

# Tattoo Removal with the PicoWay Picosecond Laser

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## Introduction

In recent years, tattoos have made the transition into the mainstream. Research shows that over 40 million Americans have tattoos, and 40% of adults ages 26 to 40 years have at least one tattoo (*NBC News, May 2, 2014*). For various reasons, tattoo regret is also prevalent with as many as 20% of those who have a tattoo wanting their tattoos removed (*Harris Interactive, 2013*). The removal of unwanted tattoos has surged with a 440% increase over the last 10 years.

Since the late 1990's, Q-switched lasers became the treatment of choice for removing tattoos safely with good cosmetic results. Prior to Q-switched lasers, tattoo removal procedures included dermal abrasion, chemicals peels, or thermally injuring the target area using heat sources or lasers that coagulate or vaporize the area. These techniques all produce a nonselective injury to the skin and, as expected, have very high rates of scarring.

The short nanosecond pulses of the Q-switch laser selectively target and break down the ink particles, initiating a process that leads to their removal by lymphatic transport. Lasers with longer wavelengths are safer for treating darker skin types. These lasers have operated in 694 nm

wavelength for the ruby laser, 755 nm wavelength for the Alexandrite laser and 1064 nm and 532 nm for the Q-switched Nd:YAG laser. The 1064 nm Nd:YAG laser is effective in treating black and dark color tattoos, and when the frequency is doubled (532 nm), removes red, yellow, and orange tattoos. The Q-switched Nd:YAG at 1064 nm is safer for darker skin than the Q-switched ruby 694 nm wavelength or Alexandrite 755 nm wavelength, because the competing chromophore, melanin, in the epidermal layer has a weaker absorption rate at longer wavelengths.

Laser treatments have contributed to the growth and popularity of tattoo removal, but optimization of tattoo removal still remains because many treatments are required, and the end result may be less than a fully eradicated tattoo. Lasers with shorter pulses in the picosecond domain have been shown to improve the treatment of tattoos; they are capable of fracturing smaller tattoo particles, resulting in better and quicker clearance with minimal long-term effects. This clinical bulletin describes our experience with tattoo removal using the PicoWay dual-wavelength laser, with 450 and 375 picosecond pulse durations at 1064 nm and 532 nm respectively.



Figure 1. Pretreatment



Figure 2. Posttreatment

## Method

A 26-year-old female presented with a seven-year-old black tattoo on the wrist that had been unsuccessfully treated on a previous occasion.

Prior to treatment, the area was cleaned using alcohol. The tattoo was treated using the PicoWay laser at 1064 nm wavelength at 450 picosecond pulse duration, using the 5 mm spot size with a fluence of 1.7 J/cm<sup>2</sup>. The end point was whitening with prominent erythema. Discomfort was minimal and dissipated as soon as the laser treatment ended. Post-treatment, ointment was applied to the tattoo and a bandage was used to cover the treated area.

## Results

The subject returned to the office for a follow-up visit after three weeks. In this particular case, the tattoo ink had resolved almost completely. The subject tolerated the treatment well and was extremely satisfied with the results.

## Discussion

In the past 20 years, Q-switched lasers, emitting short nanosecond pulse durations, have been the treatment of choice for removing unwanted tattoos. However, it has been theorized that shorter pulse durations, in the picosecond domain, may be more effective in the disruption of tattoo pigment resulting in faster clearance.

This case demonstrates that, after only one treatment, the shorter picosecond pulse durations are safe and effective in the disruption and clearance of a black resistant tattoo.

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