

What Is The Best Method for Removal of This Blue Tattoo?

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A 29 year old man with a blue tattoo since 8 years ago was referred to our dermatology clinic. For removal of this tattoo, dermabrasion and liquid nitrogen was tested before, without desirable result. What is the best method for removal of this blue tattoo?

HISTORY

The word "tattoo" is derived from the Tahitian word "tattau" and the Polynesian (Marquesan) word "tatu", which means "to mark". It was first mentioned in 1769 by explorer James Cook's after his expedition to the South Pacific. Decorative tattooing in humans is an ancient art from the origins of which can be traced as far back as the stone and bronze age (12,000 BC).⁽¹⁾

Tattoo ink, color and particle size

There is a wide variety of means by which tattoo ink can be injected into the skin. However, the one thing all tattoo techniques have in common is the depth of pigment placement; for the ink to become permanent it must be placed in the dermis.⁽²⁾ Composition of blue tattoo pigments is almost included: Azure Blue, Cobalt Blue, Copper phthalocyanine and Cobalt aluminate. Blue pigments from minerals include copper carbonate, sodium



aluminum silicate (lapis lazuli), calcium copper silicate (Egyptian Blue), other cobalt aluminum oxides and chromium oxides. The blues and greens least likely to cause allergic reaction are copper phthalocyanine pigments which are more stable than cobalt or ultra marine pigments. Copper phthalocyanine pigments have FDA approval for use in contact lenses and infant toys and furniture.⁽³⁾

Previous Techniques of Tattoo Removal

Through the years, many methods of removal have been attempted: dermabrasion, salabrasion, liquid nitrogen cryotherapy, silver nitrate, phenol or trichloroacetic acid peeling, thermal injury, thermal cautery, electrocautery, infrared coagulation and surgical excision.^(4,5)

Early Laser Use in Tattoo Removal

The advent of the laser brought new options for removal beginning with continuous wave lasers, such as the argon laser and the carbon dioxide (CO₂) laser. Although excellent results can be obtained, but there is no selective light absorption, nonspecific thermal damage to adjacent dermal structures occurs (e.g. melanin and hemoglobin absorption resulting in unwanted damage to tissue surrounding the tattoo pigment) and patients treated with continuous wave lasers usually have some form of secondary scar formation. For this reason, non-Q-switched lasers are very rarely used to treat tattoos.^(4,5)

Best Treatment Options

It is well established that Q-switched lasers are the gold standard treatment for tattoo ink removal.⁽⁴⁻¹⁰⁾ The mechanism of action is selective photothermolysis.^(4,8)

Three types of Q-Switched lasers most commonly used in tattoo removal are:

- (Q-switched) ruby (QSRL) (red light),
- Q-switched neodymium:yttrium-aluminum-garnet (QSNd:YAG) (infrared & green light)
- Q-switched Alexandrite (QSAlex) (Purple/red light).

Each of the above lasers responds differently to different colors of ink. Light is absorbed by opposite colors and reflected by its own color. Darker tattoos are easier to remove usually because they absorb the light better. The color of a tattoo will determine what laser or a light color is necessary to dissolve and remove a tattoo.⁽⁹⁾ All three Q-switched lasers can offer excellent results:

Excellent results have been obtained in the treatment of blue, black bluish and slate-gray tattoos of different origins using QS Alexandrite laser (755 nm), and this laser found to be an effective

and safe treatment for removal of blue-black tattoos. Early studies using Nd-YAG laser (1064 nm) showed that it was very effective in removing dark blue ink seen in amateur and professional tattoos. One study showed that the Q-switched ruby laser (694 nm) had the highest clearance rate in blue-black tattoos. However, comparing the Q-switched Nd:YAG laser to the Q-switched Alexandrite laser showed better results were achieved with the Q-switched Nd:YAG laser.⁽¹⁰⁾ The Q-switched ruby and Q-switched alexandrite lasers were likewise compared in the removal of blue-black tattoos after two treatment sessions revealing the Q-switched ruby laser to remove more pigment in both sessions. Some studies have shown the Q-switched Nd:YAG laser to be as good as the Q-switched ruby laser in the removal of blue-black tattoos. In one study, the Q-switched Nd:YAG laser was reported to cause more textural change than the Q-switched ruby laser one month post treatment, although the Q-switched ruby laser caused more hypopigmentation. Factors that may lead to incomplete tattoo removal are related to pigment properties, laser technique, and patient conditions. Color, coefficient absorption, composition, load, depth of pigment and age of tattoo are important predictors of clearance. However hard, new, deep, and greater amounts of pigment may need higher energies and more treatments. Dark colors are efficiently removed by all Q-switched laser systems but the response of lighter tones is variable. The depth and density of the ink is probably the biggest determining factor involved in successfully removing a tattoo. Some tattoos disappear in one treatment, and others requiring 12 or more treatments for complete removal. Taking care of the treated area is the most important factor in removing a tattoo without a scar. Post laser treatment will determine the success rate. The more energy used the greater the tissue damage thus trapping more ink. It is better to allow the technician to treat more conservatively than aggressively, allowing the surrounding tissue to relax in the weeks following the treatment. A good candidate for tattoo removal in a timely fashion without scarring is medium to fair skin, dark but not dense ink (black/brown), superficial depth of ink and the preferred locations are the arm, chest, buttocks and anywhere with good circulation.^(6,7,10)

Side effects from Q-switched laser treatment

are typically minimal and predictable (minimal erythema, pruritus, minor crusting, vesicles and bulla, dyschromia). Infection, hypertrophic scars and keloids are very rare. Q-switched laser tattoo removal treatments, when applied appropriately and swiftly, will have no long-term consequences.^(4,8,10)

CONCLUSION

Multiple means by which to remove a tattoo are available with varying degrees of success. All of these methods are associated with significant disadvantages such as pain, undesired pigmentary alterations, non-selective tissue destruction, high incidence of unsatisfactory atrophic or hypertrophic scarring and pigmentation disturbances and are no longer used. Q-switched lasers are widely considered the gold standard method of removing blue tattoos. All three Q-switched lasers can offer patients significant advantages with low-risk and excellent clinical results. The general consensus among dermatologists is that the QS Nd:YAG is the current treatment of choice for blue tattoo removal, so we recommended the QS Nd:YAG for the presented case.^(4,9,10)

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