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Allergic contact dermatitis caused by a black permanent marker

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Contact allergy caused by permanent markers has rarely been reported. We present a case with contact sensitivity to temporary 'henna' tattoos, hair dye, and a black permanent marker.

Case Report

A 20-year-old female dental assistant experienced an acute dermatitis at the site of a temporary 'henna' tattoo that had been applied 3 days earlier. It transpired that 'henna' tattoos had been applied on previous occasions. After the above episode, she subsequently developed eczematous reactions on the face, neck and upper back within a few days of dyeing her hair with dark brown or black colour on two occasions. She therefore stopped using hair dye.

On a later occasion, she drew small figures on the backs of her fingers with a black permanent marker. A few days later, she developed linear pruritic erythematous dermatitis exactly at the site of these lines. The eruptions persisted for 1 week (Fig. 1).

Patch testing was performed (with 8 mm Finn Chambers® on Scanpor® tape) with an extended European baseline series, including diluted *p*-phenylenediamine (PPD), Disperse Orange 3, and caine series. Tests were read at days 2 and 4 according to the recommendations of the International Contact Dermatitis Research Group, and the results are summarized in Table 1 and Fig. 2.

Discussion

Allergy to azo dyes contained within a pen marker has been reported previously. A 62-year-old woman



Fig. 1. Clinical picture of permanent marker reaction (this photograph was taken by the patient).

Table 1. Patch test results

	Concentration	D2	D4
<i>p</i> -Phenylenediamine	0.01% pet.	++	++
Disperse Orange 3	0.05% pet.	++	++
Permanent marker	'as is'	++	++
Nickel	5% pet.	+	+
Caine series	–	–	–

presented with dermatitis on the site where a green pen marker had been used to mark irradiation fields. She was patch test positive (+) to Solvent Yellow 146 (Orasol Yellow 4 GN®), which is a metal-free mono azo dye that is used in a green permanent marker (Edding 3000, Col.004) (1). Allergic contact dermatitis caused by other agents in permanent markers has also rarely been reported. Allergic contact dermatitis caused by a fast-drying resin (Arochem 455) within a pen marker was reported in 1975 (2). Allergic contact dermatitis caused by colophonium was reported in

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Fig. 2. Patch test reactions to the permanent marker at day 2.

1 case, the source being a 'Pentel' black permanent marker. Colophonium is used as an ink thickener to make sharp lines (3). A presumed compound allergy to a skin marker used for patch testing has been reported. The patient showed negative patch test results with all individual constituents of the marker solution (gentian violet, dihydroxyacetone, and acetone) and other dyes, but a + patch test reaction to the solution. Chromatographic analysis did not identify any incriminating chemicals (4).

Although we did not have access to the marker pen's ingredients, we strongly suspect that the allergic reaction was caused by an azo dye contained within the pen that is chemically related to PPD. She had presumably been primarily sensitized to PPD through one of the temporary 'henna' tattoos that she had received, and was very sensitive to PPD, showing a ++ reaction to 0.01% pet. PPD, which is one-hundredth of the standard PPD patch test concentration. We have previously shown that at least 80% of ++/+ + + PPD patch test reactors will cross-react with at least one azo dye (5). A positive reaction to nickel was of past relevance.

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