The background of the page features several vertical, semi-transparent panels showing microscopic cross-sections of skin tissue. These panels are arranged in a row, with the central one being the most prominent. The tissue layers, including the epidermis and dermis, are clearly visible, showing cellular structures and collagen fibers. The overall color palette is a mix of light purple, blue, and white, giving it a clinical and scientific feel.

The evolution of laser-based resurfacing has followed a series of broad pendulum swings. When the full-surface ablation of CO₂ lasers revealed some ugly side effects including delayed pigmentation problems and facial scarring, the industry moved to low-risk nonablative lasers. Unfortunately, the less than dramatic results and long-term treatment protocols of these systems did little to quench the public's thirst for immediate improvement with a quick and safe recovery. Today the pendulum is finding its center with fractional CO₂ and erbium lasers that promise great results, moderate recovery times and few adverse reactions.

By Inga Hansen

going deeper

Going Deeper

“The CO₂ wavelength is still considered the gold standard in treating sun-damaged skin in a full-surface ablative treatment mode, but the risks have made it less desirable,” says Richard E. Fitzpatrick, MD, director of dermatology, La Jolla Cosmetic Surgery Centre, La Jolla, California. “Bringing back the wavelength in a fractionated technology allows us to achieve a far greater degree of improvement than we see with any other technology.”

Some of the areas of the face that pose the greatest challenges for nonablative systems have been the lip area, crow’s feet and deep lines in the nasolabial fold. “Even with nonablative fractional systems available, a lot of physicians were still using the traditional CO₂ lasers to treat these areas,” says Kellie Young, vice president of marketing, Lasering USA, San Ramon, California. “That’s why we’ve seen such enthusiasm surrounding ablative fractionated systems.”

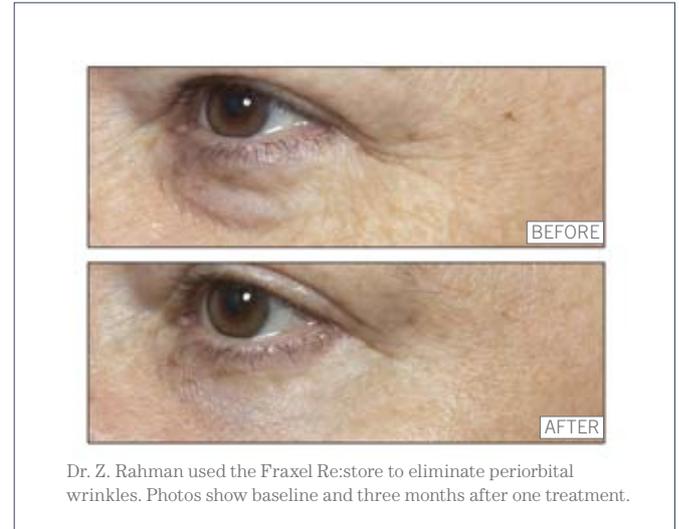
Some of the indications addressed by fractional CO₂ units include deep wrinkles, acne scarring and lax skin. Fitzpatrick combines both ablative and nonablative treatments in his practice. “These technologies are complementary,” he says. “If I’m taking a nonablative approach on a patient with a lot of wrinkling in the cheeks or upper lip area, I add an ablative fractional treatment in the areas that aren’t responding as well as I’d like to the nonablative treatment.”

“The skin-tightening results, especially around the eyes, are really impressive,” says Renee Cobos, MD, FAAD, board-certified dermatologist, Premiere Dermatology & Laser Centre, Fullerton, California, who has performed fractional CO₂ treatments on patients ranging in age from their early 40s to mid-80s. “I use the 1550nm Fraxel Re:store (Reliant Technologies) for younger patients who have more pigment issues than tightening issues,” she says. “If a patient has heavy lids and bags under the eyes, the Fraxel Re:pair CO₂ fractionated laser is remarkable. The lids are retracted, the bags are decreased and the patient retains a very natural-looking lid.”

Fitzpatrick uses the fractional CO₂ for patients with moderate to severe sun damage and “scarring of any kind,” he says. “The fractional CO₂ on severely sun-damaged cheeks is

superior to anything, including traditional CO₂,” says Fitzpatrick. “It offers skin rejuvenation as well as skin tightening without the risk of pigment loss and without creating a line of demarcation.”

With fully ablative CO₂ devices physicians ran the risk of creating obvious lines



of demarcation between treated and untreated skin. “This was something you always had to worry about,” says Deborah Sarnoff, MD, director of dermatologic surgery at Cosmetique, her private practice in Long Island, New York, and associate clinical professor of dermatology at New York University Medical Center. “Ten months later you could end up with white skin on the face that was obviously different from the more highly pigmented skin on the neck. That’s another advantage of the fractional CO₂ devices: You can use them for the neck, décolletage and hands, something that was not recommended with the original CO₂ devices.”

“We find these lasers very useful in treating early-stage stretch marks on the legs,” adds Fitzpatrick. “There really haven’t been any successful stretch mark treatments available prior to the fractional CO₂ devices, and I think they have a lot of potential in this arena.”

Patient Selection

“There are still some restrictions with the fractional ablative devices,” counsels Dr. Sarnoff, “but not nearly so many as there were with the original CO₂ devices. Avoid resurfacing of any kind with Fitzpatrick skin types IV and higher, and be sure the patient hasn’t been taking Accutane.”

In addition to looking at indications and contraindications, choosing between nonablative fractional and ablative fractional services requires some discussion regarding lifestyle and downtime. Where nonablative treatments tend to require multiple sessions with one day of downtime per session, ablative treatments generally require only one session with 48 hours of healing and up to five days of social downtime.

“A patient who is willing to tolerate that downtime for dramatic results in just one session will choose the ablative treatment,” says Rajib Ghosh, global product manager, Reliant Technologies, Mountain View, California. “A patient who simply cannot tolerate five days of downtime will tend to choose the Re:store, even if it requires multiple sessions.”

Offering ablative fractionated treatments in your practice requires a larger staff commitment than traditional fractional devices. “It is like doing a surgery,” says Dr. Cobos. “You need to use sterilized ocular shields to work around the eyes, and you need

COMPARING DEVICES

When assessing fractional ablative devices, carefully compare these parameters:

- Spot size/pattern
- Density of ablation/degree of flexibility
- Energy/depth of penetration
- Speed
- Consumables/cost per treatment
- Extra features

Going Deeper

to have multiple staff members available to assist in the procedure." Dr. Cobos performs the treatments with the help of one devoted assistant in the room and a second "floating" assistant to "bring in ice packs and whatever else we need as we perform the treatment," she says. "So we do schedule these treatments when there are no other procedures going on in the office."

Patients require topical anesthesia, oral pain medication and, in some cases, nerve blocks prior to treatment, although most systems do not use cooling. "The pain management protocol depends on the aggressiveness of the treatment," says Ghosh. "With fractional CO₂, because you're ablating and removing the tissue, the heat applied to the skin dissipates through these channels, unlike in 1550nm fractional treatments where the top layer remains intact and the heat is trapped inside. Since the heat dissipates during treatment, cooling is not necessary. But you do need a topical anesthetic for patient comfort."

After the procedure patients need to follow a rigorous cleaning protocol for the first 48 hours. "By the end of the second day, the oozing has stopped and the wounds have healed," says Dr. Cobos. "There is some erythema with a little swelling and bruising. We encourage patients to keep their skin free of makeup for at least three days and preferably five."



These photos, courtesy of Benjamin Raab, MD, show results after one treatment with the Pixel Omnift from Alma Lasers.

System to System

Differences in the ablative fractionated systems revolve around three key areas: type of laser, spot size and adjustability of parameters (see "Comparing Devices" on page 36). The majority of ablative fractionated devices use a carbon dioxide wavelength, while some utilize an erbium wavelength. Both the Sciton PROfractional and Palomar Lux2940 feature the erbium (2940nm) wavelength. The units offer up to 1.5mm and 1.3mm depth of penetration, respectively. Erbium delivers more heat than the 1550nm Fraxel but less than a CO₂ laser.

"Erbium lasers are useful in treating areas of severe sun damage or a lot of scar tissue," says Fitzpatrick. "They also offer some skin tightening with the wound healing but you don't see the im-



Lasering USA sent these images showing dramatic results using the MIXto SX fractional ablative laser.

mediate heat-induced skin tightening that we see with the CO₂."

"Both carbon dioxide and erbium fractional systems are useful. They differ in the amount of thermal damage they create and the resultant collagen remodeling they produce," says Jason N. Pozner, MD, FACS, medical director of the Aesthetic Science Institute and assistant professor of surgery at the University of Miami School of Medicine in Boca Raton, Florida. "The problem with too much thermal damage is the increased downtime, prolonged redness created and risk of hyperpigmentation. Newer fractional erbium systems like the Sciton PROfractional allow variable thermal damage that minimizes risk. We have had excellent success with the system. Only data collected over a few years will truly reveal comparative complication rates of fractionated erbium and CO₂ devices."

Reliant Technologies introduced its fractional CO₂ device in July 2007. The company spent two and a half years researching its CO₂ Fraxel Re:pair to ensure there were no delayed pigmentation responses similar to those seen with traditional CO₂ resurfacing. The Re:pair penetrates up to 1.6mm and features two dials to adjust pulse energy from 5mJ to 70mJ and coverage from 5% to 70%. The unit also features an integrated smoke evacuation unit built into the handpiece. "The system removes all the smoke, fumes and bacteria from the point of ablation," says Ghosh. "Normally the physician needs an assistant to hold the evacuation hose close to the treatment area; we built it into the unit so you don't need that extra hand."

Lumenis has created two fractionated CO₂ systems, each with distinctive spot sizes and distinct indications. The Active FX offers a relatively large 1.3mm spot size and a penetration of 20 to 300 microns. "It covers a large surface area of the skin so it's good for pigmentation problems, dyschromia, fine lines and wrinkles," says Amy Leah Easterly, product marketing manager, Lumenis, Santa Clara, California. The new Deep FX offers the smallest spot size at 120 microns, adjustable energy settings and pulse stacking capabilities that allow the Deep FX "to go from 30 microns to any depth you want to achieve," says Easterly. "This makes it a great choice for scar revision."

CO₂ Times Two

The latest fractionated devices have added a new wrinkle to the ablative/nonablative question by including both traditional CO₂

Going Deeper

and fractional CO₂ in one machine. These include the Lutronic MOSAIC eCO₂, MIXto SX from Lasering USA, SmartXide DOT Therapy from Eclipse Medical and Alma Laser Pixel OmniFit.

“Offering both fractional ablative CO₂ and fully ablative CO₂ in the same system

is a great advantage and something I think we’ll see in a lot more systems in the future,” says Dr. Sarnoff. “Clinically, we often have need for both types of devices on the same patient. For example, one fractional CO₂ treatment may produce the results a 65-year-old woman desires on most of her

RESOURCES

Here are some of the companies offering fractional ablative resurfacing lasers:

Alma, 866.414.ALMA
almalasers.com

Eclipse Medical, 800.759.6876
dottherapy.com

Ellipse, 877.355.4771, ellipse.org

Lasering USA, 866.471.0469
laseringusa.com

Lumenis, 877.586.3647, lumenis.com

Lutronic, 888.588.7644, lutronic.com

Palomar, 800.PALOMAR,
palomarmedical.com

Reliant Technologies, 888.437.2935,
fraxel.com

Sciton, 888.646.6999, sciton.com

face but not on the deeper wrinkles around her mouth. With this dual-treatment device, we can use the more aggressive settings around the mouth and the fractional ablative treatment on the rest of the face.”

The MIXto SX from Lasering USA can be used for traditional CO₂ resurfacing, fractionated CO₂ resurfacing and as a surgical cutting tool. It offers a 300 micron spot size and 20% ablation delivered by scanner in a “Z” pattern.

The SmartXide DOT Therapy from Eclipse Medical offers the same three treatment options and includes even more flexibility. When used in fractional mode, it features a 350 micron spot size and allows the operator to adjust the density of ablation from 2% to 40%. The company has created six treatment protocols starting with a low-thermal, high-density setting for epidermal pigment problems to high-energy, low-density treatments for severe wrinkles and acne scarring. “The ability to treat acne scars is one of the most promising indications for fractionated CO₂,” says Kevin O’Brien, president, Eclipse Medical, Dallas. “With the DOT Therapy procedure, you can adjust the size and shape of the scan to cover the diameter of the acne scar. This allows you to deliver a high-energy, low-density pulse right to the scar.”

Going Deeper

“Even if you are aggressive with the DOT Therapy fractional procedure, the patient can be back to work in one week with nothing more than low-grade swelling,” notes Dr. Sarnoff. “Strangely enough, patients report that this complication actually nets them compliments. You may even need to explain

that once the initial swelling diminishes, it will take a few weeks for new collagen building to establish the end results they look like they have at the end of that first week.”

The latest of these devices, the Lutronic eCO₂ system, received regulatory clearance



Dr. C. William Hanke used the SmartXide DOT to achieve these remarkable results.

from the FDA in July. Using its proprietary Controlled Chaos Technology, this next generation fractional CO₂ laser has several features that offer customizable treatments that are easy to deliver and less painful to patients. “The eCO₂ is a familiar wavelength in an elegant and versatile package, with the ability to perform laser surgery, traditional ablative resurfacing and ablative microfractional photothermolysis,” says J. David Holcomb, MD, immediate past president of the Florida Society of Facial Plastic Surgeons who is in private practice in Sarasota, Florida. At a 120 micron spot size, the laser can penetrate as deep as 2.4mm into the dermis. With both Static and Dynamic operation modes, users have the capability to stamp an area of up to 14 by 14mm and the option to “feather” the treatment area to reduce the “checkerboard” appearance that is common with currently available fractional CO₂ devices.

The prices of these lasers range from about \$80,000 to well over \$100,000. If that strains your budget, another option is the Alma Lasers Pixel OmniFit, a universal fractionated handpiece that can be used with your existing CO₂ laser. “If you have a traditional CO₂ laser that’s getting minimal use, this lets you get it back into regular rotation as a fractionated system without making a big investment in a new laser,” says Patrick Neff, marketing manager, Alma Lasers, Buffalo Grove, Illinois.

“When I introduced the fractional CO₂ laser, I thought this would serve a totally different patient base,” says Dr. Cobos. “But what I’ve found is once clients see the before-and-after photos and realize they can do this in one session, many of them prefer the ablative treatment over the nonablative fractionated series. It offers the best results of any laser in my practice.” ■

Inga Hansen is a Los Angeles-based freelance writer.