In the battle against acne vulgaris and the distressing scars it can leave in its wake, lasers and other light-based therapies are showing great promise in the treatment of scars but somewhat uneven results as therapy for acne flares. Refinements to existing technologies for ablative and non-ablative fractional resurfacing have allowed dermatologists to smooth scars of various shapes and degrees of severity. Photodynamic therapy (PDT) is gaining visibility as an alternative to isotretinoin for patients who have failed conventional topical and systemic treatments, although significant drawbacks for patients and physicians remain. And newer light-emitting devices, including one cleared by the U.S. Food and Drug Administration for home use, are helping to boost the effectiveness of conventional treatments for ongoing disease.

Fractional Lasers Minimize Scars
The array of lasers used to treat acne scarring is growing as new devices come on the market, including a system that offers a number of different handpieces for different wavelengths. Dermatologists with expertise in using lasers vary in their preference for ablative vs. non-ablative treatment, but there is general agreement that fractional photothermolysis, a technology introduced less than 10 years ago, has led to dramatic advances. Fractional resurfacing uses energy to treat microscopic columns of skin in regularly spaced arrays, leaving intervening areas of skin untouched (one newer device creates an irregular injury pattern rather than columns). Non-ablative fractional lasers heat and coagulate the tissue, while ablative fractional lasers vaporize tissue. Both stimulate the growth of new collagen. >>
Lasers "have revolutionized the treatment of acne [scars]," said Jeffrey S. Dover, M.D., associate clinical professor of dermatology at Yale University School of Medicine and co-founder of SkinCare Physicians in Chestnut Hill, Mass. "We have been overwhelmed with the success of fractional non-ablative lasers for improving acne scarring, particularly for rolling scars and superficial boxcar scars. We used to believe that the more aggressive the treatment, the better the result, but we've had a 180-degree turn in our belief, based on very extensive numbers of treatments." Dr. Dover pointed out that non-ablative treatment is also gentler, better tolerated by the patient, and more easily administered by the dermatologist. "But you need to do a series of a minimum of six treatments to get really nice results, whereas with the ablative devices you can do one single treatment to get improvement," he added.

Dr. Dover uses erbium fractionated non-ablative lasers in three wavelengths: 1440, 1540, or 1550 nm. He normally administers one treatment per month for six months, and noted that the most significant improvement occurs in the later months of treatment. He called non-ablative laser treatment of acne scarring "one of the most gratifying things I do in my practice because these are people who have tremendous psychological burden, and they are the happiest patients in our entire practice because their condition is dramatically improved."

Roy G. Geronemus, M.D., clinical professor of dermatology at NYU School of Medicine and director of the Laser and Skin Surgery Center of New York, said that, although both ablative and non-ablative fractional lasers work well, he sees a slightly better response with ablative devices. "But it becomes the patient's decision, because many people cannot afford the downtime that's required for ablative procedures," he pointed out. "Also, for darker skin types, we might prefer a non-ablative treatment because it is less likely to result in pigment change." Another factor affecting the choice of laser is the type of scarring the patient has. "For the deeper scars, I think you're better off with the more ablative treatment," Dr. Geronemus said. "But for overall rolling scars or some of the pitted scars, I think both devices can work quite nicely. Large pores do a little better with one of the superficial non-ablative treatments, and that's done with the thulium 1927 nm laser. So we'll often combine different types of lasers depending on the condition the patient has."

Because patients with moderate to severe acne are typically afflicted with a variety of scars, combination therapy with different lasers or lasers plus another modality may lead to the best results, said Arielle N.B. Kauvar, M.D., clinical professor of dermatology at NYU School of Medicine and director of New York Laser and Skin Care. "I believe there has been a shift away from ablative lasers toward repetitive, non-ablative fractional laser treatment for acne scars," she said. "The optimal treatment often requires combining laser treatment with minimally invasive surgical techniques and fillers. If a patient has complicated scars such as deep boxcar scars or large areas of fibrosis, the combination of non-ablative fractional laser treatment and subcision will provide improved results over laser treatment alone."

In addition to fractional lasers, Dr. Kauvar said she uses a pulsed dye laser or KTP laser to treat the red scars that can persist after inflammatory acne lesions have resolved. "Another laser that's very useful for both acne scarring and acne treatment is the 1450 nm diode laser, a near-infrared laser that heats and stimulates collagen, but only superficially," she remarked. "In my practice, I commonly treat mild adolescent or adult acne with a combination of pulsed dye laser and diode laser to treat both the ongoing acne as well as the red and superficial scars that are already present."

Bruce E. Katz, M.D., clinical professor of dermatology at Mt. Sinai School of Medicine and director of the Juva Skin and Laser Center, said he uses both the fractional CO2 ablative laser and fractional radiofrequency. "Fractional radiofrequency is a newer technology, and we've been getting very nice results with minimal downtime," he noted. "It works very similarly to fractional CO2 in terms of stimulating collagen and smoothing out irregularities. We use fractional CO2 in fairer skin and fractional radiofrequency in darker skin types."

**PDT, NEWER DEVICES EFFECTIVE AGAINST ACNE FLARES**

In the treatment of active disease, lasers and light therapy still take a backseat to treatment with topical and systemic agents, experts say. "While I believe there is a role for lasers and light sources in the treatment of acne, and I believe there are
some advances yet to come, I personally think these results have been a little disappointing," Dr. Dover said. "The results are variable, it's an out-of-pocket expense not covered by insurance, and I think that for the most part, these selections are being made through frustration of the patients and perhaps physicians."

A device that combines broadband light (400 to 1,200 nm) with a vacuum, Isolaz, is gaining support for its use particularly in the treatment of comedonal acne. "It's inexpensive, safe, and well-tolerated," said Dr. Dover, who has served as an investigator for Solta Medical, which makes Isolaz. "A series of four or five treatments has helped many of our patients — mostly teenagers, but also some women in their 30s and 40s — in conjunction with traditional treatments."

Dr. Geronemus, who also serves as an investigator for Solta and said he uses a wide variety of devices for active acne, remarked that in his experience, "the vacuum is nice for patients with comedonal acne, and the broadband helps with the inflammatory acne."

Home treatment with a device that emits blue light was also cited as a possible adjunct to oral and topical therapy. Noting that most home devices are underpowered, Dr. Dover singled out the TRIA Skin Perfecting Blue Light as "a highly powered blue light source that has some nice studies seen in peer-reviewed journals that show it's pretty effective." Dr. Geronemus, who tested the TRIA device in his practice and reported encouraging results in a poster presentation (J Am Acad Dermatol, 2013;69[4]:AB14), said home devices are "a growing area in this field, definitely for real. I think we'll be hearing a lot more about them." (Dr. Geronemus owns stock in TRIA.)

As researchers continue to investigate PDT for patients with acne recalcitrant to conventional therapy, fundamental questions remain regarding its effectiveness and the optimal treatment parameters.

Sally Ibbotson, MD, clinical senior lecturer in the Photobiology Unit of the University of Dundee in Scotland, examined the medical literature and published an editorial on the topic in Photodiagnosis and Photodynamic Therapy (2013;2:2-4). In a separate communication, Dr. Ibbotson said that "in my own experience and based on the literature, cystic and comedonal acne generally doesn't do well with PDT. The consensus is that PDT could be considered for inflammatory acne if other conventional therapies prove ineffective or are contraindicated/not tolerated. The literature is most in support of photosensitizer pro-drug combined with red light but the jury is still out as to the optimal emission spectrum of source, dose, irradiance, and PDT regime to use."

Although the approach of one PDT expert may prove the axiom "no pain, no gain," he maintained that for properly selected patients, PDT consistently yields results comparable to treatment with isotretinoin with far less risk. Cmdr. Nathan S. Uebelhoer, DO, head of the dermatologic surgery and laser division at Naval Medical Center San Diego, cautioned that "to do it right takes a lot of time and there’s not a lot of reimbursement, but I love PDT. It works very, very well." He presented on the topic at the Controversies in Cosmetic and Laser Surgery meeting in 2009 and 2010.

In contrast, Dr. Uebelhoer insisted that patient selection is critical to the success of PDT. "Inflammatory acne, including papular, pustular, and nodular acne, those patients do respond. I have treated patients with cystic acne, and as with isotretinoin, they respond modestly but they often need more than the norm regimen." Patients with skin types III and IV must be advised that they will experience transient hyperpigmentation for about three months. And because treatments are painful, and patients must avoid sunlight for 36 hours post-treatment, young adults tend to be better candidates than teenagers.

Dr. Uebelhoer based his treatment regimen on the more classic approach of R. Rox Anderson, MD, the Harvard-based dermatologist who leads a team of researchers at the Wellman Center for Photomedicine. "One of Rox Anderson’s techniques is the long application of topical 5-Aminolevulinic acid (ALA)," he explained. "I leave it on for two or three hours. Then I’ll treat with somewhere between 100 and 200 joules of continuous wave LED red light, 630 to 635 nm. I wait two to four weeks (or shorter for type I or II skin) and I treat them again. I will usually treat patients four times, though I’ve done some five times and some twice."

After the first 36 hours, when peeling starts to occur, patients must wear sun protection outside, Dr. Uebelhoer said. "Peeling goes on for five to seven days post-op, then after seven days they’re bright red, and after 10 days they’re presentable in public." Patients whose acne has affected their quality of life for years tell him that the downtime required by the regimen is a small price to pay, Dr. Uebelhoer said.

Dr. Uebelhoer admitted that "just like with oral retinoids, there’s going to be some level of recurrence" of acne after PDT. "Further treatment may require oral antibiotics or simple topicals or topical retinoids." Citing Dr. Uebelhoer’s "exquisite results" with PDT, Dr. Dover nonetheless maintained that "he’s able to do things our patients just won’t tolerate." Both physicians predicted that the results and the tolerability of PDT will improve as more dermatologists begin using it and refining the treatment parameters. dw