

Paradoxical darkening and removal of pink tattoo ink

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Summary

It is widely accepted that Q-switched lasers are the gold-standard treatment for the resolution of unwanted tattoo ink. Although much safer than other tattoo removal modalities, the treatment of tattoo ink with Q-switched devices may be associated with long-term adverse effects including undesired pigmentary alterations such as tattoo ink darkening. Darkening of tattoo ink is most often reported in cosmetic, flesh-toned, white, peach, and pink tattoos. In this paper, we briefly review a case of pink tattoo ink that initially darkened paradoxically but eventually resolved with continued Q-switched laser treatments.

Keywords: Q-switched laser, tattoo, cosmetic, ink, adverse event

Case report

A 32-year-old female presented to the clinic requesting tattoo removal of a pink colored tattoo on her right buttock. The tattoo had been present for 4 years. The patient received the tattoo at a professional tattoo studio and that it was, and had always been, pink in color.

Physical examination of the patient revealed a bright pink tattoo located on the right buttock (Fig. 1). The patient also had a black “tribal” tattoo located above and to the left of the pink tattoo, in the small of the lower back (Figs. 1–5) that was not to be treated.

Three days after her initial treatment with a neodymium:yttrium-aluminum-garnet (QS Nd:YAG; 532 nm) the patient called the clinic very concerned because the pink tattoo had darkened significantly and was now grey and black in color (Fig. 2).

Six weeks later, a second treatment with the QS Nd:YAG was performed but a wavelength of 1064 was used instead. Standard postprocedure care instructions were given. The second treatment resulted in significant

lightening of the black and grey ink (Fig. 3). Subsequent treatments with the 1064-nm wavelength resulted in additional fading (Fig. 4) and eventually complete resolution of her tattoo (Fig. 5).

Discussion

It is widely accepted that Q-switched lasers are the gold-standard treatment for the resolution of unwanted tattoo ink.^{1,2} Although much safer than other tattoo removal modalities, the treatment of tattoo ink with Q-switched devices may be associated with long-term adverse effects including undesired pigmentary alterations (hyperpigmentation, hypopigmentation, depigmentation), tissue texture changes, scarring, and tattoo ink darkening. The last reaction is most often reported in cosmetic, flesh-toned, white, peach, and pink tattoos.

In our case, we initially treated our patient with a QS Nd:YAG laser (532 nm) because pink tattoo ink pigment shows maximum absorption between 500 and 570 nm.³ This resulted in paradoxical darkening of the pink ink pigments. After the change in color, the darkened ink was successfully removed with subsequent treatment with a QS Nd:YAG laser at 1064 nm (Fig. 4). Although it is unclear, the mechanism for the

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Figure 1 Pink tattoo ink prior to treatment.



Figure 4 Continued fading of ink after five treatments with QS Nd:YAG (1064 nm).



Figure 2 Paradoxical darkening after one treatment with QS Nd:YAG (532 nm).



Figure 5 Excellent ink resolution after nine total treatments.



Figure 3 Fading ink after treatment with QS Nd:YAG (1064 nm).

paradoxical change in believed to be reduction of ferric oxide (Fe_2O_3 , "rust") to ferrous oxide (FeO , jet black) leading to a darkening of the ink.⁴ Another possibility to consider is the Tyndall effect because of the ink pigments found in the dermis.

Although the vast majority of tattoos respond favorably to treatment with QS lasers, which are a very safe treatment option, cosmetic ink and ink that is flesh-toned, white, peach, or pink in color may paradoxically darken.⁴ This phenomenon has also been reported with yellow ink.⁵ This paper serves to remind QS laser operators that this reaction can occur and will hopefully help facilitate discussions about the possibility of paradoxical darkening with patients who request to have these ink colors removed.

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