

# Laser Tattoo Removal



Many people get tattooed and bitterly regret the decision later. What seemed like a good idea at the time, can cause major problems in later life.

For some people having a tattoo can mean psychological distress. For others it can mean difficulty in securing employment or going for a promotion.

Those who regret getting a tattoo have three choices:

- Hide it,
- Cover it with a better tattoo, or
- Have it Removed!

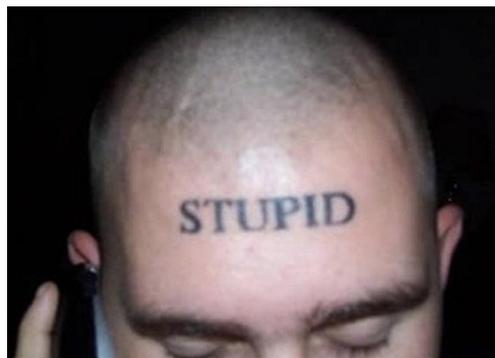
For some classic examples of regrettable tattoos, please follow the link below

<http://www.typebrighter.net/2005/10/really-bad-tattoos.html>

Remember:

- Difficult to hide facial tattoos and
- Very, very difficult to cover them with a better tattoo

**So, the alternative left is to remove them - which these days, means laser treatment**



## *How do Lasers Remove Tattoos?*

Lasers work by directing energy toward ink in the skin with highly concentrated coloured light beams. The Q-Switched, Frequency Doubled Nd: YAG laser emits light in very short flashes of light called pulses. Laser beams break up ink particles into tiny fragments which are later cleared up by the body's lymphatic system. This process of fragmenting the ink particles requires numerous sessions depending on the depth of the ink level. The laser selectively targets the pigment of the tattoo without damaging the surrounding skin. With deeper penetration of the skin and multiple sessions however, the heat generated by the lasers may cause pain.

Even though laser technology is refined, the darker colours respond more to the laser treatment. Dark (blue/black) inks and red inks tend to have the highest response. Oranges and purple tattoos usually respond well. Green and yellow inks are the most difficult to remove, although additional treatments can produce further fading.

## *Treatment Information*

Laser emits light in very short flashes of light called pulses. The impact of the energy from the powerful pulse of light is similar to the snap of a thin rubber band or specks of hot bacon grease on the skin. A large majority of patients do not require anesthesia. You may return to work immediately. There is no down time for this procedure. On average, professional tattoos require 8-12 treatments or even more, while amateur tattoos require 4-6 treatments with an interval of 6-8 weeks in between sessions. The number of treatments depends on the age of tattoo, the amount and type of ink used as well as the depth of the ink in the skin. Rarely, even more than ten treatments may be needed.

## *Do all colors of ink disappear equally as well?*

No. Dark (blue/black) inks and red inks fade the best. Oranges and purples usually respond well. Green and yellow inks are the most difficult to remove, although additional treatments can produce significant fading.



## *What to expect after tattoo removal?*

After the procedure the area may be red or swollen, as if mildly sunburned, for five days to several weeks. There may be some bruising, and with deeper tattoos bleeding is not uncommon. Usually there will be pinpoint bleeding associated with the treatment. An antibacterial ointment and a dressing will be applied to the area. The treated area should be kept clean with continued application of any ointment given to you by your laser therapist.

A shower can be taken but you must keep the skin clean and dry for 5-7 seven days and the treated area should not be scrubbed. Recovery times depend on the extent of the treatment and the individual's capacity to heal. Redness, sensitivity or even blistering may continue for several weeks, and there may be discoloration and a change in skin texture in the area, which will gradually improve.

You should avoid exposing the treated area to the sun, as this may retard healing and hyper-pigmentation. You may not notice significant results until several treatments have been completed. Most people are satisfied with the pigment removal achieved through laser treatment. It is important to remember, however, that your skin will never look as it did before you had the tattoo, even though the tattooed pigment has been removed. At the end of treatments, in most cases hyper or hypo pigmentation or even mild skin irregularities can occur.

## *Candidates for Laser Tattoo Removal*

If you are in good health (no serious health concerns), have realistic expectations and do not have hypo-/hyper- pigmentation, tanned or Keloid scarring in your family or personal history, you may be a good candidate for Laser Tattoo Removal.

## *The Average Prices of Tattoo Removal*

Getting a tattoo removed is much more expensive than having one put on. The price of Laser tattoo removal depends upon the size, color, type, location of the tattoo and the number of visits required. Medical insurance generally does not pay for tattoo removal, since it is considered aesthetic or cosmetic in nature. The average cost can be anywhere from \$100 per session for removal of a small tattoo (intentional or trauma tattoo) to \$700 for a large piece (A4 Size) per session.



## *Methods*

Tattoo removal is most commonly performed using lasers that break down the ink in the tattoo. The broken-down ink is then absorbed by the body, mimicking the natural fading that time or sun exposure would create. All tattoo pigments have specific light absorption spectra. A tattoo laser must be capable of emitting adequate energy within the given absorption spectrum of the pigment to provide an effective treatment. Certain tattoo pigments, such as yellows, greens and fluorescent inks are more challenging to treat than darker blacks and blues, because they have absorption spectra that fall outside or on the edge of the emission spectra available in the tattoo removal laser.

Tattoos consist of thousands of particles of tattoo pigment suspended in the skin. While normal human growth and healing processes will remove small foreign particles from the skin, tattoo pigment particles are permanent because they are too big to be removed. Laser treatment causes tattoo pigment particles to heat up and fragment into smaller pieces. These smaller pieces are then removed by normal body processes.

**Laser tattoo removal is a successful application of the theory of selective photothermolysis (SPTL) For laser tattoo removal, SPTL for the selective destruction of tattoo pigments 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. Different tattoo pigments therefore require different laser colors. For example, red light is highly absorbed by green tattoo pigments.
- 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. Otherwise, heating of the surrounding tissue can cause burns or scars. For laser tattoo removal, this duration should be on the order of nanoseconds.
- Sufficient energy must be delivered during each laser pulse to heat the pigment to fragmentation. If the energy is too low, pigment will not fragment and no removal will take place.

**Q-switched lasers are the only commercially available devices that can meet these requirements.**

## *Number Of Laser Tattoo Removal Treatment Sessions Needed*

Complete laser tattoo removal requires numerous treatment sessions, typically spaced at least seven weeks apart. Treating more frequently than seven weeks increases the risk of adverse effects and does not necessarily increase the rate of ink absorption. Anecdotal reports of treatments sessions at four weeks leads to more scarring and dischromia and can be a source of liability for clinicians. 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. The number of sessions and spacing between treatments depends on various parameters, including the area of the body treated and skin color. Tattoos located on the extremities, such as the ankle, generally take longest. As tattoos fade clinicians may recommend that patients wait many months between treatments to facilitate ink resolution and minimize unwanted side effects.

## *Pain Management During Treatment*

Laser tattoo removal can be uncomfortable but is very tolerable in most cases. The pain is often described to be similar to that of hot oil on the skin, or a "slap" from an elastic band. Depending on the patient's pain threshold, and while some patients may forgo anesthesia altogether, most patients will require some form of local anesthesia. Pre-treatment might include the application of an anesthetic cream under occlusion for 45 to 90 minutes prior to the laser treatment session. In very rare cases, if complete anesthesia is necessary, it can be administered locally by injections of 1% to 2% lidocaine with epinephrine. Anecdotal reports however have noted that patients receiving anesthesia by local injection may require additional treatment as the injection causes mechanical edema, a spreading out of the tattoo ink, which in turn makes it more difficult for the laser light to act on specific ink particles and thus, experts in the laser tattoo removal field caution against injecting anesthetic as these injections may also increase the risk of scarring and/or additional treatment.



## *Post-Treatment Considerations*

Immediately after laser treatment, a slightly elevated, white discoloration with or without the presence of punctuate bleeding is often observed. This white color change is thought to be the result of rapid, heat-formed steam or gas, causing dermal and epidermal vacuolization. Pinpoint bleeding represents vascular injury from photo acoustic waves created by the laser's interaction with tattoo pigment. Minimal edema and erythema of adjacent normal skin usually resolve within 24 hours. Subsequently, a crust appears over the entire tattoo, which sloughs off at approximately 14 days post-treatment. As noted above, some tattoo pigment may be found within this crust. Post-operative wound care consists of simple wound care and a non-occlusive dressing. Since the application of laser light is sterile there is no need for topical antibiotics. Moreover, topical antibiotic ointments can cause allergic reactions and should be avoided. Fading of the tattoo will be noted over the next eight weeks and re-treatment energy levels can be tailored depending on the clinical response observed

Transient textural changes are occasionally noted but often resolve within a few months; however, permanent textural changes and scarring very rarely occur. If a patient is prone to pigmentary or textural changes, longer treatment intervals are recommended. Additionally, if a blister or crust forms following treatment, it is imperative that the patient does not manipulate this secondary skin change. Early removal of a blister or crust increases the chances of developing a scar. Additionally, patients with a history of hypertrophic or keloidal scarring need to be warned of their increased risk of scarring.

Local allergic responses to many tattoo pigments have been reported, and allergic reactions to tattoo pigment after Q-switched laser treatment are also possible. Rarely, when yellow cadmium sulfide is used to "brighten" the red or yellow portion of a tattoo, a photoallergic reaction may occur. The reaction is also common with red ink, which may contain cinnabar (mercuric sulphide). Erythema, pruritus, and even inflamed nodules, verrucose papules, or granulomas may present. The reaction will be confined to the site of the red/yellow ink. Treatment consists of strict sunlight avoidance, sunscreen, interlesional steroid injections, or in some cases, surgical removal. Unlike the destructive modalities described, Q-switched lasers mobilize the ink and may generate a systemic allergic response. Oral antihistamines and anti-inflammatory steroids have been used to treat allergic reactions to tattoo ink.

Studies of various tattoo pigments have shown that a number of pigments (most containing iron oxide or titanium dioxide) change color when irradiated with Q-switched laser energy. Some tattoo colors including flesh tones, light red, white, peach and light brown containing pigments as well as some green and blue tattoo pigments, changed to black when irradiated with Q-switched laser pulses. The resulting gray-black color may require more treatments to remove. If tattoo

darkening does occur, after 8 weeks the newly darkened tattoo can be treated as if it were black pigment.

Very rarely, non Q-switched laser treatments, like CO2 or Argon lasers, which are very rarely offered these days, can rupture blood vessels and aerosolizes tissue requiring a plastic shield or a cone device to protect the laser operator from tissue and blood contact. Protective eye-wear may be worn if the laser operator choose to do so.

With the mechanical or salabrasion method of tattoo removal, the incidence of scarring, pigmentary alteration (hyper- and hypopigmentation), and ink retention are extremely high

The use of Q-switched lasers could very rarely produce the development of large bulla. However, if patients follow post care directions to elevate, rest, and apply intermittent icing, it should minimize the chances of bulla and other adverse effects. In addition, health care practitioners should contemplate the use of a cooling device during the tattoo removal procedure. While the infrequent bulla development is a possible side effect of Q-switched laser tattoo removal, if treated appropriately and quickly by the health care practitioner, it is unlikely that long term consequences would ensue.

## *Risks*

Although laser treatment is well known and often used to remove tattoos, unwanted side effects of laser tattoo removal include the possibility of discoloration of the skin such as hypopigmentation (white spots, more common in darker skin) and hyperpigmentation (dark spots) as well as textural changes - these changes are usually not permanent when the Nd:YAG is used but it is much more likely with the use of the 755 nm Alexandrite and the R20 method.. Very rarely, burns may result in scarring but this usually only occurs 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.



## *Tattoo Inks*

Some forms of tattoo ink and various colours can be easier or more difficult to remove by laser treatment. For example, India ink (graphite) tattoo can be removed easily with laser treatments. Colours that are difficult to remove are blue, green and yellow and sometimes require more than 20 laser treatments. Generally an average of 8 to 10 treatments for one tattoo should conveniently suffice. You must give at least a month in between treatments, so be ready to put in a substantial amount of time for the process.

## *Cost Factors*

Tattoo removal is far more expensive than getting a tattoo in the first place. In fact, a laser tattoo removal can cost from several hundred dollars upward

## *How Does Laser Tattoo Removal Actually Work?*

The area on the tattoo and around it is cleaned in order to remove oils present on the skin and a topical anaesthetic is applied for an hour. Depending on the tattoo colour, an appropriate laser wavelength is chosen and the treatment begins. The laser enables the top layer of the ink to break into smaller fragments. These particles are absorbed by the body's natural cleansing system (lymphatic) over the next 4 to 8 weeks.

## *Side Effects*

The skin over the treated area will become white and there may be some slight bleeding. You will experience a pain during the treatment often described as a stinging or burning sensation or the snap of an elastic band.



## *What Is The Time Taken For This Procedure?*

On average every laser treatment takes about ten to twenty minutes. Multiple treatments are required to achieve the desired results - this number can vary depending on the age, colour and depth of the tattoo.

It could be gone in four short sessions but normally will take 8 or more sessions, depending the depth of the colour and how old and dark the tattoo is

### **Space visit intervals to one every 4-8 weeks**

## *Approximate Costs*

The cost of removal depends on the size of the treatment area combined with the amount of ink contained within your tattoo (the colour density) .

The number of sessions required varies based on a number of factors including amount, type and depth of ink, your skin type and whether your end goal is complete removal or just to lightening prior to re-tattooing.

