

CORRESPONDENCE

Paraphenylenediamine ingredient possibly contributes to granuloma formation in inflammatory tattoo

Dear Editor,

Tattoos are used as world-wide cosmetic practice and an exotic self-expression form in some social groups. While tattoo-related health has focused on prevention of infections¹, tattoos evoke dermal hypersensitivity reaction, granuloma, pseudolymphoma, morphea-like lesions, vasculitis, and pseudoepitheliomatous hyperplasia as adverse effects²⁻⁴. The composition of tattoo inks is complex, and organic and inorganic colorants, and auxiliary components are included⁵. In most cases of tattoo hypersensitivity, however, it is difficult to identify the causative ingredients⁵. Patients with reactions to the tattoo color red, which is the most predominant causative color for inflammation, showed negative patch tests to common

allergens^{2,6}. Hypersensitivity reactions can occur in both temporary and permanent tattoos. Traditional temporary tattoos consist of red henna or black henna⁷. In the black henna tattoo, to darken the color, it occasionally contains hair dyes, as represented by paraphenylenediamine (PPD)⁸⁻¹⁰, which is well known as contact allergen. Here, we report an erythematous indurated eruption congruous with a dermally injected permanent tattoo in a patient who had contact dermatitis to PPD.

A 67-year-old Japanese man was referred to us because of a 20-year history of itchy reddish change in his permanent tattoo (Figure 1A), which he got on the back and arms at the age of 32 years. He was treated with various antihistamines and topical

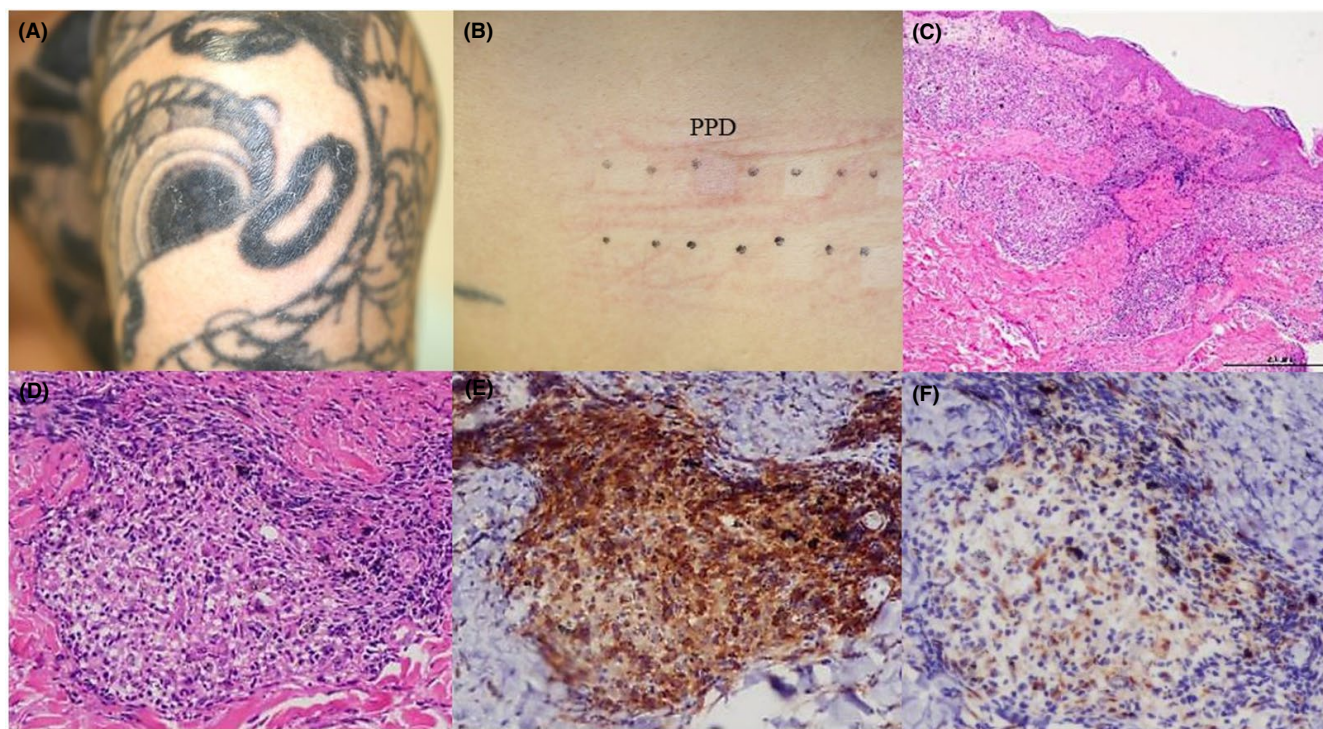


FIGURE 1 Clinical appearance and histopathological findings. (A) Clinical appearance of the patient's tattoo on the arm, showing a pinkish change on the peripheries of indurated tattoo. (B) Positive patch test to PPD. (C) Histopathology, showing inflammatory infiltrate of lymphocytes and histiocytes. (D) High magnification, showing multinucleated histiocytes infiltrating in conjunction with pigments. (E) CD4 staining, showing infiltration of many positive T cells. (F) CD68 staining, showing infiltration of positive histiocytes

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corticosteroids without therapeutic effects. To address the sensitizing ingredients, a patch test was performed with a patch panel (Sato Patch Panel; Sato Pharmaceutical Co., Tokyo, Japan) consisting of 24 common contact allergen substances prevalent in Japan. The patient exhibited a positive result only to PPD (Figure 1B), as evaluated by ICDRG criteria. This urged us to ask the patient whether he experienced contact dermatitis to hair dyes, and he uncovered the sensitivity. He also mentioned that the tattoo dyes used for him probably contained a hair dye, according to a tattoo artist who drew his tattoo. A skin biopsy specimen taken from an inflammatory tattoo lesion disclosed an infiltrate of lymphocytes and histiocytes in the upper and middle dermis (Figure 1C). Of note is the finding that many multinucleated giant cells infiltrated around pigments, forming a granulomatous change (Figure 1D). Immunohistochemically, a high number of CD4⁺ T cells (Figure 1E) infiltrated with CD68⁺ histiocytes (Figure 1F). The patient was treated with tranilast, a relatively low dose of 200 mg daily because of his anxiety for bladder irritation, and rupatadine, 10 mg daily. Currently, his pruritus was slightly improved.

Permanent tattoo ink is a blend of pigments, including amorphous carbon, metals, azo, diketopyrrolopyrrole, quinacridone, anthraquinone, dioxazine, or quinophthalone dyes.⁷ Notably, it is speculated that PPD was also used for not only temporary henna tattoos, but also permanent ones. Although there is no definite evidence, our case might be such a case. Since many patients with immune reactions to tattoos do not react with skin patch testing, antigens in the dyes may be small molecules to become immunogenic with proteins.^{2,6} Allergic contact dermatitis was reported as the most common adverse effect (31.6%) in tattoos, followed by granulomatous reactions (26.3%).³ Our case provides a possibility that PPD also can contribute to a granulomatous reaction when injected dermally.

DECLARATION SECTION

Approval of the research protocol: N/A.


Informed Consent: N/A.

Registry and the Registration No. of the study/trial: N/A.

Animal Studies: N/A.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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