

Using Tissue Endpoints for Successful Removal of Tattoos, Pigmented Lesions and Additional Applications



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The introduction of picosecond lasers for use in dermatologic procedures has been heralded as a safer and more efficient way to deliver laser energy for a variety of treatments.

Picosecond lasers offer some distinct advantages relative to other laser modalities. For example, as pulses are delivered at a trillionth of a second (compared to a billionth of a second with nanosecond), the picosecond laser yields an almost exclusive photoacoustic effect, therefore shattering tissue rather than heating it. Because picosecond is more efficient than nanosecond, less energy is required to generate a response. Since the skin is not heated, the picosecond laser can confidently be used in sensitive skin areas and there is less downtime required between treatments. However, not all picosecond laser platforms are necessarily equal.

Picosecond lasers were originally developed for the treatment of tattoos and pigmented lesions, but they are becoming even more versatile with the addition of fractional capabilities. The PicoWay® (Syneron-Candela) has been used to treat tattoos and pigmented lesions more effectively than nanosecond technology. The PicoWay offers enhanced versatility with both non-fractional and fractional capabilities. The system recently incorporated the Resolve™ holographic handpiece that emits 532nm wavelength that targets the epidermis, and 1064nm that targets the upper papillary dermis. Small enough to fit in almost any practice setting, it is also powerful and flexible, offering the capability to adjust beam delivery, energy, spot size, and repetition rate for completely customizable treatments.

This novel feature and PicoWay's flexibility and adjustability are what make it a truly powerful tool for tattoo removal, pigment and anti-aging procedures. By harnessing the PicoWay's unique and proprietary features, I have developed a nearly



Figure 1



Figure 2

foolproof protocol for complete tattoo removal using tissue endpoints. In addition, advancements in its anti-aging treatment capabilities have allowed me to treat patients with almost no downtime. We are getting results that are really very close to a single fractional CO₂ in three to five no-downtime sessions. The Resolve handpiece is finally a no downtime procedure that gives noticeable photorejuvenation. Resolve also offers an effective local pigment system to remove lentigos.

TATTOO REMOVAL PROTOCOL

The ability to customize treatment is about more than meeting patients' needs and satisfying their expectations. The versatility of a given system increases the practitioner's ability to design a successful and safe treatment. In tattoo removal, the wearer's skin, the ink used, the location of the tattoo, and whether the tattoo was professionally applied are important variables that affect the ability to remove the ink from the



Figure 3

skin. Treatment should be directed to a variable endpoint (i.e., the effect on the tissue assessed in real time) so as to control the amount of laser energy delivery. Too little energy will result in a wasted treatment; too much energy delivery may increase the risk of leaving a scar.

My protocol for tattoo removal using the PicoWay starts with using the largest spot size available, because it will deliver photons deep into the tissue where there is more tattoo material deposited. Superficial energy delivery is more likely to engender a blister or scar. A large spot size will require less energy (because the focus is diffuse), so therefore the delivery of photon energy will be more efficient.

I use the highest energy at the largest spot size to place a test laser pulse, knowing that there are three potential outcomes for that test spot:

An immediate and full whitening of the skin (and not a speckling), which indicates that I have achieved my tissue effect endpoint.

Immediate edema of the skin, which means that too much energy has been delivered. That edema will eventually lead to blistering and scarring. If there is immediate edema, I stop the laser and lower the energy by 50%.

No immediate whitening or edema, which indicates that not enough energy has been delivered. In this case, I lower the spot by one (i.e., from 10mm to 9mm) and use maximum fluence at that spot size.

The ideal response after laser delivery is immediate whitening and edema within 2 to 3 minutes. When I achieve this, I know I have delivered an effective treatment. The next time the patient comes in, I will lower the spot size by one and start the process over again.

PRACTICAL APPLICATIONS

For a virgin tattoo, tattoo removal can be achieved with half the number of treatments and in one-third the time it takes an average Q-switched laser. Where PicoWay is truly different is for recalcitrant tattoos in which Q-switched lasers are no longer effective, and in situations where a scar has formed over previous attempts at tattoo removal. In fact, I have observed that

not only can PicoWay penetrate through scars caused by previous attempts at removal with a Q-switched laser to remove the tattoo, but it also helps to resolve the scarring.

PicoWay is successful at treating tougher cases like cosmetic tattoos on the brows and red ink using the 532nm wavelength on patients with skin type V. I have also used the 1064nm wavelength to treat green tattoos, which are notoriously difficult to remove.

PIGMENTED LESIONS

The improved ability to remove tattoos of all types is a significant advantage of the PicoWay laser. I have also found it to be extremely beneficial for removing several types of pigmented lesions. With the PicoWay, I have observed significant clearance after a single session. For Café Au Lait spots, the PicoWay has been an absolute game changer. The classic thinking with Café Au Lait spots is that only about one-third will improve with laser treatment; with PicoWay, results treating Café Au Lait have been truly remarkable, with almost all patients responding to treatment.

AGING SKIN AND TEXTURAL IRREGULARITIES

The most exciting advancement in picosecond technology has been the introduction of the fractional handpieces for non-ablative resurfacing. With the PicoWay laser we are able to create optical breakdown (LIOB) in tissue leading to collagen regeneration. This phenomenon was first reported by Habbema et al.¹ In his study he reported that empty vacuoles were detected immediately after irradiation, and a month later new collagen was seen in the region. Furthermore, they demonstrated the feasibility of creating subsurface dermal injury while leaving the epidermis in tact. This allows treatment with only mild erythema which makes it an ideal treatment for patients who do not want downtime.

Our results to date are encouraging and I am now exploring protocols using the combination of wavelengths—1064nm (targeting the dermis) and 532nm (targeting the epidermis) for a variety of anti-aging treatments, including textural irregularities, photo damage, wrinkles, and acne scars.

CONCLUSION

The PicoWay has been a significant addition to my clinical practice. It was simple to incorporate, and, in fact, I cannot imagine practicing without it. However, practitioners should be cautioned not to get lulled into a sense of security just because the technology is advanced. The unique features and characteristics of the PicoWay allow the user to customize and adapt the laser to the specific needs of each individual patient. ■

1. Habbema L, Verhagen R, Van Hal R, Liu Y, Varghese B. Minimally invasive non-thermal laser technology using laser-induced optical breakdown for skin rejuvenation. *J Biophotonics* 2012; 5(2): 194-199.