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Hand Rejuvenation**

eCO2 Laser Redefines Fractional Technology

For many years carbon-dioxide (CO₂) lasers dominated laser resurfacing technology. Consumers were thrilled with the significant results, however, the associated risks and lengthy downtime with this highly ablative treatment modality led to a decrease in interest. The patient's desire for less invasive treatments has influenced the skin rejuvenation field as a whole and skin resurfacing is no exception. Lutronic, Inc. (Princeton Junction, N.J.) has combined the ablative properties of a CO₂ laser with fractional and scanning technology to create their eCO₂ device. This unique combination provides a wide variety of treatment options and considerably reduces adverse effects.

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eCO2 Merges Traditional CO₂ with Modern Fractional Technology for Improved Results

By Lara G. Owens and Kevin A. Wilson, Contributing Editors

In July 2008 eCO₂ received FDA clearance to treat wrinkles, furrows, fine lines, textural irregularities, pigmented lesions, vascular dyschromia and various other skin conditions for total skin resurfacing. Its ability to adjust depth penetration along with Controlled Chaos scanning technology has resulted in a high level of efficacy with decreased discomfort, positioning it as a top player among multi-functional fractional CO₂ laser platforms on the market.

"Ability to adjust penetration depth is an important feature but not all lasers offer it," said Mark G. Rubin, M.D., assistant clinical professor of dermatology at the University of California, San Diego and dermatologist in Beverly Hills, Calif. "Post treatment healing with fractional CO₂ procedures is dramatically improved and much faster than previous ablative techniques. Up to this point, we have not observed any infections, scars or loss of pigment after eCO₂ treatments. If they're treated on Monday, patients are healed by the end of the week and have very few issues, if any."



Mark Rubin, M.D.
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"Healing time is what truly distinguishes fractional technologies from traditional laser therapies," stated Dr. Rubin. Instead of full ablation, the eCO₂ lays down a pattern of tiny ablative wounds. The skin between each wound is left undamaged, allowing new, healthy skin cells to spread more rapidly to the injured areas. In addition, bulk heating is reduced, which lessens treatment discomfort and decreases downtime to just days.

In contrast, traditional ablative CO₂ laser resurfacing produces mass thermal injury and completely removes an entire layer of skin. Downtime is measured in weeks and the risk of complications such as scarring, infection, or hypopigmentation is much greater. Physicians must rely on topical anesthesia, nerve blocks or sedation to control the pain during treatment and discomfort during recovery is also greater.

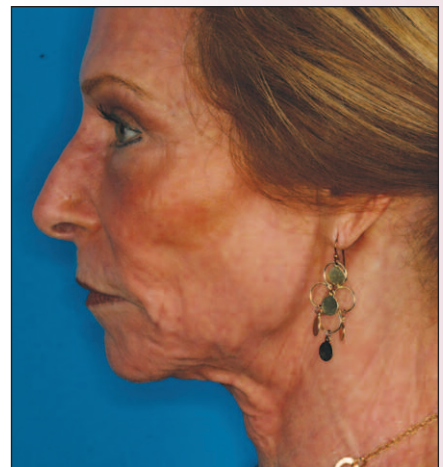
"Basically, the technology behind eCO₂ fills a niche we've been trying to fill for years," Dr. Rubin advised. "Patients with significant wrinkling have desired resurfacing treatments, however they were wary of the risks and disadvantages associated with full-on ablative lasers and therefore elected not to undergo resurfacing procedures. We can now offer an attractive technology to them which has had a very positive impact on our practice."

eCO₂ features Controlled Chaos Technology (CCT) which sets it apart from the competition. "Unlike most other devices that deposit microscopic wounds in a linear pattern, eCO₂ laser pulses are deposited

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Before Tx



One month after second eCO₂ Tx

Photos courtesy of J. David Holcomb, M.D.

“Lutronic’s instruments are equipped with recognition software so their devices have interchangeable treatment tips. Users can apply a low profile tip to enable a more ergonomic treatment, I use that one for eyelids and it makes a big difference.”

in a seemingly random fashion,” explained Jeffrey Rapaport, M.D., of Cosmetic Skin and Surgery Center in Englewood Cliffs, N.J. “This technology actually chooses the farthest point from the last wound, thus decreasing thermal damage and reducing pain. That’s what I want – a unit I can use without nerve blocks or sedation that provides effective treatment.” eCO2 is also capable of laying down wounds sequentially, depending on physician preference.



Jeffrey Rapaport, M.D.
Cosmetic Skin and Surgery Center
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According to J. David Holcomb, plastic surgeon in Sarasota, Fla. and past president of the *Florida Society of Facial Plastic and Reconstructive Surgery*, eCO2’s dynamic mode is another unique aspect of its versatility. “In this mode, if the patient feels discomfort, the user can simply turn down the speed that spots are being laid down at instead of having to change parameters, which can have a detrimental effect on the overall results. Treatment time increases a little but it reduces discomfort without disturbing efficacy.” Conversely its static mode provides the ability to repeatedly stamp patterns in the treatment area, with a spot size of up to 14 mm x 14 mm.

Dr. Rubin finds the dynamic mode especially beneficial in finessing treatment to reduce the checkerboard look seen many times with traditional stamping modes that other devices rely on. “eCO2’s dynamic mode is like spray painting. We use it for blending more than traditional therapy. This device is one of the few fractional devices that allows the option of either mode.”

Another useful feature of the eCO2 is its automatic total density counter which

enables greater treatment consistency. “This ensures exact amounts of treatment, not only between different facial regions but across different patients, which enhances reproducibility.”

eCO2 also features selectable continuous or pulsed operating modes; randomized or regular beam patterns; and skin sensor technology which prevents the handpiece from discharging when not in contact with the skin. Initial biopsy studies indicate that the laser can penetrate as deep as 2.4 mm into the dermis at a 120 micron wound diameter. Parameters can be set for minimum or maximum ablation and three different treatment tips are offered, including a point beam tip for incision, excision and vaporization of skin tags and pigmented lesions. “Tips connect magnetically so they’re easy to attach and detach,” said Dr. Holcomb. “Lutronic’s instruments are equipped with recognition software so their devices have interchangeable treatment tips. Users can apply a low profile tip to enable a more ergonomic treatment, I use that one for eyelids and it makes a big difference.”

Patients with photodamage are benefiting from eCO2 therapy because of the positive effect the procedure has in the deep dermis. According to James H. Carraway, M.D., of the Aesthetic Skin Care Center in Virginia Beach, Va., “We lack the appropriate experience to comfortably handle darker pigmented skin so we only treat skin types I through III. We’re focusing on photoaged skin with fine wrinkles and a thin dermis. The eCO2 reaches the deep dermis and stimulates new collagen to thicken the skin and tighten to some extent.”

“As a plastic surgeon, my goals are different from those of a dermatologist,” Dr. Carraway continued. “I can operate on a patient for two hours, and they will have

dramatically tighter skin. I often tighten with a face-lift, then follow-up with eCO2 to enhance the overall effect, but it all depends on power, density and how much downtime a patient is willing to accept. I tell my eCO2 patients the same thing I tell my face-lift patients: the more comprehensive result we achieve, the more downtime you'll have. Let the patient get involved in their care. They can tell you how much downtime they can manage."

"Fractional lasers produce approximately 10% to 15% less wrinkle reduction than traditional CO2 ablative lasers," Dr. Rubin reported. "That's still very impressive. In addition, results have been spectacular for color and textural improvement and everyone believes fractional CO2 lasers are the treatment of choice for acne scars today."

Dr. Rapaport also added that, "scars are a traditionally difficult to treat indication that necessitate eCO2 therapy rather than popular non-ablative devices. Unlike many other physicians my practice is about 70% acne scars and 30% photo-aging." When treating acne scars, "ablation is superior to non-ablation for three reasons: greater depth, better remodeling and improved tightening. Acne scars contain more collagen and elastin fibers than other tissue, making it more difficult to get through ablatively, let alone non-ablatively. Generally, acne scar patients are more willing to tolerate downtime than wrinkle patients because they've dealt with disfigurement for so long. So far I haven't needed to perform a second treatment."

"Certain types of acne scars respond better than other types of acne scars," Dr. Rapaport continued. "The eCO2 works very well for boxcar scars, pits and shallow scars. Atrophic scars are the only limitation but nothing works terrifically on them."

Dr. Holcomb uses the eCO2 to treat a lot of dyschromia, skin laxity on the face, neck and arms, acne scars and other types of scars. "You obviously have to be careful about the energies. I use low densities and moderate energies. After evaluating many different non-ablative fractional devices, results with eCO2 are by far greater and patient satisfaction is high."



J. David Holcomb, M.D.
Plastic Surgeon
Sarasota, FL

"Patient feedback has only been positive," Dr. Rubin agreed. "Everybody just loves it. It's like botulinum toxin – you have to search long and hard to find an unhappy patient. I don't think we've treated one person with eCO2 who hasn't come back thrilled with their skin."

Dr. Carraway has found results to be similarly noteworthy, even in patients who had received previous treatment with comparable devices. "After one eCO2 treatment they could really see a change, and that's the key. In order to feel an enthusiasm towards treatment, patients need to see a change and know a bigger transformation is coming."



Before Tx



Three weeks after eCO2 Tx

Photos courtesy of Jeffrey Rapaport, M.D.

"After evaluating many different non-ablative fractional devices, results with eCO2 are by far greater and patient satisfaction is high."

“Patients we treated five or six months ago are very happy with their results, but I think we are more aggressive with treatment than we were back then owing to our continued training. I’m sure that our current patients will achieve even better results than those we saw with our first patients.”

Since the eCO2 device is still new to the market and collagen remodeling takes four to six months to fully occur, future results could potentially be even better as clinicians perfect their technique. “Patients we treated five or six months ago are very happy with their results, but I think we are more aggressive with treatment than we were back then owing to our continued training,” explained Dr. Rubin. “I’m sure that our current patients will achieve even better results than those we saw with our first patients.”

Dr. Rubin also shared the two opposing paradigms for achieving the best result in fractional resurfacing: deep penetration on a small percentage of skin versus more superficial penetration on a higher percentage of skin area. “We’re moving more towards deeper treatment with low density, but we have quickly realized that we can be more aggressive than we were initially comfortable with. You can easily reach 800 or 1,000 microns in a small percentage of skin and get significant improvement in wrinkling and tightening. If you’re treating just pigmentation or areas off the face, don’t go too deep. You can use very low energies and low densities.”

“Another reason I like eCO2 is that I can treat my patients with 30% topical lidocaine only. I am able to be pretty aggressive with my settings even without sedation,” noted Dr. Rapaport. “Here in New Jersey, there are a lot of regulations for pain management medication and nerve blocks can cause bruising which could take longer to resolve than laser induced erythema.”

Dr. Carraway manages treatment discomfort with intra-muscular Versed from Hoffman-LaRoche, Inc. (Nutley, N.J.), which takes effect more rapidly than many alternatives. “We also use topical anesthetics but 3 mg to 4 mg of Versed relaxes the patient just enough to get them through

the laser procedure. Since I also use it for various surgery procedures, I have experience with it.”



James H. Carraway, M.D.
Aesthetic Skin Care Center
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“Hydroquinones may be appropriate with eCO2,” Dr. Rapaport noted. “For any skin type higher than type II, we will start that from day one. If they’re dark, we’ll give them 8% hydroquinone.”

The group agreed that post treatment care is limited mostly to moisturization but each physician had their own preferred protocol. Dr. Rubin sends his patient’s home with Aquaphor healing ointment from Eucerin-Beiersdorf (Wilton, Conn.) for the first day and then replaces it with a less greasy moisturizer to reduce the chance of post treatment acne outbreaks. “We also have patients apply cool compresses several times a day for three or four days. Most people are completely healed and ready to face the world by day five, but we encourage them to set aside seven days just in case,” he said.

Dr. Carraway added that the need for antibiotic prophylaxis with eCO2 is less than what is required for traditional resurfacing. “We only use pre-operative antibiotics if someone has a history of recurrent infections. Post-operatively we routinely administer anti-virals for all laser work around the mouth. We also like to prepare the skin with tretinoin and vitamin C. Antibacterial ointments have the potential to incite allergies so we don’t use them.” He also puts patients on a low-starch diet to reduce swelling, which contributes to post treatment discomfort. “Usually after five days, patients can wear make-up again.”



Before Tx



Nine weeks after eCO2 Tx

Photos courtesy of Mark Rubin, M.D.

“With eCO2’s fractional technology, the healing is much faster and the injuries are less traumatic than they were with the old lasers.”

As with any laser therapy, there is a risk of burns or post-inflammatory hyperpigmentation, but this is extremely low with eCO2 therapy. “Anytime you create a wound you have to be prepared for the potential adverse events,” Dr. Rubin advised. “With eCO2’s fractional technology, the healing is much faster and the injuries are less traumatic than they were with the old lasers, therefore ensuing problems are much less frequent.”

Dr. Holcomb agreed that adverse effects have not been an issue. “With any device you have to be careful about employing too much energy in a short period of time, but I have had no problems, even with the darker skin types.”

Fractional technology is not new, and neither are the procedures associated with it, which facilitates easy integration. “Integrating eCO2 into a practice is not difficult, especially for those with laser experience,” Dr. Rubin stated. “There is a learning curve for setting it all up, but it really only takes a few days to get your office up to speed. The paperwork, including consent forms and other patient information sheets are the real issue, which is normal.”

According to Dr. Rapaport, eCO2 provides an alternative for his older patients who, due to the extent of their photodamage, previously only had the option of traditional CO2 resurfacing. “Now with maybe two eCO2 treatments we will see results equal to one traditional CO2 treatment. Additionally, the price of eCO2 is lower than similar devices for both the patient and the physician and there are no disposables. Therefore fewer treatments are required to see the return.

“Cost is a major factor,” agreed Dr. Carraway. “Plastic surgeons and dermatologists need to be able to afford these machines. Quite honestly, I am always averse to offering patients expensive procedures, so if I can present something more affordable I feel good. eCO2 gives me the opportunity to provide a more affordable treatment with the confidence of obtaining a good result and less downtime. Moreover, Lutronic’s technical support and service have been excellent.”

According to Dr. Rubin, the full capabilities of eCO2 and fractional CO2 technology are still being explored. “There are actually more features on the eCO2 that I have not experimented with yet, but I like the idea of having a device that does more than I need. Oftentimes you can enhance treatment when you have more parameters available. This is more than just science. As we gain experience we can advance further toward the artistic side of cosmetic surgery. Having an eye for aesthetics is what separates good practitioners from great ones and eCO2 definitely plays a role in this.”



Before Tx



Ten days after eCO2 Tx

Photos courtesy of Jeffrey Rapaport, M.D.