

Reactions to formaldehyde and formaldehyde releasers in a standard series

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Formaldehyde and the 3 formaldehyde-releasing preservatives Bronopol, Germall 115, and quaternium 15 are widely used in water-containing products such as cosmetics, topical medications, and industrial materials (1). Formaldehyde, a frequent contact allergen (1–7), has progressively been substituted by “safer” formaldehyde releasers (1). However, cross-reaction between formaldehyde and formaldehyde releasers in sensitized patients has frequently been reported (8–12).

Materials and Methods

In an Austrian multicenter study, 11,516 eczema patients were patch tested from January 1992 to December 1993 in 14 centers with the Austrian standard series (Hermal). Tests were read according to ICDRG recommendations (13). Formaldehyde and formaldehyde releasers were tested as follows: Bronopol 0.5% pet., formaldehyde 1% aq., Germall 115 2% pet., quaternium 15 1% pet. Results altered due to ‘angry’ back were excluded from analysis. Reactions to formaldehyde and formaldehyde releasers were retrieved from the data-recording system and tested for association (the Fisher exact test).

Results

71.5% of the 11,516 patients tested were females, with an average age of 39 years, the male patients having an average age of 40 years. Table 1 shows the frequency of positive patch test responses to formaldehyde and its releasers, and Table 2 outlines the associations. Quaternium 15 (odds ratio: 49; $p < 0.0002$) and Germall 115 (odds ratio: 14; $p = 0.0003$) were statistically associated with formaldehyde, whereas Bronopol (odds ratio: 2.6; $p = 0.33$) was not. Between the formaldehyde releasers, no significant association was found.

Discussion

Multiple sensitization to formaldehyde and formaldehyde releasers is not uncommon. Edman (9), Ford & Beck (10), Holness et al. (4), and Kang et al. (11), found a high concordance rate of allergy to formaldehyde for quaternium 15, which also showed frequent cross-sensitizations with other formaldehyde releasers (10, 11). Possible explanations might be formaldehyde release from consumer products or patch test substances. The threshold for elicitation of an allergic contact reaction to aq. for-

maldehyde has been shown to be as low as 30 ppm (14), which can be exceeded in consumer products by strong releasers such as quaternium 15 and Bronopol (1, 15, 16).

Sensitization rates and associations found in the current study were less frequent than previously reported, and there was no statistically significant association between reactions to formaldehyde and Bronopol, nor among the formaldehyde releasers. This might be due to our test concentrations, which were below irritancy thresholds to avoid false-positive reactions. False positives due to irritant reactions may explain why about 1/3 of allergies reported to formaldehyde and its releasers can be lost on repeated patch testing (11, 17). Furthermore, Bronopol seems to have inherent sensitizing abilities, which are largely independent of formaldehyde release (1, 16).

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Table 1. Frequency of positive patch test reactions to formaldehyde and its releasers in 11,516 patch-tested patients

Substance	Female		Male		Total	
	n	(%)	n	(%)	n	(%)
Bronopol	36	0.4	7	0.2	43	0.4
formaldehyde	77	0.9	28	0.9	105	0.9
Germall 115	28	0.3	8	0.3	36	0.3
quaternium 15	55	0.7	15	0.5	70	0.6

Table 2. Associated reactions of formaldehyde and its releasers in 11,516 patch tested patients (n = no. positive test reactions to each allergen)

Substance	Bronopol (n=43)	Germall 115 (n=36)	Quaternium 15 (n=70)
formaldehyde (n=105)	1	4	19
Bronopol	—	1	1
Germall 115	1	—	0
quaternium 15	1	0	—

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Occupational allergic contact dermatitis caused by Euxyl K 400

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The preservative Euxyl K 400 (Schülke & Mayr GmbH, Germany) is now a well-recognized sensitizer (1–8), but occupational cases have only occasionally been reported (1, 2, 9, 10).

Patients and Methods

Between January 1989 and April 1996, 736 patients were tested with Euxyl K 400 0.5% pet. at the Finnish Institute of Occupational Health in Helsinki, all suspected of having occupational contact dermatitis. Euxyl K 400 was tested in an antimicrobials series and in an oils and cutting fluids series. Patch tests were performed as previously described (11, 12), according to ICDRG guidelines, using Finn Chambers on Scanpor (Epitest Ltd, Finland). The tests were positive in 11 patients (1.5%). Occupational allergic contact dermatitis from Euxyl K

400 was found in 2 patients; in 1 other case, the source of sensitization was non-occupational. In the rest of the cases, the source of sensitization remained unclear. All but 1 patient had other contact reactions. 4 were sensitized to common constituents of cosmetics, 3 to perfumes and 1 to chloroacetamide.

Case Reports

The results of these 2 patients' patch tests are shown in Table 1.

Case no. 1

A 43-year-old non-atopic male offset printer had had hand dermatitis for 10 years. He had washed his hands 20× a day for 3 years with Dreumex[®], a cleansing agent containing Euxyl K 400. The employer had paid for the

Table 1. Patch test results

Patient no.	Occupation	Patch test	D2	D3	D4	D5	D6	Other contact reactions
1	offset printer	Euxyl K 400 0.5% pet.	+	++	++			–
		Dreumex 10% pet. (hand cleansing agent)	2+			–		
2	hospital cleaner	Euxyl K 400 0.5% pet.	++	2+			++	nickel sulfate, Ampholyt 103G
		Prilan [®] 10% pet. (liquid detergent)	+	+			++	

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