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## Tattoo Granuloma Restricted to Red Dyes

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Dear Editor:

A tattoo is as forms of visual art, which entails insertion of an ink design into the skin. Although there have been reports on allergic reactions caused by tattoos of almost every color, the most common reactions are those caused by red tattoos. Here we describe a case restricted to reactions to red portion in colored tattoos.

A 34-year-old man presented with a 4-month history of elevating plaques restricted to red tattoo portions of the tat-

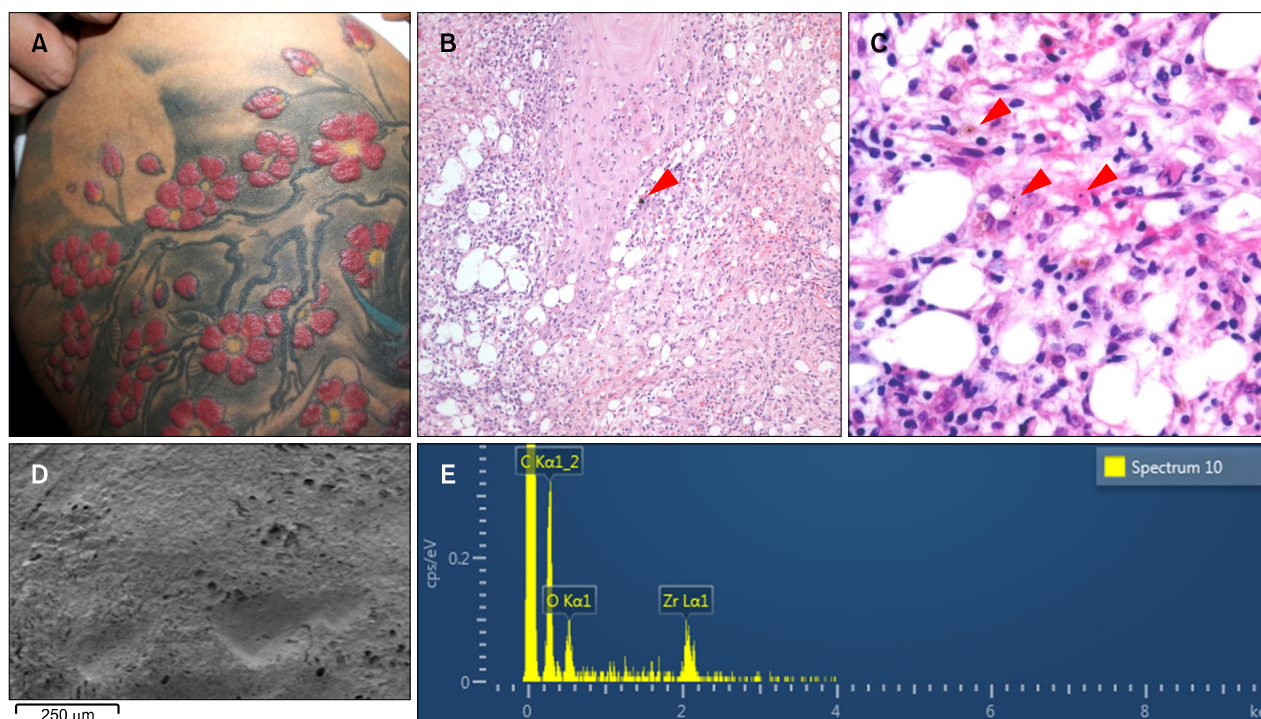
too on the right thigh. These skin lesions were firm and well-demarcated. The remainder of the tattoo was unaffected (Fig. 1A). The patient had been tattooed 10 years ago without any complication since then. Recently, however, he felt itching sensation and induration confined to red-tattooed area. Histopathologic finding revealed granulomatous response with Swiss-cheese pattern and scattered exogenous tattoo pigments (Fig. 1B, C). To figure out tattoo component, biopsy specimen was analyzed via

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**Fig. 1.** (A) Plaque lesions restricted to red tattoo areas. (B) Granulomatous reaction with Swiss-cheese appearance and granule containing black pigmented material on the superficial dermis (H&E,  $\times 100$ ; arrowhead: granule). (C) Multiple ovoid cavities with scattered black pigmented materials, suspicion of tattoo pigment (H&E,  $\times 400$ ; arrowheads: tattoo pigment). (D) Scanning electron microscopy image. (E) In the scanning electron microscopy and energy-dispersive X-ray spectroscopy findings, zirconium was detected. The mean zirconium content (weight, %) of biopsy specimen was 30.28.

scanning electron microscopy and energy-dispersive X-ray spectroscopy (SEM-EDS). In the SEM-EDS findings, zirconium was detected (Fig. 1D, E). He has been receiving intermittent steroid injection and taking topical methylprednisolone aceponate, antihistamine for pruritus as a part of his maintenance treatment, though his symptoms continue to wax and wane.

It has already been widely recognized in the past that the mercury content in red ink is the agent that causes reactions related to red tattoos<sup>1</sup>. Modern alternatives such as sienna-ferric hydrate, cadmium-selenide, organic vegetable dyes, sandalwood and brazilwood have largely replaced mercury. In this case, we found zirconium, associated with allergic reaction and granuloma formation<sup>2</sup>. Zirconium could chelate with alizarin red S, forming zirconium-alizarin red S complex, and this complex produces red-violet color<sup>3</sup>. This material is used in analytical chemistry for spectrometry and anionic dye<sup>3</sup>.

Illegal tattooing that violated medical laws in Korea has occurred frequently. The majority of tattooists are not fully aware of the composition of the pigments they work with. There is much difficulty in defining exactly which chemicals are involved. Furthermore, there are even greater

challenges in recognizing the particular ingredients in a certain type of ink, especially with the creation of new mixtures. It appears that there is generally a lack of understanding regarding the risk of dangerous chemicals in tattoos. These could become carcinogens. Several studies reported that benign and malignant lesions could occur in tattoos<sup>4</sup>.

The reaction occurred in this patient 10 years after tattooing. The long period might need to break the tattoo pigment to a critical size. However, in general, the black dye particles, which have a less tendency to react inflammatory response, are the smallest, and the red dye particles have a bigger size<sup>5</sup>. Swiss-cheese pattern appeared in histology of this patient could be presented in the injection of oily substance. It is possible that oil solvent to mix tattoo substances could make granulomatous reaction synergistically in the restricted red tattoo area. Relatively high rate of granulomatous reaction to red tattoo could be attributed to the allergen in red dye with oil solvent in comparison with inertness of carbon material in black tattoo.

## CONFLICTS OF INTEREST

The authors have nothing to disclose.

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# A Type II Segmental Vitiligo Developed under Infliximab Treatment for Ulcerative Colitis

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Dear Editor:

Tumor necrosis factor (TNF)- $\alpha$  inhibitor has shown various adverse skin reactions, including alopecia areata, atopic dermatitis, leukocytoclastic vasculitis, and so forth. Herein, we report a rare case of segmental vitiligo (SV) during infliximab therapy and like to provide academic information about its pathogenesis.

A 34-year-old man presented with multiple hypopigmented patches appeared 4 months after the initiation of intravenous infliximab therapy, as part of which he had re-

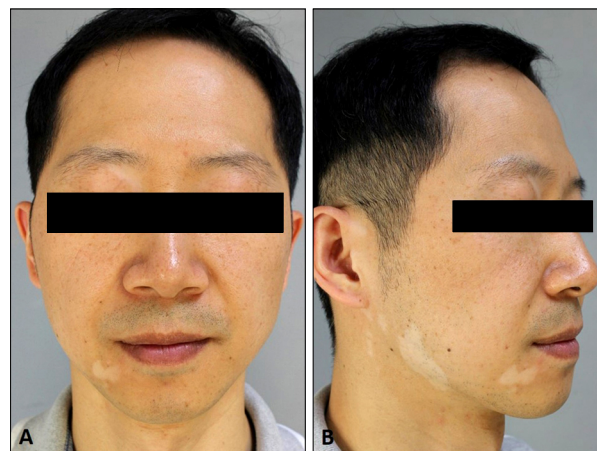
ceived 4 infusions (Fig. 1). He had been treated for ulcerative colitis (UC) for 9 years showing wax and wane, but did not report any symptomatic aggravation at the time of

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**Fig. 1.** Type II segmental vitiligo showing multiple irregular bordered hypopigmented patches on right facial area: upper medial eyelid and perioral area (A), mainly on mandibular and auricular are (B).