

Shared Clinical Experience:

An Expert's Perspective on Tattoo Removal with the PicoSure® Laser



BRENDAN LEIGH MS, RN

AUSTIN MEDSPA IN AUSTIN, TEXAS

Brendan Leigh, MS, RN is a registered nurse specializing in tattoo removal at Austin Medspa. An early adopter of Cynosure's PicoSure laser system, he has used it daily for nearly five years to clear complex, multi-colored and hard-to-remove black tattoos.

Physicians and patients around the globe seek his advice in especially challenging or complex cases because of his reputation of expertise treating tattoos previously considered to be impossible to remove. Prior to concentrating on tattoo removal, he was certified in Hyperbaric Oxygen Therapy and focused on advanced tissue management at Texas College of Osteopathic Medicine.

Tattoo removal has been one of the most commonly sought aesthetic treatments for decades, and while the armamentarium has been refined over that time, the laser is still the go-to tool in the box. The ceiling on what is possible in terms of what is considered final clearance has been raised repeatedly and has only now reached its pinnacle. Yet the world is still full of partially removed tattoos, and in cases where the tools were inadequate or the clinician was not skilled, patients endured potentially painful and lasting side effects including burns and scarring when clinicians were frustrated by a case and overtreated. About 50% of our patients have been treated elsewhere before they come to us.

Enter the PicoSure laser. Not limited by power or depth of penetration, the remarkable tattoo removal prowess of the PicoSure multiwavelength laser platform lies not only in its precise, consistent delivery of laser energy in the picosecond domain, but in the wavelengths at the user's disposal and their ability to modulate the device's efficacious energies based on spot size selection, harnessing them to their fullest potential. With up to three available wavelengths (755 nm standard, commonly added 532 nm and optional 1064 nm) with the adjustable treatment parameters, as well as the optical manipulation using the standard, flat optic and the unique Boost™ feature that reduces pulse width for a more

photomechanical effect, the PicoSure laser facilitates the removal of tattoos of any color or density. Additionally, scarring from previous overtreatment may improve as well. Once the tattoo is clear, we can even out the surface and pigmentation of the skin using the Focus™ lens array, especially in cases of previous scarring during attempted removal using a Q-switched laser.

As tattoo removal has evolved, so has the tattooing process. Newer inks are more robust and complex at times, and artists may use different needles to implant ink to achieve specific, desired effects. The PicoSure laser uses just the right amount of energy to fracture pigment particles without harming the surrounding skin. To get the most out of its extraordinary capabilities, one must understand them in the context of tattoo removal. Tattoo removal is about using laser energy to photomechanically fracture pigment particles implanted in the dermis without causing undue damage to the skin itself, which are then cleared by the body's natural waste removal processes. This takes time; the body can only handle so much, so fast, at one time. Historically, tattoo removal has taken many sessions because of this fact. Originally, lasers were limited by their ability in absorption by ink colors, and for a long time some ink colors like blue and green were untreatable.

Pretreatment

We ask a lot of questions about the tattoo itself: How old it is, or if it is a cover-up of another tattoo. If less than ten years old, inks will be more challenging to remove. If a cover-up, the superficial tattoo will usually fade first and reveal what's underneath. We definitely want to know the patient's motivation for undergoing tattoo removal. If the tattoo is a tribute to someone or something important, I won't treat them that day. We also will not treat pregnant or breastfeeding women because there have been no studies showing that it's safe to do so. Also important are the circumstances under which the tattoo was obtained; who did it and where? A surprising number of tattoos were acquired in prison or put on by a friend in their basement. We want to know if there was any adverse reaction during implantation. And any minor needle scarring will likely be more visible after the tattoo fades, which patients will need to know. Of course, we also ask the patient about their initial expectations.

Expectation management begins from the initial consult and continues throughout. Each patient is different and should be counseled based on the individual case. Make no mistake, patients are always hoping for 100% clearance of their tattoo unless they're just looking to fade it before a cover-up tattoo. What a clinician sees as an excellent result may, to the patient, seem sub-par, so it is important that they be well educated about how a cleared tattoo looks. Ideally, show them photos using a subject of similar tattoo and skin type.

As with any medical therapy, patient compliance is an essential component to maximizing outcomes and minimizing the number of treatments. Education about their unique case as well as what to expect in treatment is part and parcel with medical procedures, but a thorough explanation of each aspect of the procedure and its purpose can help guide and even inspire the patient to take responsibility for compliance. Patients may not understand what tattoo clearance looks like and what to expect. After the initial treatment significant change will occur. Detailed descriptions of visible milestones in the recovery process between treatments will help the patient feel comfortable; a happy patient is a compliant patient, and a compliant patient is the most likely to be successful and satisfied. These patients will be your best advertisement, and a constant source of referrals. Pre- and post-treatment care, the limitations of treatments with the PicoSure device, and pricing are all part of the discussion.

Typically, patients find treatment to be tolerable, and we use air cooling which the patients love. I recommend it to anyone using the PicoSure laser—it makes all the difference. We try to avoid using numbing cream and we make sure they are aware of this.

CASE STUDY

Tattoo Removal with the PicoSure Laser

In considering tattoo removal with the PicoSure device, let's look at four patient cases. Each case highlights the capabilities of the device for tattoo removal issues regularly encountered in clinical practice.

Case 1: KARMA Tattoo (Wrist)

Located at the wrist, this tattoo is one of the first I treated with the PicoSure device. In the baseline picture, the word KARMA can be seen clearly; at first glance the black outline obscures the purple ink filling in the letters. The location, especially on a slimmer patient such as this one, must be considered because the skin is thin, so the tattoo needle penetrated the full thickness of the skin, so the ink is deeply implanted.

Clearance was easily achieved in only three treatments using the PicoSure laser at six-week intervals using the 755 nm wavelength with a progressively smaller spot size. The trick was to stretch the skin during treatment. My experience with hyperbaric medicine provided the insight that stretching the skin would make the ink particles more accessible to the laser energy.

We started with the 4 mm spot in session 1, the result of which can be seen in the second picture of Figure A. For treatment 2 we dropped to the 3.5 mm spot size and moved slowly to assure we put down enough pulses per cm²; in other words, we traced the lines of the letters carefully to deliver therapeutically adequate energy. As a relatively inexperienced user at the time, we used a 5 Hz repetition rate because I felt it gave me more control. A 10 Hz rep rate may be the standard but as Figure A shows, 5 Hz worked well in this case. Observing how the ink responded to treatment we were then able to go over the entire tattoo. The patient experienced no post-treatment blistering, and the overall result is beautiful.



Before & After 3 Treatments
Courtesy of Brendan Leigh, MS, RN

However, many patients have not undergone laser treatment in the past, so we offer numbing cream as an option to alleviate concern and anxiety. We also show off our many before-and-after pictures, especially those similar to the patient's case, which does wonders.

Treatment

Hopefully the patient comes expectant. Sessions do take some time, so positioning is important because a comfortable patient is easier to treat.

It is important to remember that the PicoSure laser disrupts ink particles using mostly photomechanical (photoacoustic) processes, versus photothermal. Pulses fire faster than the skin heats up, producing a PressureWave™ effect that fractures ink particles. This allows users to leverage the safety of the picosecond pulse to treat aggressively with relatively minimal risk of side effects, which most often resolve quickly if they do occur. Any blistering that may occur is superficial because the effect is photomechanical, similar to getting a blister from running versus from a heat-induced burn. Scarring is rarely a problem. Intervals of six to eight weeks, depending on the size of the tattoo; a larger interval is required when there is more shattered ink for the body to process after each treatment.

Because treating with the 755 nm wavelength usually causes some mild redness, we often will treat red and yellow ink with the 532 nm wavelength first. In some cases we will choose to clear the dark lines with the 755 nm first, then go over the area with the 532 nm after those colors are revealed more clearly. Choice of spot size and energy level or repetition rate, as well as Boost mode (with 755 nm), comes easier with experience, but observation of entry action during treatment is the best indicator. If you like what you're seeing in terms of reaction, which may include frosting or erythema, adjust the spot accordingly.

Spot size can also be adjusted to account for fine lines and detail. While the smallest spot currently available with the PicoSure system is 2 mm, if you're treating a 1 mm wide line and have energy penetrating untattooed skin, you should not expect to see damage to the surrounding tissue but may not have as pronounced an effect on the tattoo ink either, so use the smallest spot you can while always watching for an accurate clinical endpoint. Color and ink implantation technique may also impact spot size. Outlining needles implant more densely, while shading needles implant more shallowly. Make notes of ink and skin reaction because you may use these to adjust treatment parameters for that patient in a future session, or another, similar patient. Meticulous treatment of detail takes time, especially when tattoos are complex, but this also contributes greatly to the overall result.

CASE STUDY

Case 2: Black Compass Tattoo (Upper Arm)

This modern tattoo on the upper arm at the deltoid region was about a year old at presentation. Specialty ink was used, likely with added carbon and iron, to make it more robust, luminescent, glossy, and resistant to UV exposure, so if this man worked outside it would not fade; the glossy appearance is somewhat evident in the before image. The ink was deeply implanted and thickly layered, shown by the clarity of the lettering. This was another case where the skin was thin, due to the man's good physical condition and relatively low adiposity in the location.

The 755 nm wavelength was used to address the dark ink in this case. It is important to note that 755nm and 1064nm wavelengths (at picosecond pulses) are equally absorbed in black ink, and for the majority of skin types I-IV, 755nm is highly efficient. Due to logistical reasons rather than clinical ones—the patient traveled a great distance for treatment—we chose to treat less aggressively because of the ink density, expecting quite a reaction starting with the 4 mm spot size, using a smaller spot (2 mm) for the lettering to focus the energy. We try to fade tattoos evenly and altering the spot size and/or energy level during each session, depending on the case, helps us to achieve this effect. Rep rate was 10 Hz. We added Boost mode as we treated because we weren't getting the desired reaction, and we saw an immediate shift in the response. As the sessions progressed we went to 100% Boost mode. While we needed 10 sessions to clear this tattoo, it was mostly gone by the eighth session.

This case highlights the tattoo implantation process somewhat. Easy-to-clear ink particles will go first. When tattoos are applied, the initial needle cuts implant a bolus of ink because the needle was recently dipped. When you see stray dots as you clear the tattoo, this is where they initially stuck the patient. These come off easily with the 755 nm using Boost mode.



Before & After 10 Treatments
Courtesy of Brendan Leigh, MS, RN

Post-treatment

Dressings must remain in place as long as blistering is present but after a few days most blistering, post-treatment inflammation, and other side effects should be resolved. Light compression dressing helps minimize blistering as well, which resolves within a few days.

Personally, I recommend that patients wash the area daily with mild soap and apply OTC cortisone twice daily to reduce inflammation.

As the tattoo clears, our education on the front end pays off because patients know what they can expect. Black outlines, for example, may fade differently and cause concern to the patient unless we've properly counselled them beforehand.

Darker Skin Types

Melanin in dark skin can limit the transmission of energy to the implanted tattoo pigment. We urge these patients to avoid the sun and to use a broad spectrum sunscreen with UVA and UVB protection for at least four weeks before treatment to reduce any tanning. Lightening agents and OTC cortisone ointment are options pre- and post-treatment when applicable. The 1064 delivery system is also an option for treating dark tattoo ink in skin with greater melanin content due to the wavelength's inherent absorption characteristics. In general, larger spots sizes and lower fluences can work conservatively to reduce the appearance of unwanted ink in darker skin type patients.

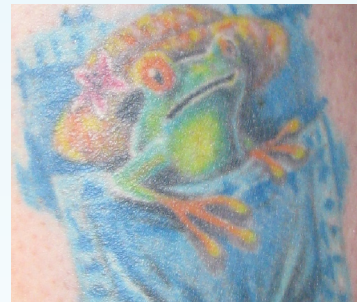
CASE STUDY

Tattoo Removal with PicoSure

Case 3: Frog Tattoo (Leg)

The frog tattoo on the lower leg is somewhat large, more than four inches long, and appeared as if it would be challenging to remove. The patient was a woman with venous insufficiency in her leg, so they were somewhat swollen. With the PicoSure laser the tattoo was removed in only four sessions using the 755 nm and 532 nm wavelengths. Boost mode was employed when treating the black ink using the 755 nm wavelength. This is a case where the slow, methodical movement of the handpiece was essential to assure proper energy delivery and complete treatment. The second photo shows the tattoo after two treatments and even then, clearance is significant.

This is an excellent example of a tattoo which would have been virtually impossible to remove before the PicoSure laser. Blue and green inks were historically difficult to clear but using the PicoSure laser these were the first to fade.



Before & After 4 Treatments

Courtesy of Brendan Leigh, MS, RN

CASE STUDY

Tattoo Removal with PicoSure

Case 4: Snake Tattoo (Neck)

This tattoo may be the best example of a life-changing experience for a patient that I've encountered thus far. The patient found herself unable to work due to the visibility of the tattoo, which encompassed not only the right side of the neck but wrapped around the ear, and if laid out flat it would take up the better part of a sheet of paper. Before the advent of the PicoSure laser, this tattoo would have been considered unremovable due to its size, complexity, and color variation. A Q-switched laser, used incorrectly (or if of poor quality), may have caused significant skin complications in this case. An additional challenge to consider is location—a common theme—because neck skin is thin and sensitive. Again, the ink was dense and deeply implanted. Incredibly, this tattoo was cleared completely in only 8 sessions (at intervals of 8 weeks, due to both the complexity of the tattoo and the distance the patient had to travel to undergo treatment). Blistering was minimal and resolved in a few days whenever it occurred.

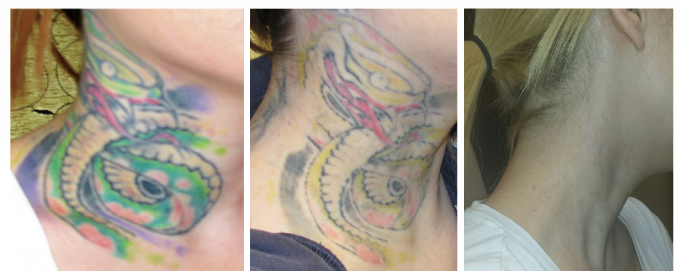
This case required the 532 nm wavelength to address the red and yellow, and the 755 nm for the purple, green, and black. For session 1 we used the 755 nm because the yellow and red inks were not clearly discernable from adjacent ink. Usually one treats the red and yellow first because once you use the 755 the entire area becomes somewhat red. We started with a large spot (4.5 mm) due to the ink saturation, and we were impressed at how well the PicoSure laser fractured the ink particles. In this case, as we pulled the skin taut we could feel the pressure waves as we applied energy to the skin. Note again that we're shattering the ink photoacoustically, rather than photothermally. Also, we treated the black outlines differently than the green and purple because they are laid down differently, with a different type of ink; black outlines are implanted with an outlining tattoo needle designed to go deep into tissue, while the green and purple were implanted using a shading needle which enters the skin at an angle and places ink more superficially.

Each section needed to be addressed separately, requiring adjustment of energy, spot size, and wavelength to account for local factors. The reaction of the ink during treatment is the best indicator of success in such cases. In this case I stopped during treatment and adjusted parameters because I didn't get the response from the skin that I was looking for—when you're treating it takes only a few seconds to notice if you're getting the anticipated reaction. Patient positioning was important here because of the time involved.

At the midpoint of this case it is obvious that the ink manufacturer merely mixed blue and yellow ink to make green, because as it faded it turned yellow; to achieve different shades the manufacturer adjusts the ratio of blue to yellow accordingly. As the ink fades to yellow one must use the 532 nm wavelength. Additionally, as the purple fades it appears black; this may be due to layering of purple over black ink, or the addition of black to darken existing purple ink before implantation.

In cases like this one Boost mode may be used at 50% initially, moving toward 100% at each additional session.

The final result shown in the after image highlights the power of the PicoSure system to clear a complex tattoo. One can easily see what was meant by 'life-changing' in this case, where we have complete clearance of a tattoo that kept a woman off the job market in her chosen field. We remain impressed with this result because of the quality-of-life impact on the patient, who is now employed and very happy.



Before & After 8 Treatments
Courtesy of Brendan Leigh, MS, RN

Conclusion

As an owner/operator of the revolutionary PicoSure laser, I'm extremely happy with its capabilities and what it adds to our practice at Austin Medspa. For tattoo removals it is unparalleled and in skin revitalization it is unmatched in results and patient satisfaction. The PicoSure laser continues to be a top revenue producer in our med spa. As I've built my practice over the past five years, Cynosure has been a partner every step of the way, ensuring I had the marketing support I needed and providing technical service and support at a world-class level. I highly recommend PicoSure laser for the discerning practitioner who values clinical results that deliver repeat business and glowing reviews. *Brendan Leigh, MS, RN*

Practitioner was compensated for these product endorsements. PicoSure 755 and 1064 are FDA cleared to treat pigmented lesions and tattoos in skin types I-VI. PicoSure 755 with Focus is FDA cleared to treat acne scars and wrinkles in skin types I-IV. PicoSure 532 is FDA cleared to treat pigmented lesions and tattoos in skin types I-III. Individual results may vary and are not guaranteed.

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