Effective Hair Removal Protocols and Technologies

By J. Elaine Spear

The growing list of laser and light-based devices approved for permanent hair reduction could make anyone's head swim. Real-world experience with a number of devices with different skin types can help you decide which might provide the best efficacy and reliability for your practice.

Next to Botox, laser hair removal is the most requested procedure in aesthetic medicine, according to the American Society for Aesthetic Plastic Surgery. This demand is prompting such a rush of new laser and pulsed-light devices that the U.S. Food and Drug Administration cannot maintain an up-to-date list of specific models that are now cleared for permanent hair reduction. While this avalanche of hair removal systems is complicating the purchasing process, it is also providing more opportunities to buy state-of-the-art devices that offer safer, more effective hair removal for all skin types.

"I have done clinical trials on several devices including the Lumenis LightSheer, Palomar Starlux RS and the Aesthera PPx," says Vic Narurkar, MD, board-certified dermatologist, president-elect of the American Society of Cosmetic Dermatology and Aesthetic Surgery, and founder and medical director of the Bay Area Laser Institute in San Francisco. "It has been my experience that as the array of lasers and pulsed-light devices continues to grow, so do their efficacy and safety."

Dr. Martin Kassir, Mona Lisa Dermatology, Dallas, Texas, uses the multifunction Apogee Elite Laser from Cynosure. "With this system I can offer my patients optimal results with maximum speed, safety and comfort," he says. ➤

Specifically, Narurkar mentions these advancements in laser and light technologies:

1. Devices that use photon recycling and contact sapphire cooling, such as the Palomar Technologies Starlux, a pulsed-light system that replicates results previously attainable only with lasers
2. Advanced cooling systems, such as the Wavelight Mydon Nd:YAG, that allow for safer delivery of a long-pulsed 1064 nm laser.
3. Extended pulse durations of the Lumenis LightSheer laser to enable treatment of all skin types, including Fitzpatrick types V and VI.
4. The ability of the Aesthera PPx to manipulate the optical characteristics of the skin using vacuum and light, thereby allowing for the use of shorter wavelengths for safer hair removal.

"Ten years ago, physicians used lasers almost exclusively for hair removal," notes E. Victor Ross, MD, director Laser Unit, Dermatology Department, Scripps Clinic in La Jolla, California, who has been involved in numerous laser and light-based research projects, including one assessing pseudofolliculitis barbae. "Today, pulsed-light systems have become increasingly popular for hair removal. This isn't because laser technology has declined; it's because pulsed-light technology has dramatically improved in the past few years. Integrated cooling, improved spectral filtering, variable pulse shaping, larger spot size and improved reliability have elevated the stature of pulsed-light devices in the cosmetic arena."

Being on Target

The basis of laser and pulsed-light hair removal devices is selective photothermolysis that typically targets the melanin in the hair follicle. "While there have been many refinements in laser and pulsed-light technologies over the years, the challenge has always been to selectively destroy the hair follicle, while preserving the epidermal melanocytes at the dermal-epidermal junction," says Narurkar. "Recently, this process has improved with the introduction of effective cooling techniques and appropriate wavelengths that more precisely target the follicle while preserving the epidermis."

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To date, five types of cooling are used for laser hair removal services:

- ♦ Clear gel, usually chilled
- ♦ Cryogen spray
- ♦ Contact cooling
- ♦ Frigid air cooling
- ♦ Evaporative cooling

To limit thermal injury, scientists originally determined that photopulsation should be less than, or equal to, the thermal relaxation time of the hair follicle (10 ms to 100 ms, depending on the diameter of the follicle). However, because some parts of the follicular unit, such as stem cells, do not have significant amounts of melanin, or may be distant from targeted areas, some researchers now suggest that longer pulse durations (15 ms to 40 ms) will produce optimum thermal injury throughout the follicle, and likely lead to permanent hair reduction. The Opusmed F1 Diode Laser, for instance, has a wavelength of 810 nm. It provides follicular melanin absorption without the need for increased fluence. This longer pulse duration matches the thermal relaxation time of most hair follicles, thus inflicting deep follicular injury while sparing the epidermis.

Darker Skin Challenges

While laser results are highly effective for patients with light skin and dark hair, one of the greatest challenges in laser and light-based hair removal technologies is achieving long-term hair reduction in patients with very dark skin (types V and VI). "It has been my experience that in very dark skin, laser and light-based hair reduction is more about maintenance," says Narurkar. "In these instances, we typically recommend a series of treatments for darker hairs, and then address the finer hairs with topical eflornithine (Vaniqa, SkinMedica)."

Celibre Medical Corp., located in Torrance, California, serves a large ethnic population. Medical Director Harold J.

Kaplan, a board-certified plastic surgeon and clinical associate professor of surgery at UCLA, and business owner Kevin DiCerbo report excellent results with the Sciton Profile. "The 1064 Nd:YAG laser combined with the ClearScan computer guided scanner allows us to achieve permanent hair reduction with fewer treatments on patients with dark skin, a substantial portion of our clientele. The scanner makes the treatment much faster than most other devices, and the perfect coverage means improved efficacy," says DiCerbo. "Other devices may be equally effective, but we have found that the Sciton's scanner lets us work faster and achieve results with fewer treatments, which improves our bottom line and keeps our clients happy."

According to Narurkar, patients who are poor candidates for laser and light-based hair removal include those with red hair, white hair or fine light hair. "However, in East Indian, Latin American and Mediterranean skin types, paradoxical regrowth has been reported," he notes. "We believe this is due to using subtherapeutic energy in hair removal." Dr. Narurkar also reports that besides the challenges associated with treating very dark skin, fine, light-colored hair remains a key challenge for laser and light-based hair removal devices.

Versatile New Tools

Because of the vast array of light-based devices on the market, choosing the right one(s) for your practice can be tough. Here are just a few of the newer lasers and pulsed-light devices that can bring new dimensions to your practice:

Aesthera PPx Photopneumatic therapy (PPx) by Aesthera is bringing a new dynamic to pulsed-light hair removal technology by using a shorter wavelength—400 nm to 500 nm—along with continuous suction and a self-regulated evaporative cooling process. This design dramatically increases the amount of energy transmitted to the target intended for destruction by rotating the follicle closer to the surface.

American Medical Bio Care Omnilight is a novel IPL that incorporates fluorescent technology for hair reduction, skin rejuvenation and many other applications. It includes laser dye filters for more precise targeting of hair or tissue.

Cutera Prowave 770 is a light-based system that allows practitioners to select the ideal wavelengths for each skin type (light, medium and dark), pulse duration and cooling for safe and efficacious treatments of different skin types. Prowave 770 is available on the new Solera Opus platform (tabletop), and the XEO, Cutera's high-end multi-technology system.

The Palomar StarLux offers Active Contact Cooling and Smooth Pulse Technologies for greater patient comfort. ➤

OCAs Enhance Hair Removal

Some laser hair removal researchers are investigating the effectiveness of optical clearing agents (OCAs) to reduce the amount of light scattering, especially in darker skin types. One such research team, led by Misbah H. Khan, MD, formerly a Laser Surgery Fellow at Beckman Laser Institute and Medical Clinic at the University of California, Irvine, now affiliated with St. Peters University Hospital in New Jersey, investigated the effects of light scattering, and whether or not it plays a significant role in the improvement of hair removal results, as well as removal of port wine stains and tattoos, particularly in darker skin types.

Dr. Khan and her research team focused on the impact of epidermal side effects, and on the total number of treatments required–two challenges of laser and IPL therapies on skin types V and VI. Dr. Khan worked with various combinations of polyethylene glycol and polypropylene glycol to achieve better penetration of the OCA across the dermal-epidermal junction. She reports that by combining these two agents in the right proportions, the resulting mixture can cross the dermal-epidermal junction. The results of this study showed a significant improvement in the outcome after just one hair removal treatment.

Cynosure Apogee Elite combines a variable pulse 755 nm Alexandrite laser designed for use on skin types I-IV, and a variable pulse 1064 nm Nd:YAG for skin types V-VI, as well as tanned skin. The Apogee Alexandrite delivers 35 J/cm^2 maximum fluence on a 10 mm spot; the Nd:YAG delivers 80 J/cm^2 maximum fluence on this same spot size.

Laserscope Gemini combines a 532 nm KTP and 1064 nm Nd:YAG laser, allowing practitioners to perform not only hair removal, but skin rejuvenation and leg vein applications all in one device. It also features an intuitive touch screen interface and either of two handpieces (variable 1 mm-5 mm, or 10 mm VersaStat).

Laserscope Solis is an IPL dedicated to fast hair removal over large anatomic areas via a large spot size, quick rep rate and integrated cooling system. The Solis is also used for skin rejuvenation procedures over large areas, such as the face, chest, arms and legs.

Lumenis LightSheer is an 800 nm pulsed diode laser designed to treat the entire range of skin colors (including tanned skin) and hair types. The patented ChillTip handpiece with a 9 mm or 12 mm sapphire tip provides epidermal contact cooling and compression, thereby increasing penetration of laser energy to the base of the follicle.

Palomar Technologies StarLux laser and pulsed-light system offers Palomar's proprietary Active Contact Cooling and Smooth Pulse technologies for greater patient safety and comfort. Each handpiece uses chilled water to continuously cool the sapphire tip to as low as 5 degrees centigrade. Spot size (LuxY handpiece) 16 mm by 46 mm.

Seeking the Best

Like so many things in medicine, choosing the best lasers and light-based devices for hair removal is not a simple either/or proposition. "You have to take many things into account, including the skin types that you are targeting and the primary focus of your practice," says Narurkar. "If you do many hair removal services in the course of a day, then you should consider having a dedicated device. This is also true if you have multiple treatment rooms and do not want to sacrifice a laser facial treatment because your multi-platform equipment is booked for a hair removal service."

"I have many lasers and pulsed-light devices at my facility at any given time, and depending on the situation (hair color, skin type, etc.), one of them might be a better choice for achieving permanent hair reduction. This is why when a fellow physician asks me which laser or pulsed-light device I think is the best on the market, I always reply, 'The one that you know the best.' This means being intimately aware of its capabilities and limitations, as well as the specific results you can expect to achieve in a wide variety of situations. It's like the car-rental scenario. You may know how to drive a car, but when you don't know exactly where the controls are, the first several miles are a bit uneasy. Likewise, if you dabble with a laser or IPL, hair removal will be suboptimal, as typically one either under or over treats, leading to compromised efficacy or increased side effects, respectively."

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Patients with white, red or very fine hair are poor candidates for laser hair removal.

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