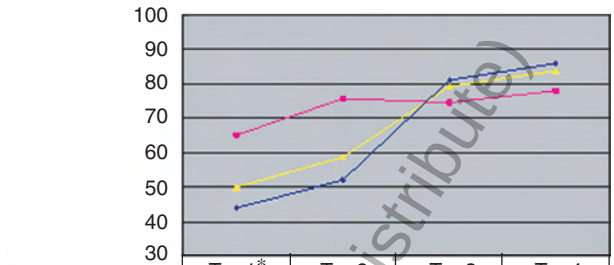
Thirteen requested hair removal from their axillae, with the remaining five requesting hair removal from their upper lip. Fitzpatrick skin types included type III ($n=3$), type IV ($n=13$) and type V ($n=2$). All patients had black hair. Exclusion criteria included any previous laser treatment to the study areas, waxing or depilatory within 1 month of study entry, active any infection within the treatment area, pregnancy, history of keloid, use of photosensitizing medication, and tanning.

A new IPL device (Lumenis One^{TM}) was used throughout the study. All patients underwent four IPL treatments at 4 to 6-week intervals. Local anesthesia was not required in any patient, even on the upper lip. Before IPL treatment, hairs in the treatment areas were shaved. Then, a thin layer (1–2 mm) of cold coupling gel was applied to the skin. In choosing the treatment parameters, we utilized the Lumenis presets for each application, individually matching a specific preset to the patients' skin type, hair color, and hair texture. Test spots were performed on each patient 30 minutes before every session. The energy density for treatment ranged from 14 to 22 J/cm^2. Usually, we utilized 695-/755-nm filters, triple pulse for patients on the axillae, and 640-/695-nm filters, double pulse for patients on the upper lip (3.5- to 7-ms pulse, 30- to 90-ms pulse delay, 15×35 mm spot size). Further adjustments were made according to the skin and lesion immediate response. After the treatment, patients were instructed to continue with ice pack cooling of the skin.

Hair counts and photographic evaluations of skin sites were obtained at baseline, immediately before each treatment session, and at 4 weeks after the fourth treatment. A sample hair count was performed in a 1.5×1.5 cm square template, which was carefully placed in the same location at each visit, and used to calculate the percent hair reduction. Digital photographs of treatment sites at each patient visit were obtained using identical lighting, patient positioning, and camera settings. Before the third session and one month after the last session, patients were asked to provide their level of satisfaction for each treated area, using a 5-point scale (1–5, from not satisfied to extremely satisfied). Immediately after each treatment, skin and lesion immediate response were recorded, and patients were asked to assess the pain on a scale of 0–4, with 0 being none and 4 being intolerable pain. Side effects, if any, were also recorded at each visit.

Statistical analyses were undertaken by using SPSS, version 11.5. Repeated measures and Wilcoxon were used to determine significant differences between each treatment and previous treatment variables. The data of different treatment regions were analyzed using student's *t*-test or Mann-Whitney Test. All statistical tests were two-sided, and differences were considered significant if $p<0.05$.



	T×1*	T×2	T×3	T×4
Overall ($n=18$)	49.9	58.6	79.3	83.8
Axillae ($n=13$)	44.1	52.1	81.1	86.0
Upper lip ($n=5$)	65.1	75.7	74.6	78.0

Figure 1. Physician evaluated overall and treatment group mean % hair reduction scores after each treatment. *hair reduction after one session.

Results

Physician assessment of hair reduction percentage is shown in Figure 1. The results indicate an overall 49.9% reduction after one session, 58.6% after two sessions, 79.3% after three sessions, and 83.8% after four sessions ($F=35.91$, $p<0.001$). The overall satisfaction rating of the subjects is shown in Figure 2. Clinical photos are shown in Figure 3. On a scale of 1–5, the mean score was 2.0 after two sessions and increased to 3.1 after four sessions ($Z=-3.272$, $p=0.001$). In both the assessments, upper lip appeared to show a better response than axillae after two IPL treatments, which reversed after four treatments. The differences were not found to be statistically significant.

Side effects were very limited with IPL treatment. Mild transient erythema and/or perifollicular edema were seen immediately after treatment in most patients, of whom five with hair burnt to surface. No scarring or postinflammatory changes were reported at any of the visits. In addition, patients reported an

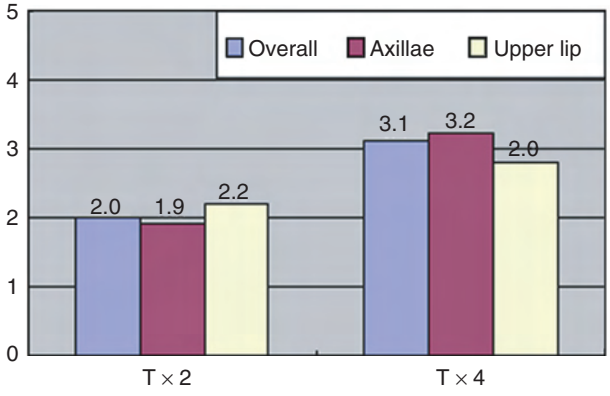


Figure 2. Overall and treatment group mean patient satisfaction scores after two and four sessions.

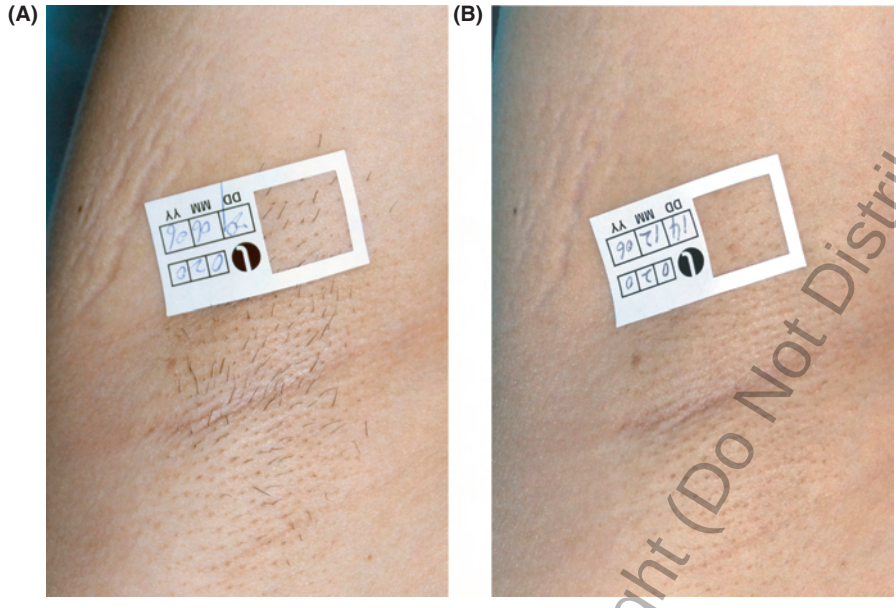


Figure 3. A representative photograph of a patient with unwanted axillary hair before and after IPL treatments: (A) Pretreatment; (B) After 4 sessions.

average pain score of 1.98 and 2.10 for axillae and upper lip, respectively.

Discussion

From the above data we conclude that hair removal with the new IPL device is effective. The new IPL treatment of eighteen patients of skin type III–V involved in this study resulted in an average hair reduction of 83.8% after four treatments. The efficacy could be improved when repetitive treatments were given. Successful hair removal with IPL has previously been reported. Gold et al. (3). reported a 60% hair reduction after a single treatment at 3 months. Sadick et al. (4). reported a 76% hair reduction after a mean of 3.7 treatments in 34 patients with skin phototypes II–V, using fluences of 34–42 J/cm^2. Several studies confirm this finding, showing a 75% hair reduction after several treatments (5,6).

In our study, IPL treatment has better results on the axillae than the upper lip after four treatments, although the latter appeared to response to IPL better after two treatments. Consistent with our study, McDaniel et al. found treatment efficacy varied with the anatomic location. They reported maximum reductions were 40%, 56%, 50%, and 15% for the lip, leg, back, and bikini areas, respectively, after one alexandrite laser treatment (7). Tanzi and Alster (8) found nonfacial areas were slight more responsive than facial areas in each skin phototype, using 1064-nm Nd:YAG laser. Hair in the upper lip might be more difficult to treat because it is thinner not to absorb light well and more influenced by sex hormones. Site-dependent hair growth cycle is another important factor to affect the therapeutic effect. Anagen hair follicles are sensitive to the light, whereas catagen and telogen hair follicles are resistant. In the upper lip region, there are more hair follicles (about 65%) in the sensitive anagen phase than axillae (about 30%) (1). This might be an explanation for better results in upper lip after one or two treatments.

In general, there are similar success rates for treatment with alexandrite, diode lasers and IPL, except for the Nd:YAG laser (which is found to be less efficacious, but more suited to patients with darker skin) (9). However, IPL, especially in Lumenis One^{TM}, has many advantages for hair removal. It enables a wide choice of emitting wavelengths to be chosen simply by choosing different cut-off filters, and thus this modality may be effective in a wide range of skin types, especially in darker skins. Large light guides can deliver much higher "effective fluences" at the depth of the target tissue, and make large surface areas be covered faster (10). More importantly, the introduction of OPT, enables use of lower fluency levels with higher efficacy and relatively few side effects. In our study, side effects were very limited. No scarring or postinflammatory changes were reported at any of the visits.

Conclusion

The new IPL device provides a safe and effective means of hair removal for Chinese patients. Treatment efficacy varies with the anatomic location and number of treatments. This study mainly evaluates the short-term efficacy and side effects. Therefore further study is necessary to determine the long-term clinical efficacy in Chinese patients.

References

1. Richards RN, Uy M, Meharg G. Temporary hair removal in patients with hirsutism: a clinical study. Cutis. 1990;45:199–202.
2. Wanner M. Laser hair removal. Dermatol Ther. 2005;18:209–16.
3. Gold MH, Bell MW, Foster TD, et al. Long-term epilation using the EpiLight broad band, intense pulsed light hair removal system. Dermatol Surg. 1997;23:909–13.
4. Sadick NS, Weiss RA, Shea CR, et al. Long-term photoepilation using a broad-spectrum intense pulsed light source. Arch Dermatol. 2000;136:1336–40.
5. Gold MH, Bell MW, Foster TD, et al. One-year follow-up using an intense pulsed light source for long-term hair removal. J Cutan Laser Ther. 1999;1:167–71.
6. Troilius A, Troilius C. Hair removal with a second generation broad spectrum intense pulsed light source–a long-term follow-up. J Cutan Laser Ther. 1999;1:173–8.
7. McDaniel DH, Lord J, Ash K, et al. Laser hair removal: a review and report on the use of the long-pulsed alexandrite laser for hair reduction of the upper lip, leg, back, and bikini region. Dermatol Surg. 1999;25:425–30.
8. Tanzi EL, Alster TS. Long-pulsed 1064-nm Nd:YAG laser-assisted hair removal in all skin types. Dermatol Surg. 2004;30:13–7.
9. Bjerring P, Cramers M, Egekvist H, et al. Hair reduction using a new intense pulsed light irradiator and a normal mode ruby laser. J Cutan Laser Ther. 2000;2:63–71.
10. Eremia S, Li C, Newman N. Laser hair removal with alexandrite versus diode laser using four treatment sessions: 1-year results. Dermatol Surg. 2001;27:925–9.