

Ablative Fractional Skin Resurfacing and Facial Scar Reduction with the CO₂RE Device

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Background

Lasers based on fractional photothermolysis were developed in order to minimize downtime and side effects associated with conventional non-fractional treatments, while maintaining similar clinical results. Fractional resurfacing creates areas of microscopically ablated and thermally affected columns, which are spatially separated by non-injured tissue. Fractional lasers can ablate deeper into the reticular dermis to induce neocollagenesis and a wound-healing effect¹, providing clinical improvement for the treatment of photoaging, as well as scars. Scars can depress and widen over time, likely due to weakened collagen fibers in the underlying dermis.² Ablative CO₂ fractional laser treatment for acne scarring in Asian skin has been reported to be safe and effective, resulting in normal re-epithelialization.³ Ablative fractional laser therapy has also been shown to provide rapid wound healing with improvement in scar pliability, texture, durability, and range of motion.⁴ Moreover, according to a recent consensus report, fractional ablative laser resurfacing, represents a promising and vastly underused tool in the multidisciplinary treatment of traumatic scars.⁵

This report describes safe and effective CO₂ fractional laser skin resurfacing and facial scar reduction in dark Fitzpatrick Skin Types IV-VI.

Methods

Patients presenting for scar reduction or indications for skin resurfacing underwent one to three treatments with the CO₂RE system (Syneron-Candela, Irvine, CA) – a second-generation fractional CO₂ laser. A unique feature of the CO₂RE system is the availability of different treatment modes and pattern shapes to simultaneously penetrate to both the epidermis and the dermis. The system offers six ablative modes - four modes for fractional skin resurfacing and

treatment of lines and wrinkles (Light Mode, Mid Mode, Deep Mode, and Fusion Mode), one mode for fully ablative resurfacing (Classic Mode) and one mode for incisions (Surgical Mode). The laser beam is delivered to the target tissue, after being scanned by a double-axis scanner into a pattern of pre-determined shape, size, and depth and selected energy.

Treatment efficacy was assessed by the study investigator, using a 5-point Global Aesthetic Index (GAI) from '0-No improvement' to '4-Significantly marked improvement'. Subjects, who received a single treatment, were assessed at a follow-up visit 2 - 4 weeks after treatment, while subjects receiving 2 or 3 treatments were assessed immediately before the last treatment session.

In addition, the subjects were asked to report their discomfort level after each treatment, according to a 5-point scale (1=no pain at all, to 5=intolerable pain).

Results

A total of 19 subjects (4 males, 15 females; mean age 34±13 years with range 16-63 years) with Fitzpatrick Skin Types IV-VI were treated for various types of facial scarring (9 subjects with acne scars, 5 subjects with traumatic scars, and 3 subjects with tattoo scars), aging skin and melasma. A total of 35 treatment sessions were conducted. Seven subjects (37%) received a single treatment, 8 subjects (42%) received 2 treatment sessions and 4 subjects (21%) received 3 treatment sessions. Table 1 presents the treatment modes used to treat the 19 subjects and the number of passes used for each mode. No treatments were performed using the Mid Mode or the Surgical Mode. Table 2 presents the number of treatments treated with each treatment mode.

Table 1: Treatment Mode Parameters (Tx=treatments)

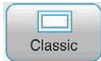
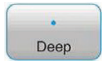
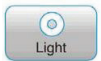

Mode and Application	Classic Mode (Full thickness resurfacing) 	Deep Mode (Deep fractional resurfacing) 	Light Mode (Light peel) 	Fusion Mode (Combination of Mid and Deep modes) 
Energy	10mJ	70mJ	25mJ (n=14 tx); 74.5mJ (n=1 tx)	Deep: 70mJ Mid: 257mJ
Fractional density	100%	5%	40%	40%
# of passes	Single	Single (9 tx); Double (22 tx)	Single pass	Single pass

Table 2: Various Treatment Modes Used in the 35 Treatment Sessions

Mode	Single Mode Therapy			Combination Mode Therapy				
	Classic only (full resurfacing without fractional)	Light only	Deep only	Classic + Light	Classic + Deep	Classic + Deep (1 st fractional pass) + Light (2 nd fractional pass)	Deep (1 st fractional pass) + Light (2 nd fractional pass)	Deep (1 st fractional pass) + Fusion (2 nd fractional pass)
# of treatments	1	3	15	1	4	9	1	1

As shown in Table 2, 54% (19/35) of treatments were performed using a single treatment mode, while 46% (16/35) used a combined therapy; for example, full resurfacing (Classic mode), followed by a fractional mode (Deep and/or Light), in the same treatment session.

Treatment efficacy

Treatment efficacy was assessed by the study investigator at the final clinic visit, using the 5-point GAI. Two subjects had only one treatment visit without a follow-up visit for efficacy assessments. All 17 subjects with clinical assessment showed improvement (Figure 1) with two subjects experiencing significantly marked improvement of facial scars (a traumatic scar and an acne scar). Figures 2 and 3 show examples of treatment efficacy.

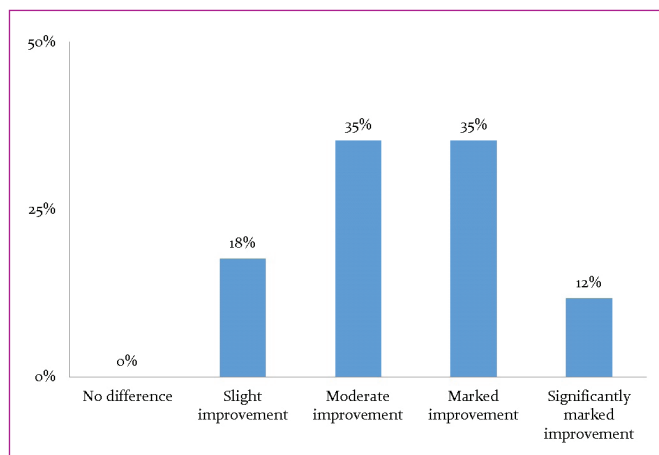


Figure 1. Physician-assessed treatment efficacy

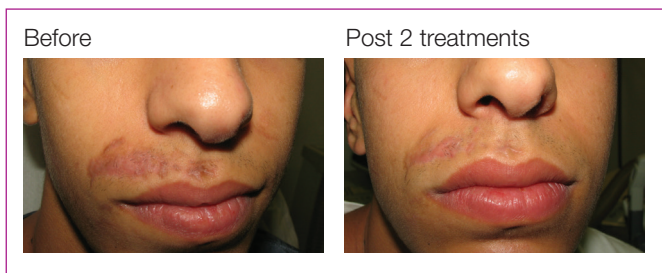


Figure 2. Skin Type IV male with a traumatic scar. Marked improvement was observed following 2 treatments with the Deep Mode (Tx 1 - single pass; Tx 2 – double pass).

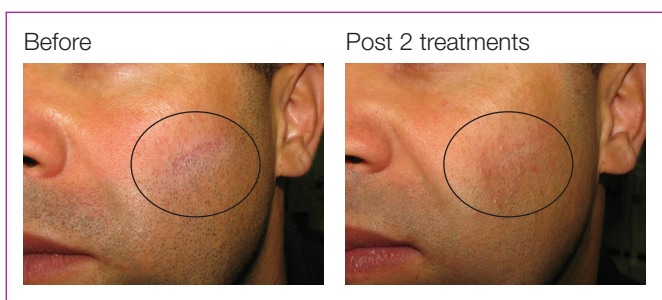


Figure 3. Skin Type IV male with a traumatic scar. Significantly marked improvement was observed following 2 treatments: Tx 1 - single pass with Deep Mode, followed by single pass with Fusion Mode; Tx 2 – Light Mode).

Safety assessment

Generally anesthesia or sedation were not necessary prior to treatment. One subject received a nerve blocker before the two treatments. During treatments, Zimmer cold air was used. Subjects tolerated the procedures well with 89% reporting slight to moderate discomfort. There were no reports of intolerable pain.

There were no adverse effects associated with the 35 treatments on dark skin subjects (Fitzpatrick skin types IV-VI). In particular, there were no post-inflammatory hyper/hypo-pigmentation, blistering or burns.

Conclusion

This report demonstrates the very favorable safety profile and clinical efficacy of the CO₂RE device following 35 treatments to dark skin subjects (Fitzpatrick skin types IV-VI). All subjects presenting for physician assessments experienced improvement with 82% of subjects having moderate to significantly marked improvement. There were no reports of PIH, blistering or burns or adverse effects even with treatments to dark skin. The various treatment modes and scanning patterns available with the CO₂RE system enable physicians to customize treatment for optimal clinical safety and efficacy for their patients.

References

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