Tattoo Removal Comes of Age

An Expert Interview with Dr. William Kirby and Dr. Rady Rahban.

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Editor's Note:

Tattoos, or "skin art," are increasingly popular, but along with more tattoos comes a greater demand for removal. William Kirby, DO, a board-certified dermatologist and leading authority on tattoo removal, addresses the vast changes and improvements in tattoo removal of the past decade. He is Clinical Assistant Professor of Dermatology at Western University of Health Sciences and Clinical Assistant Professor in the Department of Internal Medicine, Division of Dermatology, at Nova Southeastern University. He is also an expert reviewer for the Osteopathic Medical Board of California in the field of dermatology and is the medical director of the Dr. TATTOFF, Inc. clinics, which specialize in tattoo removal and laser hair removal. Plastic surgeons also encounter requests for tattoo removals, and Rady Rahban, MD, a board-certified plastic and reconstructive surgeon in Beverly Hills, provides insight into this part of his practice. Both physicians spoke to Medscape's Pippa Wysong about the latest developments and challenges in tattoo removal.

Tattoo Removal

Medscape: Are there different kinds of tattoos?

Dr. Kirby: Tattoos can be divided into 2 basic categories: amateur and professional. Amateur tattoos are usually done in a home setting, sometimes in jail, and use a variety of amateur means, such as scratching the skin and rubbing ashes into it, or using a needle and injecting ink from a pen into the skin. Professional tattoos are much more complex. A steel -- rather than a hollow -- needle is used to inject ink into the dermal layer of the skin. If the ink is not placed into the dermal layer, it won't remain.

Medscape: How common are requests for tattoo removal?

Dr. Kirby: A recent survey[1] showed that tattoos are increasing in popularity, from 16% of the US population in 2003 to 24% of people aged 18-50 in 2006. A parallel increase has been seen in demand for tattoo removal, but exact numbers aren't available.

Medscape: Are all tattoo inks the same?

Dr. Kirby: Tattoo inks vary widely. I wrote the definitive article on ink allergies and included a table about the different colors of ink. Each ink color can be derived from any number of pigment sources. The type of ink affects tattoo removal because although we can see colored ink on the skin, we can't tell specifically what is in the ink. The US Food and Drug Administration considers tattoo ink to be a "food additive," so it isn't well regulated in medicine.

Medscape: How are tattoos removed?

Dr. Kirby: First I'll give you some background. A number of methods are now out of favor. These older methods resulted in unwanted side effects, such as scarring, discoloration, and ink retention. Older methods included salabrasion using acid, thermal destruction, and dermabrasion, in which the skin is just debrided with a rotating metal brush. Because these techniques are nonspecific, they destroy the tattoo colors but can also cause scarring, pain, and delayed healing.

We now have Q-switched lasers (Nd:YAG, alexandrite and ruby) that are being used in an increasing number of clinics. These devices have revolutionized tattoo removal. The laser light enters the skin so that it quickly destroys the ink while minimizing destruction of the surrounding tissue. This process is called "selective photothermolysis." The laser light destroys the ink, and the body breaks it down. The surrounding skin stays intact with few unwanted side effects.

Medscape: How effective is laser treatment?

Dr. Kirby: In most cases it's very effective, and a tattoo can be reduced significantly or removed completely.

Medscape: Do you need a different laser for each ink color?

Dr. Kirby: Yes and no. The most common ink, seen in 90% of tattoos, is black, which responds very well to a 1064-nm wavelength of light. This is the wavelength emitted from an Nd:YAG laser, and it treats black ink very effectively. The next most common ink color we see is red, and using that same laser, through a process of harmonic doubling, we can divide the wavelength in half, to 532 nm. This one device can treat most tattoos composed of black and red inks. The Alexandrite laser has a 755-nm wavelength and is best for green inks. The ruby laser is best for blue inks. The number of colors in a tattoo determines the best devices for removing it.

We occasionally see an ink that won't respond to the laser. The tattoo won't resolve, disappear, or even darken. Some colors don't respond to any form of laser light. Yellow ink sometimes doesn't respond well, although it may fade and blend in with the background color of the skin.

Medscape: Do physicians who remove tattoos have several lasers on hand?

Dr. Kirby: Actually, the more modern Nd:YAG laser is good for black and red, and handpieces can be added to treat blues or greens. Most of the devices have means for treating additional colors. Of course, every device has pros and cons. The ruby device is great for blues, but it also causes the highest rate of hypopigmentation or skin discoloration -- so it's not used very often.

Medscape: How many laser treatments are needed to remove a tattoo?

Dr. Kirby: A colleague and I developed the Kirby-Desai scale to help predict how many treatments a patient needs to remove a given tattoo. It takes much of the guesswork out of estimating how many treatments are needed. This scale is now widely recognized as a necessary tool in the estimation process.

Medscape: How does the scale work?

Dr. Kirby: The scale uses 6 categories. One is skin type, which assigns a score of 1-6 on the basis of how fair or dark the skin is. The next criterion is the location of the tattoo -- head and neck, upper trunk, lower trunk, proximal extremity, or distal extremity. The third criterion is the color of the pigment or pigments in the tattoo. The fourth is the amount of ink -- a subjective assessment that we classify as a mild, moderate, or significant amount of ink. The fifth category is scarring. If scarring is present, the ink is more difficult to remove. The last category reflects layered or covered-up tattoos, meaning there is more ink because someone tried to cover up a tattoo.

You assign a score for each of those 6 criteria, then add the points and the result is the approximate number of treatments needed, plus or minus 2.5. It's a relatively accurate estimate and has been widely accepted by dermatologists.

Medscape: Are there differences in treating fair- vs dark-skinned people?

Dr. Kirby: The fairer the complexion, the more aggressive we can be because we're not worried about discoloration of the surrounding skin. With darker complexions, we have to be more cautious because the chances of discoloration -- either hypo- or hyperpigmentation -- increase.

Medscape: Which tattoos are easiest to remove?

Dr. Kirby: Generally speaking, the closer a tattoo is to the heart, the easier it is to remove because of circulation and vascularity. The way the process works is that the ink is fractionated into microscopic pieces and the body breaks it down on its own. Areas of high vascularity, like the scalp and face, also respond quite well. As you get farther away toward the distal extremities, it becomes trickier.

Challenging Tattoos and Complications

Medscape: Which tattoos are especially challenging?

Dr. Kirby: I am currently writing a paper with a section on special situations. One is "traumatic tattoos," in which a person has a road accident and asphalt or other substances become embedded in their skin. Asphalt is carbon-based, and an "asphalt tattoo" is very treatable. Some people come in with fluorescent tattoos that you can see only under blacklight. Those are worrisome because we don't know what is in that ink, and it could be carcinogenic. Some cancer patients come in with "radiation tattoos" created by radiation technologists to help with accurate placement of radiation therapy. After their treatment course, some patients want those removed. We also see heroin addicts with "track-mark tattoos" or discoloration, which we can remove. In one report of a traumatic "tattoo" from a fireworks accident, gunpowder was embedded in the patient's skin. That's tricky to manage because the gunpowder could explode after exposure to the laser.

Medscape: Does the skin get burned from laser treatments?

Dr. Kirby: Not really. Selective photothermolysis, as the name suggests, is selective -- for the most part, only ink responds to the treatment. The treated area can look like nothing happened, or it can look like a minor burn. Either of those reactions is normal and is not an indication of treatment success or failure. Stating that the skin is "burned" is an oversimplification of the process.

Medscape: Do other side effects or complications occur?

Dr. Kirby: Sure, but they are rare and usually occur only when the patient doesn't follow instructions. A rare phenomenon called "paradoxical ink darkening" can occur, typically with removal of flesh-colored inks -- pinks, oranges, and especially white inks. Paradoxical darkening happens with inks that contain a metal that can oxidize and turn darker. Usually, the darkening resolves with continued treatment. We warn people that it can look a lot worse before it looks better.

Medscape: What can you do to prevent or treat ink-darkening?

Dr. Kirby: We can usually predict when a patient is going to experience paradoxical ink darkening. I will treat the patient, but tell him or her that I anticipate that the ink will likely turn black or gray. However, once the ink turns black, you can treat it like any black tattoo. Sometimes a patient will come from another clinic, where the tattoo darkened with treatment and the physician didn't know why.

Medscape: What should doctors tell patients who want tattoo removal?

Dr. Kirby: Because the process is still relatively new, many patients and even physicians don't think tattoos can be effectively removed. That was true with the older removal techniques, but the Q-switch lasers changed that, and laser tattoo removal is now alive and well! Still, you want patients to have realistic expectations and to understand the process. First, it takes multiple treatments to remove a tattoo, and you have to wait a minimum of 8 weeks between treatments. It's a long process depending on the complexity of the tattoo. Patients must be encouraged to take proper care of the tattoo removal site; tenderness and inflammation may be present. Patients need to do simple, common-sense things like keeping the skin clean.

What patients should do depends on where the tattoo is located. Sites such as the distal extremity (ankle, foot, or fingers) should be elevated and iced intermittently to reduce inflammation. It's not uncommon to develop blisters and those need proper care. If the patient pops the blisters, the risk for scarring is increased. We usually give patients a cortisone-based product for aftercare to reduce some of the inflammation.

Medscape: Are any new removal technologies in the pipeline?

Dr. Kirby: We will eventually see inks that are designed to respond better to laser removal -- inks that are microencapsulated or biodegradable. The question is whether tattoo artists will embrace that technology.

The Plastic Surgeon's Perspective

Medscape: Does the plastic surgeon do anything differently from the dermatologist in removing a tattoo?

Dr. Rahban: Consulting a plastic surgeon is practical for people who have very small tattoos but don't want to undergo the multiple trips for the laser removal process. Laser therapy is currently the most effective way to remove tattoos. Very small tattoos can be excised in a single procedure but will leave a scar. Plastic surgeons used to excise more tattoos, but that was before the current technology became available.

Medscape: **What other removal techniques have plastic surgeons used?**

Dr. Rahban: Some techniques have fallen out of favor, such as serial excision, in which some, but not all, of the tattoo is removed. The patient comes back at a later time when the skin is relaxed and more is excised.

Another option was expansion, which expanded the surrounding normal skin so that the tattoo could be excised and then covered with the surrounding skin. An even more dramatic technique was to cut the tattoo out and then skin-graft it; but this exchanged a tattoo for a scar. Skin grafts are not nearly the same quality as regular skin. Those are pretty much the techniques that were available.

Medscape: Do some patients need a different approach from lasers?

Dr. Rahban: Some rare pigments don't respond to lasers, and patients who have tattoos with these pigments may need a surgical approach. If the patient has a traumatic tattoo that is not actually an ink -- caused, for example, by asphalt embedded underneath the skin -- sometimes we can cut those out.

Medscape: Would plastic surgeons ever do cosmetic repair of a botched tattoo removal?

Dr. Rahban: Sure. If a patient was burned during a tattoo-removal session, because someone didn't calibrate the laser properly or used the wrong device, and the patient was left with a bad scar, some kind of reconstruction is needed to fix that.

Medscape: Have you heard of that sort of thing happening?

Dr. Rahban: I have seen patients in the past with tattoos removed through old techniques like dermabrasion or acid, and they looked like scars. I have seen a lot of tattoo removals from the past that just weren't good.

Medscape: Do you have any tips for plastic surgeons who want to start performing tattoo removal?

Dr. Rahban: Yes. They must understand the different lasers and wavelengths, and the different types of tattoos. Generally, this can be learned through the tattoo-removal laser manufacturers who set up seminars. However, it is best to learn from colleagues. Find someone with a lot of experience with tattoo removal and observe them. Begin with the simpler cases. Don't start with a complex multicolored tattoo on the foot. Start with a black ink tattoo on a well-vascularized area.

References

1. Laumann AE, Derick AJ. Tattoos and body piercings in the United States: a national data set. J Am Acad Dermatol. 2006;55:413-421.