



TATTOO REMOVAL

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Once considered permanent, it is now possible to remove tattoos with laser technology. Older tattoo removal methods included dermabrasion, salabrasion, cryosurgery, thermal destruction, continuous wave lasers and excision. Today, "laser tattoo removal" usually refers to the non-invasive removal of tattoo ink using Quality Switched (also known as Q-switched or QS) lasers.

Laser tattoo removal is a successful application of the theory of selective photothermolysis and depends on four factors:

- The color of the light must penetrate sufficiently deep into the skin to reach the tattoo pigment.
- The color of the laser light must be more highly absorbed by the tattoo pigment than the surrounding skin.
- The time duration (pulse duration) of the laser energy must be very short, so that the tattoo pigment is heated to fragmentation temperature before its heat can dissipate to the surrounding skin.
- Sufficient energy must be delivered during each laser pulse to heat the pigment to fragmentation.

The amount of energy (fluence in Joules/cm²) is determined prior to each treatment as well as the spot size (in mm) and treatment speed (repetition rate in Hertz). During the treatment process the laser light passes harmlessly through the skin, targeting only the ink resting in a liquid state within. While it is possible to see immediate results the majority of the time the fading occurs gradually over the 7–8 week healing period between treatments.

There are four QS devices currently available: the Q-switched frequency-doubled Nd:YAG: 532 nm, Q-switched Ruby: 694 nm, Q-switched Alexandrite: 755 nm, and Q-switched Nd:YAG: 1064 nm.

Complete laser tattoo removal requires multiple treatment sessions, typically spaced at least seven weeks apart. Treating more frequently than this increases the risk of adverse events and does not necessarily increase the rate of ink resolution. At each session, some but not all of the tattoo pigment particles are effectively fragmented, and the body removes the smallest fragments over the course of several weeks. The result is that the tattoo is lightened over time. Remaining large particles of tattoo pigment are then targeted at subsequent treatment sessions, causing further lightening.

In the past health care providers would simply guess on the number of treatments a patient needed which was rather frustrating to patients. In 2009, a predictive scale, the "Kirby-Desai Scale", was developed to assess the potential success and number of treatments necessary for laser tattoo removal, provided the medical practitioner is using a quality-switched Nd:YAG (neodymium-doped yttrium aluminum garnet) laser incorporating selective photothermolysis with eight weeks between treatments. The Kirby-Desai Scale assigns numerical values to six parameters: skin type, location, color, amount of ink, scarring or tissue change, and layering. Parameter scores are then added to yield a combined score that will show the estimated number of treatments needed for successful tattoo removal. Experts recommend that the Kirby-Desai scale be used by all laser practitioners prior to starting tattoo removal treatment to help determine the number of treatments required for tattoo removal and as a predictor of the success of the laser tattoo removal treatments. Prior to 2009, clinicians had no scientific basis by which to estimate the number of treatments needed to remove a tattoo and the use of this scale is now standard practice in laser tattoo removal.

Although laser treatment is the gold standard method to remove a tattoo, unwanted side effects of laser tattoo removal includes the possibility of discoloration of the skin such as hypopigmentation (white spots, more common in darker skin), hyperpigmentation (dark spots), as well as textural changes. Very rarely, burns may result in scarring but this usually only occur when patients don't care for the treated area properly. Rarely, "paradoxical darkening" of a tattoo may occur, when a treated tattoo becomes darker instead of lighter. This seems to occur more often with flesh tones, pink, and cosmetic make-up tattoos.

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