

A photograph of a person's back, showing a tattoo of a butterfly on the lower back. Overlaid on the upper back is the title 'erasing the past' in a mix of black and purple script fonts, with a decorative flourish below it.

erasing the past

An increase in the number of people getting tattoos translates to more demand for tattoo removal, and improved treatment modalities are up to the challenge.

By Wendy Lewis

WHAT COULD BE MORE BEAUTIFUL than a blue butterfly, poised to take flight, on your lower back? Or a waving flag on the upper arm just in time for the 4th of July? Even better, a big, bold red heart pierced by an arrow and encircled with a lover's name?

Such body art designs may have seemed like a good idea at the time, but many tattoos lose their allure after a few years—or worse, after a few hours. It's little wonder that tattoo regret is an increasingly common lament, and the demand for tattoo removal is growing.

"Tattoos are not only permanent, they can't be edited or changed," says Jeffrey Dover, MD, a dermatologist at Skincare Physicians in Chestnut Hills, Massachusetts. "Some people have day-after-tattoo regret, meaning that maybe they drank too much at a bachelor party and woke up with a serpent on their ankle, but in truth, those 'mistakes' are few and far between."

Most common are people, who are now in their late 20s, 30s and 40s, eager to get rid of any signs of past indiscretions as they embark on their future careers.

Mitchell Chasin, MD, medical director of Reflections Center for Skin & Body, Livingston, New Jersey, has also noticed that tattoo removal clients are getting younger and younger. "Apparently people aren't waiting until they settle down to do something about that tattoo they regret," he says. "We're also seeing more tattoos that can't be concealed with clothing. We used to see them mostly on the shoulders and ankles and the lower back, places where the person could choose who saw their tattoos. But now we see art creeping down the sleeves and up the neck, displayed in places where it can't be hidden. Unfortunately, tattoos are a lot like fashion in that certain looks come into and go out of vogue. But, unlike trendy clothes, tattoos can't be hidden away in the closet when they're no longer in style."

Another group of patients come from the armed forces and law enforcement. Dr. Chasin has seen a growing demand for tattoo removal among people who are trying to get their ink into compliance with military regulation. "We also see young men and women who have decided to pursue a career in law enforcement, but have tattoos that might keep them from making the grade," he says.

TATTOO REMOVAL 101

In the past, tattoo removal procedures were painful and yielded mixed results. Options included salabrasion (where salt is rubbed on the tattoo until it bleeds), dermabrasion using a diamond burr, serial excision to remove the tattoo with surgery, and use of an ablative CO₂ laser.

Today, tattoo removal has improved to meet rising patient demand. "Laser tattoo removal has experienced unparalleled growth, following the explosion among those acquiring tattoos," says Philadelphia-based dermatologist Eric Bernstein, MD.

To treat the widest range of ink colors and skin types, laser surgeons are employing a variety of devices with multiple wavelengths. Dr. Bernstein explains that there are three main types of lasers used for removing tattoos: alexandrite, Ruby and Nd:YAG lasers, and all are

Q-switched or very short pulse-duration lasers. "The pulse duration of a laser is matched to the size of the particle being treated, and tattoo particles are microscopic—but aggregated in cutaneous macrophages into somewhat larger particles—and thus require very short pulses—nanosecond pulses—for removal without scarring," he explains.

Although each physician will have his or her own preferences, there are some devices that are mainstays in practices that offer laser tattoo removal. The benefit of these devices is that they offer versatility to treat many different dermatologic concerns. "The AlexTrivantage (Syneron/Candela, syneron-candela.com) consists of a Q-switched alexandrite laser for treating pigmented lesions and tattoos, with a novel laser-pumped-laser



BSIP / PHOTO RESEARCHERS, INC.

Laser tattoo removal requires the use of multiple wavelengths to clear different ink colors.

platform. The platform utilizes lasers that are actually contained in the handpieces enabling delivery of 1064nm and 532nm laser energy. Switching wavelengths is as easy as connecting another handpiece," says Dr. Bernstein. The device's long-pulse 755nm wavelength is viewed as a bonus as it allows practitioners to comfortably treat a greater variety of pigmented lesions without unwanted pigment changes."

Alma Lasers (almalasers.com) Harmony offers a Q-switched Nd:YAG laser for treatment of darker skin types and darker ink colors, such as black and red.

"The Medley laser platform (Ellman International, ellman.com) combines a Q-switched Nd:YAG laser with an Er:YAG laser and an IPL," says Dr. Bernstein. "This system offers a variety of treatment options in a single unit. And the Q Plus C laser (Quanta Aesthetic Lasers, qantausa.com) is the only laser system on the market offering the combination of a Q-switched ruby and Nd:YAG laser in one box."

Before



After



Tina Alster, MD, used the Syneron-Candela TriVantage to remove this patient's tattoo.

Minneapolis dermatologist Brian Zelickson, MD, also utilizes several different tattoo removal systems in his practice. "In order to treat multiple colors of ink, you need several wavelengths: Nd:YAG—1064nm and 532nm—and either an alexandrite 755nm or Ruby 695nm. I am currently using nanosecond lasers, the Revlite Nd:YAG and the Alex TriVantage for the alexandrite 755nm wavelength," he says.

Ellman International recently introduced the Ruby 694nm Q-switched laser. According to Florida Dermatologist James M. Spencer, MD, "Of the Q-switched tattoo lasers, the Ruby is the fastest and works the best."

"The Picosure laser works better for almost all colors."

According to Dr. Chasin, "Q-switched lasers remain the best and most versatile technology for removing tattoos. They are reliable, powerful and have a large spot size that allows the energy to penetrate to a greater depth, making for safer and more effective treatment. The picosecond laser is emerging, and it certainly shows promise, but the big price tag and small spot size still make Q-switched lasers the smarter choice."

Dr. Chasin uses three different lasers for tattoo removal; the Alex TriVantage, the RevLite (Cynosure/ConBio, cynosure.com) and the Sinon Ruby (Quantel Derma, quantel-derma.com). "Each offers unique wavelengths that are better at treating different colors of ink and skin types. Having a selection of lasers allows us to treat just about any tattoo safely and effectively," he says. "We also use ablative and non-ablative lasers, like the Fraxel re:pair and the Fraxel re:store Dual (Solta Medical, solta.com), to enhance ink clearance and increase the threshold for scarring, allowing us to treat more aggressively with the Q-switched lasers. It's a great combination."

The Ellman 694nm Ruby is very reliable and quicker, and we have been happy with it. It is capable of removing multiple colors with the exception of red ink. Typically, we do six to 10 treatments spaced two months apart for professional tattoos, but we can get amateur tattoos to come off in about three treatments because there is not that much ink there."

THE PICO PROMISE AND OTHER INNOVATIONS

Recent developments have advanced the spectrum of tattoo-removal options, with the goal of making the process faster, more predictable and with fewer treatment sessions required. These include the application of perfluorodecalin, performing multiple treatments in the same office visit (called the R20 method), applying fractional lasers to complement Q-switched lasers, and the advent of picosecond lasers.

Cynosure's Picosure picosecond pulse duration alexandrite laser launched in 2013, and is a game changer that has been 25 years in the making.



The Q-switched Nd:YAG laser in Ellman's Medley platform is well-suited to remove black ink tattoos.

"Pico looks promising for resistant tattoos and reducing the number of total treatments. It might also enjoy other applications beyond tattoos, for example, for treating melasma, skin rejuvenation and scars, but more studies are needed," says San Diego dermatologist E. Victor Ross, MD.

Pico (which is short for picosecond) is a Latin term for 1×10^{-12} seconds. "The advent of the Q-switched laser was an improvement, but the Picosure takes these gains and runs with them," says Dr. Dover. "Instead of breaking down pigments from big to small like the Q-switched lasers, the Picosure turns them to dust."

The Picosure device does hurt, so topical or local anesthesia is recommended. Patients will experience some downtime in the form of oozing, crusting and bleeding after each treatment, similar to Q-switched lasers. The typical protocol is six or more treatment sessions, spaced six to eight weeks apart. According to Dr. Dover, it is safest and most effective on skin types I – IV. "But it does work and it works well especially on notoriously hard-to-treat tattoo colors such as blues and greens. It is revolutionary. It works twice as fast at clearing tattoos," he says.

According to Roy G. Geronemus, MD, director, Laser & Skin Surgery of New York, "The Picosure laser works better for almost all colors, and some colors, such as blue and green, that were very difficult to remove previously, are now our easiest colors to remove as we see a complete response many times in one to three sessions."

The downside is the price of the laser, which is considerably higher than anything else on the market to date. The price per treatment ranges from approximately \$400 to \$800, with prices varying across the U.S., while the average laser tattoo removal session hovers around the \$300 mark.

This may be a deal breaker for some physicians. "It does not make sense for me to purchase a single

wavelength tattoo laser for that price. It is hard to charge more for each treatment, when with an individual patient you cannot guarantee how many treatments it will take to make them happy with the clearance," says Dr. Zelickson.

The Picosure system is also being used for benign

pigmented lesions including lentigenes and café au lait marks. "We are using the Picosure for other indications including scars, stretch marks and photorejuvenation. It has a fractional-like handpiece that allows one to rejuvenate the skin without wounding and works particularly well in patients with darker skin types who are difficult to treat with other technologies," say Dr. Geronemus, who notes that the picosecond concept will likely improve further as new wavelengths are introduced.

And new picosecond devices are already on the horizon. At the 2014 annual meeting of the American Academy of Dermatology, Cutera (cutera.com) introduced enlighten, a picosecond laser with two wavelengths: 532nm and 1064nm. "It will be good to have competition and a different picosecond wavelength," says Dr. Dover.

Though picosecond lasers offer shorter pulse-durations than nanosecond Q-switched lasers, and may offer some increased clearance over currently available systems, Dr. Bernstein notes that since lower fluences are required when using the shorter pulse-duration lasers, comparisons have to take that into consideration.

INNOVATIVE SOLUTIONS

An overriding goal among engineers and laser surgeons in the tattoo arena is to make the removal process more predictable, faster and with fewer treatment sessions required. With that in mind, ON Light Sciences (onlightsciences.com) is developing a patented method utilizing PFD (perfluoradecalin) that will allow physicians to perform multiple passes in one session. "We found that this solution, which can also be in a dressing form, allows for rapid resolution of the steam bubbles seen immediately following laser treatment of a tattoo," says Dr. Geronemus. "A previous effort to perform multiple treatments in one session required a 20-minute delay between treatment sessions, which is not practical for most patients and physicians. The perfluoradecalin

“Compliance is an issue because many patients will see slow progress and become discouraged.”

application allows us to re-treat the tattoo within seconds of each laser pass.”

“In my experience alternative treatment protocols, including the R20 technique and the treatment patch, can help reduce the number of treatments. So the specific advantage of these new wavelengths may be less of an issue,” says Dr. Zelickson.

Dr. Dover agrees: “The R20 method uses four passes over the tattoo every 20 minutes for a total of four. It takes way longer per visit, but it appears to help the tattoos clear faster. So if you don’t have a Pico but want to speed the clearance of tattoos, this is the best alternative,” he says.

THE INK COLOR CONUNDRUM

There is no question that many different types and colors of ink present unique challenges. Most laser surgeons concur that effectively treating the widest range of tattoos and patients requires multiple wavelengths.

“The most difficult for me are the brown/red flesh tones used in lip, eyelid and eyebrow liner,” says Dr. Zelickson. “These often have white titanium in them so very often one can get a darkening or even a peach type of color after treatment, which can be very difficult to get out. Greens, light blues, purples and yellows can also be difficult.”

“Any tattoo ink that is mixed with white ink to get the resulting color, such as light blue, pink or just plain white, is the most difficult to remove,” adds Dr. Bernstein. “Iron and zinc oxides often turn gray requiring many treatments to remove, often proving refractory to removal. Green and blue inks are the next most stubborn colors to remove.”

Another hurdle is patient compliance. “Compliance is an issue because many patients will see slow progress and become discouraged. In some cases, only the black portion of a tattoo will improve but the remainder will not, leaving a smudge,” says Dr. Ross. “Possible side effects, such as loss of skin color, is always an issue

for non-black tattoo removal treatments in darker-skinned patients.”

In addition to ink colors, some tattoo placements are tricky to treat effectively. For example, “To treat eyeliner, we use corneal shields and a brushed metal lid protector to protect the eyelashes,” says Dr. Zelickson.

Areas that are more painful to treat often require a diverse approach and larger beam diameter spot size. “Large areas can be very painful,” says Dr. Zelickson. “For those I use my Revlite, which is very powerful, set on a large spot size and I do several passes. This is much more tolerable and, anecdotally, I seem to get very good clearance with this technique.”

Dr. Spencer adds that tattoo removal treatments on the lower legs and the back are particularly hard for patients to tolerate. “We use numbing cream, but some people require lidocaine before treatment. Tattoos on the ankle are quite common, but treating them can be very uncomfortable,” he says.

PRACTICE BENEFITS

“If someone is really looking to add this to their practice then they should get all wavelengths to cover the most colors and get the highest-powered device available,” says Dr. Zelickson. “Then look closely at the service contracts and any other ongoing costs.”

The costs and pain involved are always going to be a factor in getting patients to come back to complete a treatment course. “Tattoo removal can be tough because many sessions are necessary, and it’s hard to treat non-black tattoos,” says Dr. Ross. “The unpredictability of responses to treatment make it a hard sell for many patients.”

“If the treatments are working, and the patient is motivated, then they are compliant. One way to help compliance is to offer package pricing so they pay upfront for a series of treatments,” says Dr. Zelickson.

Despite the challenges, laser tattoo removal can be a wonderful addition to any practice, according to Dr. Bernstein, who considers it to be a fun procedure. “The laser-skin interactions are cool to watch, and patients are often quite happy to remove the name of a no-longer-loved-one. The type of laser to buy will depend upon a number of factors, including the demographics and skin types of those patients presenting for tattoo removal.” **ME**

Wendy Lewis is a New York-based writer specializing in cosmetic medicine and practice management.