INTENSE PULSED LIGHT VERSUS ADVANCED FLUORESCENT TECHNOLOGY PULSED LIGHT FOR PHOTODAMAGED SKIN: A SPLIT-FACE PILOT COMPARISON

Martin Braun MD
Vancouver Laser & Skin Care Centre Inc, Vancouver, BC, Canada

Abstract
Intense pulsed light (IPL) has been a popular nonablative treatment of photodamage. A prospective, randomized, controlled, single-blinded, split-face pilot study compared the efficacy and safety of 2 multitechnology broadband pulsed light platform devices: an IPL device (Lumenis One, Lumenis Corporation, Santa Clara, CA) and a fluorescent pulsed light with advanced fluorescent technology (AFT, Harmony System, Alma Lasers, Buffalo Grove, IL) device. Eight volunteer subjects (skin types I-IV) with a 2.0 mean Global Score for Photoaging (scale 0-4) participated in the study. Subjects received 3 to 5 treatments 3 weeks apart in which one side of the face was treated with the IPL device and the other side with the AFT device. During each treatment session, the face received 3 complete passes without anesthesia. Treatment was aggressive and parameters were determined by test spot application. Treatment endpoints were mild erythema. Results were evaluated by clinical observations of the investigator and comparison of pre- and post-treatment photographs by subjects and 2 blinded dermatologists. Blinded evaluators agreed that improvements in dyspigmentation, telangiectasias, erythema, and skin texture were similar on both sides of the face. Subject assessments of discomfort during treatment were also comparable. Adverse effects were not observed.

Introduction
Since the mid-1990s intense pulsed light (IPL, 500-1200 nm) has been a popular nonablative modality for the treatment of telangiectasia, erythema, lentigines, dyspigmentation, and reduced skin quality secondary to photoaging. In a full-face study, Bitter1 reported visible improvement in wrinkling, dyspigmentation, telangiectasia, coarseness, and pore size in more than 90% of subjects treated with an IPL device. Downtime was minimal and subject satisfaction surpassed 88%.

At least 7 manufacturers actively market IPL devices in the US and thousands of these devices have been sold.2 To the author's knowledge, split-face trials comparing the efficacies of various IPL devices have not been reported. One platform (Lumenis One, Lumenis Corporation, Santa Clara, CA, Figure 1) is equipped with a Universal IPL treatment head that delivers 515 to 1200-nm wavelengths. Multiple cutoff filters (515-755 nm) are available.

The Harmony platform (Alma Lasers, Buffalo Grove, IL, Figure 2) is a multitechnology platform in which 13 different treatment heads including advanced fluorescent technology (AFT, 410-950 nm), infrared light, and laser energy (Q-switched Nd:YAG, long-pulsed Nd:YAG, Er:YAG, fractional Er:YAG) are available.

The purpose of this prospective pilot study was to gather preliminary data to determine if the AFT device—a system less than half the size, weight, and price of the IPL device—could provide results similar to those of the IPL device for global photorejuvenation of the face.

Methods
Eight volunteers recruited from a single group practice received a series of 3 to 5 split-face treatments 3 weeks apart, in which one half of the face was treated with the AFT device and the other half was treated with the IPL device. Although treatment was aggressive with high fluences on both facial sides, topical anesthesia was not used on either side.

Treatment fluences were determined on both sides by test pulses in which the clinical endpoint was erythema. All subjects were Caucasian (mean age 45 years, skin types I–IV) with a modest degree of photoaging (mean score 2.0 on a 0 to 4 Global Score for Photoaging) that included dyspigmentation, erythema, telangiectasias, and tactile roughness. All subjects provided informed consent for treatment.

Aggressive parameters were used to take advantage of the full clinical potential of each device. For treating skin types I to III, normal or “average” fluences for both devices are 12 to 16 J/cm². This range was chosen for the first treatment and then increased by 1 to 2 J/cm² per session as tolerated by patients. No patient sustained a burn. Furthermore, as Caucasian inhabitants of the Pacific Northwest, the patients could tolerate higher pulsed light fluences because they had no background tan or chronic bronzing of the skin.

After subjects washed their faces, a thin layer of refrigerated cooling gel was applied to all treatment areas. For the IPL-treated side, the 515-nm, 560-nm, and 590-nm cutoff filters were used and treatments were double pulsed with a 3.0- to 4.0-ms pulse duration and 10- to 20-ms pulse delay. The investigator made 3 passes at high fluences (14-21 J/cm²). The contralateral side of the face was treated with the AFT device using the green (540-950 nm) and yellow (570-950 nm) treatment heads (single pulsed light, 10-12 ms pulse duration). Three passes were made at high fluences (14-20 J/cm²). Subjects were asked to compare pain during treatment of each side of the face. Subjects were instructed to avoid
active tanning between treatments and to use sunscreen during sun exposure.

The front and oblique sides of the face were photographed before treatment and one month following treatment, using a digital camera (Fuji S2, Canfield Scientific, Inc, Fairfield, NJ) with a standard fixed focal distance and chin rest to assure consistency. Subjects washed their faces before photography.

Results were evaluated by clinical observations of the investigator and comparison of pre- and post-treatment photographs by subjects and 2 blinded dermatologists. Blinded evaluators graded telangiectasia, erythema, mottled pigmentation, and textural improvement on a 1 to 4 scale (1=0-25%, 2=26%-50%, 3=51%-75%, 4=76%-100%).

**Results**

All 8 subjects completed the study. Table 1 shows the results for the improvement of telangiectasia and erythema, pigmentation, and skin texture as graded by blinded evaluators. Clinically obvious differences were not observed. Both treatments were equally well-tolerated, with no differences in the incidence or profile of adverse effects.

Discomfort levels from the treatments were rated similar by the subjects. At the end of the study, subjects were asked to compare pretreatment and post-treatment photographs of each side of their faces. Subjects reported no subjective differences between the 2 sides of their faces in dyspigmentation.

**Table 1.** Improvement scores* judged by blinded dermatologist evaluators.

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<th>Subject</th>
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*Graded on a scale of 1 to 4 (1=0%-25% improvement, 2=26%-50%, 3=51%-75%, 4=76%-100%); AFT = fluorescent pulsed light; IPL = intense pulsed light.
vascularity, or textural improvement. They unanimously rated global improvements as equal on both sides of the face.

Clinical examples are shown in Figures 3 and 4.

**Discussion**

This pilot study suggests that the efficacy and safety profiles of the 2 devices are equal for the treatment of telangiectasia, erythema, dyspigmentation, and skin roughness associated with photodamage.

The Lumenis One platform with one universal IPL treatment head is priced at approximately US $90,000, not including additional equipment. Since the IPL device is quite large (154 kg, 67 x 47 x 159 cm), service must be performed on site. This IPL device can also be equipped with long-pulsed

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**Figure 3.** A 50-year-old woman (skin type II) before and after 5 split-face pulsed light treatments at 3-week intervals. Left face (AFT): 2 passes with green head (540 nm, 15 to 20 J/cm², 10- to 12-ms pulse duration) followed by one pass with yellow head (570 nm, 16-20 J/cm², 10- to 12-ms pulse duration). Right face (IPL): 515/560/590-nm cutoff filters, double pulses (4.0/4.0 ms, 20-nms delay); 590-nm cut-off filter, triple pulse (3.0/3.0/3.0 ms, 30-ms delays); 3 passes at 17 to 20 J/cm².
Nd:YAG (1064-nm) and 810-nm diode laser treatment heads for hair removal.

In contrast, the Harmony AFT multitechnology platform is smaller, lighter, and less expensive to purchase and maintain than the IPL device. The AFT device weighs only 40 kg with dimensions of 65 x 45 x 40 cm, permitting easy return shipment for depot servicing. Downtime due to device malfunction is minimal (eg, 1 day) because the manufacturer can provide “loaner” devices via overnight carrier. Depot service costs approximately half the amount of traditional on-site technical service and turnaround time is minimal.

The Harmony platform in this study was equipped with the green and yellow pulsed light treatment heads and retails for approximately US $60,000. Eleven other modalities can be added and the platform can be upgraded with additional light-based modalities not available for the Lumenis One. The

Figure 4. A 35-year-old woman (skin type III) before and after 5 split-face pulsed light treatments at 3-week intervals. Right face (AFT): 2 passes with yellow head (570 nm) and one pass with green head (540 nm) at 16 to 19 J/cm², 10- to 12-msec pulse durations. Left face (IPL): 3 passes with 560 and 590-nm cutoff filters, double pulses 3.0- to 4.0-ms duration, 10- to 20-ms delay, 14 to 19 J/cm² fluence.
Harmony platform has a clear advantage over the Lumenis One for clinicians wishing to offer treatments with other light-based modalities without purchasing an additional system for nonablative infrared fractional resurfacing skin rejuvenation or tattoo removal.

Comparison of facial halves by the investigator, blinded evaluators, and subjects failed to reveal clinically obvious differences in the results of the AFT and IPL devices. Both treatments were well-tolerated and adverse effects were similar. In an increasingly competitive marketplace for the delivery of cosmetic light-based treatments, the multitechnology Harmony platform appears to offer advantages over the Lumenis One platform and probably other large stand-alone systems without compromising efficacy.

Although results from this pilot study are encouraging, further studies with more patients are needed to verify these preliminary results.

Conclusion
The AFT and IPL devices in this study appear to provide similar efficacy and safety in the nonablative treatment of telangiectasia, erythema, lentigines, dyspigmentation, and reduced skin quality secondary to photoaging.

Disclosure
The author has received honoraria and equipment discounts from both Lumenis and Alma lasers. The study was devised and funded by the author.

References

Address for Correspondence
Martin Braun MD
Vancouver Laser & Skin Care Centre Inc
309-750 West Broadway
Vancouver, BC, Canada V5Z1H2
e-mail: info@vancouverlaser.com