

titis caused by hair dyes and the results of sodium metabisulfite patch tests in 20 control patients.

Case Report

A 26-year-old hairdresser with a history of allergic rhinitis had been working as a hairdresser since 1996. In 2004, she had been examined for atopic hand dermatitis at a local hospital. In 2006, she started to have oedema, erythema, and itching of the eyelids, and she soon related them to work and the use of hair dyes. The symptoms disappeared on sick-leaves. At a local hospital in 'semi-open' tests, she reacted to seven different hair dyes with reactions interpreted as positive. She was referred to the Finnish Institute of Occupational Health (FIOH) for further evaluation.

In 2007 at FIOH, on patch tests, she reacted to two of her own hair dyes with weak reactions (dye A 5% +, 2% + and dye B 5% +). The ingredients of the hair dyes were

provided by the manufacturer and patch tested 5 months later: sodium metabisulfite gave reactions that morphologically corresponded to ++ reactions (Fig. 1, Table 1), the others were negative. Five control patients were tested with sodium metabisulfite (0.064% and 0.02%; Table 1). In the next patch test session, the morphology of the patient's reactions to sodium metabisulfite and various other sulfites was different, appearing more irritant than allergic in our opinion (Tables 1 and 2, Figs 2 and 3). Fifteen additional control patients were then tested with sodium metabisulfite (0.064%, 0.2%, 0.064%, and 0.02%; Table 1). During the investigations at FIOH, she had no dermatitis even though she was working a few days a week.

Discussion

Sodium metabisulfite has not been included in any routine patch test series at FIOH, and we investigated the present case in the same way as all

Sodium metabisulfite – a contact allergen?

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Sodium metabisulfite is a widely used antioxidant. Allergic contact dermatitis has been reported especially from pharmaceutical products (1–3). Patch tests in controls have induced erythema, and the ideal test concentration has not been determined (3, 4). The compound may be a common contact allergen as patch tests have been positive in 1.7–4.0% of consecutive patients (1, 5). We present a case suspicious of allergic contact derma-



Fig. 1. D3 patch test reactions to sodium metabisulfite (from the cosmetic company) at 0.64%, 0.2%, 0.064%, and 0.02% concentrations in aqua from left to right.

Table 1. Patch test reactions to sodium metabisulfite (from the manufacturer of the hair dyes) at various concentrations in the patient and in 20 control patients

Concentration % aq.	The patient		1 control patient	4 control patients	1 control patient	1 control patient	1 control patient	1 control patient	11 control patients
	I session	II session							
2	++	IR							
1		IR							
0.64	++				IR	IR	IR	(IR)	–
0.32		IR							
0.2	++				IR	(IR)	–	–	–
0.1		IR							
0.064	++		IR	–	–	–	–	–	–
0.032		IR							
0.02	++		(IR)	–	–	–	–	–	–
0.01		–							

–, a negative reaction; ++, a strong allergic reaction; aq., aqua; empty boxes, not tested; IR, an irritant reaction; (IR), a weak irritant reaction consisting of slight erythema.

Table 2. The patient's patch test reactions to various sulfites at different concentrations in aqua on D2 and D5*

%	Potassium metabisulfite		Sodium metabisulfite		Sodium bisulfite		Sodium sulfite		Ammonium sulfite	
	D2	D5	D2	D5	D2	D5	D2	D5	D2	D5
2	++/IR	IR	+/IR	IR	+/IR	IR	?+/IR	IR	+/IR	IR
1	++/IR	IR	+/IR	IR	+/IR	IR	?+	IR	+/IR	IR
0.1	+/IR	IR	+/IR	IR	?+/IR	IR	—	IR	?	IR
0.01	+/IR	IR	?+/IR	IR	?	IR	—	—	—	—
0.001	—	—	—	—	—	—	—	—	—	—
0.0001	—	—	—	—	—	—	—	—	—	—

++, a strong allergic reaction; +, a weak reaction; —, a negative reaction; ?, slight erythema; ?+, a doubtful reaction; IR, an irritant reaction.

*The chemicals were purchased from the chemical companies.



Fig. 2. D5 patch test reactions to a concentration dilution series of sodium metabisulfite from the cosmetic company (2%, 1%, 0.32%, 0.1%, 0.032%, 0.01%, 0.0032%, 0.001%, 0.00032%, and 0.0001%).

our patients with patch test reactions to their own products. At first, our patient reacted to 2–0.02% sodium metabisulfite (from the manufacturer) with ++ appearing reactions (Fig. 1). Lower concentrations were not tested. In the last patch test session, the morphology of the reactions was different, in our opinion more irritant than allergic, and a 0.01%

concentration was negative (Fig. 2). One of the first five control patients reacted to 0.02% sodium metabisulfite with slight erythema and two of the later control patients reacted to 0.2%. The irritant reactions of the control patients were not strong, i.e. only erythema, and in one case also slight infiltration at 0.64%. On the basis of the clinical picture, the pre-

vious literature, the morphology of the reactions to sodium metabisulfite and related substances (especially to sodium bisulfite in Fig. 3), and the results of the control test, our criteria of occupational contact allergy were not fulfilled. In our view, it was at least equally probable that the reactions were false positive and possibly due to sensitive atopic skin.

On patch testing, irritant concentrations often need to be used to detect all relevant allergies. According to our experience, some patients obtain irritant reactions that are impossible to distinguish from true allergic + or ++ reactions. Repeated testing with a dilution series usually helps to interpret the nature of the reactions. As regards to new substances and products from the workplace, patch tests in control patients are of crucial importance.

Our patient had similar irritant patch test reactions to four other sulfites with closely similar chemical structures, and the lowest irritant concentrations were 0.1–0.01%, similar to those of sodium metabisulfite. The irritant reactions to the four other sulfites were also quite strong. In Italy, patients reacting to sodium metabisulfite have also been positive to sodium bisulfite and potassium metabisulfite, and in some cases also to sodium sulfite (5). Various sulfites were common constituents of the hair dyes of our patient.

In previous reports, sodium metabisulfite has been tested at 10–0.1% concentrations (6), which in our experience are irritant. If we are right in our judgement, strong false-positive reactions occur down to 0.03–0.02% concentrations and the allergenicity of the compound is thus questionable. Sodium metabisulfite may be a true and frequent contact sensitizer, but further investigations are

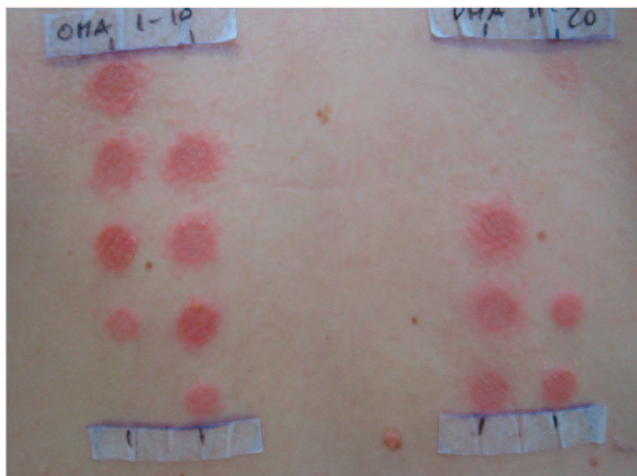


Fig. 3. The patient's D5 patch test reactions to potassium metabisulfite (chambers 1–6: 2%, 1%, 0.1%, 0.01%, 0.001%, and 0.001% in aq.), sodium metabisulfite from Aldrich (chambers 7–12: 2%, 1%, 0.1%, 0.01%, 0.001%, and 0.001% in aq.), sodium bisulfite (chambers 13–18: 2%, 1%, 0.1%, 0.01%, 0.001%, and 0.001% in aq.), and sodium sulfite (chambers 19–20: 2% and 1%). aq. aqua.

nevertheless needed. We have used aqua as the vehicle, but pet. might give fewer irritant reactions. In the case of true contact allergy, cross-reactions to other sulfites have to be considered. We suggest that further cases with suspicion of contact allergy from this compound be patch tested with a concentration dilution series down to very low concentrations in different vehicles.

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