

## A rare case of allergic contact dermatitis from silver nitrate in a widely used special patch test marker

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Allergic contact dermatitis from silver nitrate contained in the ink of patch test skin markers is very rare and mainly of historical interest. Here, an unusual case with severe eczema from silver nitrate in a widely used brand of patch test marker is reported.

### Case Report

A 42-year-old Turkish non-atopic man underwent patch testing to evaluate his hand eczema of 10 months duration. For 20 years, he had been working as a machine operator. Patch testing was performed with the extended European baseline series, cosmetic, fragrance, and other allergens (Brial Allergen, Greven, Germany), using IQ Chambers<sup>®</sup> (Chemotechnique Diagnostics, Vellinge, Sweden). Tests were removed after D2, test sites were marked using the Chemotechnique<sup>®</sup> skin marker (Chemotechnique Diagnostics), and evaluated according to International Contact Dermatitis Research Group criteria (1). At D3, erythema, infiltration, and papules developed along the marked lines showing a crescendo pattern to form coalescing vesicles at D4 (Fig. 1), but there was no reaction against the tested contact allergens. Tests were terminated at D4 because of the severe eczematous reaction on the marked skin of the back. Systemic steroids and wet compresses were given, and the lesions cleared completely within 10D.

The ink of the Chemotechnique skin marker consists of methylrosanilin (synonym: gentian violet) 1%, silver nitrate 10%, and denaturated ethanol/aqua in equal parts to 100% (2). After 3 months, a second patch test with

the ingredients of the skin marker showed ++ reactions to silver nitrate (1% pet., Brial Allergen) at 2, 3, and 4D (Fig. 2) and negative to gentian violet (1%, 0.1%, and 0.01% aqueous). Histopathology of the skin marker-induced lesion at D3 showed spongiosis, sparse dyskeratosis, and lymphocyte exocytosis in the epidermis and a mild perivascular lymphocytic infiltration in the upper dermis, consistent with an eczematous reaction.

The patient had used Silverdin® cream (Deva, Istanbul, Turkey) (active ingredient: silver sulfadiazine 1%) for a thermal burn on his left foot 5 years previously. During this treatment, redness and weeping had developed on the foot spreading to the legs, trunk, arms, and face. The lesions had cleared with systemic steroids and discontinuation of the cream. No prior use of this cream or contact with silver-containing agents was known. Repeated open application test with Silverdin® cream was positive showing a crescendo pattern through D3–D7 (Fig. 3). Silver sulfadiazine and the inactive ingredients of the cream could not be obtained from the manufacturer for further patch testing. Propylene glycol and polysorbate 80, which were already included in the cosmetic series, gave negative patch test results.

### Discussion

Allergic contact dermatitis due to silver nitrate contained in the ink of the Chemotechnique skin marker was diagnosed from clinical, histopathological, and patch test findings. An angry back reaction was excluded because there was no other positive patch test reaction. The lack of any skin marker reaction in approximately 2000 patch-tested patients in our department, who had been marked with the same brand of skin marker since 1996, excludes an irritant patch test reaction. History of a generalized dermatitis within 1–2 weeks of the initial use of silver sulfadiazine cream for a burn wound in the past and positive repeated open application test to Silverdin® cream suggested a primary sensitization to the silver content, but concomitant sensitizations to sulfadiazine or some of the inactive ingredients of the cream could not be excluded.

Topical silver nitrate is regarded as a rare sensitizer, and liberated silver ions have been considered as the sensitizing part of it (3–5). Presumably,

allergic contact dermatitis to silver was more common when silver nitrate was used as a topical treatment more frequently than it is now. Interestingly, a

recent (5). study indicated silver nitrate as one of the most common contact allergens in patients with venous leg ulcers in Serbia (6).



Fig. 1. (a and b) Erythema, infiltration, and coalescing vesicles along the marked lines with the Chemotechnique skin marker at D4.



Fig. 2. A ++ reaction to silver nitrate (1% pet.) at D4.



Fig. 3. Positive repeated open application test with Silverdin® cream on the left volar forearm at D7.

Apart from the widespread use of topical silver nitrate mainly for cauterizing bleeding and healing wounds, it has also been used for skin marking for decades. Skin markers containing silver nitrate are usually considered safe and effective for prolonged staining of the skin during patch testing. Since the description of a patient with allergic contact dermatitis due to 10% silver nitrate solution used for marking patch tests in 1948 (3), no similar case has been published. A fuchsin-silver nitrate skin marker was reported to cause irritant contact reaction when using the solution from an old bottle which became concentrated through evaporation (7). Furthermore, an edge effect might occur in patch testing with silver nitrate which might be difficult to distinguish between positive and irritant reactions (8).

To the best of our knowledge, this is the first reported case of allergic contact dermatitis from the Chemotechnique skin marker, a widely used marking pen in patch test clinics. Silver nitrate is generally accepted as a rare sensitizer; however, recent reports with unexpectedly high rates of contact sensitization should be taken into consideration for future discussions on its continuous use in skin markers.

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