

Short Communication

Contact allergy to 2,4,6-tris(dimethylaminomethyl)phenol

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2,4,6-tris(dimethylaminomethyl)phenol (tris-DMP – Fig. 1) is used as a cold-curing hardener in epoxy resin systems.

Patients, Methods and Results

Case no. 1

A 52-year-old engineer had worked at a chemical plant manufacturing epoxy and formaldehyde resins for 3½ years. He spent ½ his time in administration and the other ½ as a “trouble-shooter” on the shopfloor. He had had the occasional episode of mild hand dermatitis. 1½ years into this job, he noticed that his hands were worsening. 6 months later, he developed a far more extensive eruption involving his hands, left upper arm, under the eyes, left hip, knees and abdomen. As far as he was aware, his choice of protective equipment was appropriate. After several months off work, he was made redundant on ill-health grounds, having persistent dermatitis on his arms and trunk.

Case no. 2

A 48-year-old man had a 4-year history of dermatitis on the palms and fingertips, which blistered, dried, and cracked. This cleared when he was off work for 2 to 3 weeks. He worked as a chemical process operator in the production of epoxy and formaldehyde resin systems, wearing plastic gloves when knowingly in contact with these. He had not required time off work, but had noticed that the rash was gradually extending to involve his feet. He had no previous history of skin problems or atopy.

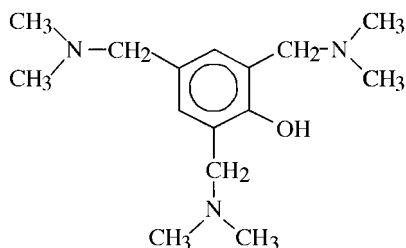


Fig. 1. 2,4,6-tris(dimethylaminomethyl)phenol.

Case no. 3

A 45-year-old worker in a paints factory had had several mild episodes of eczema from contact with solvents at work during his 17 years there. The condition affected his hands alone, lasting for no more than a few days. His skin condition deteriorated rapidly 1 week after starting work on a special thermal insulating paint for pipework. Initially, he noticed eye irritation and, within 1 week, his face, neck and arms were acutely erythematous and exudative (Fig. 2). He presented to the local A&E department and was given Betnovate® cream and systemic corticosteroids. Despite these, his eczema spread to cover much of his body and he required 7 weeks off work. He was equipped with goggles, overalls and leather gloves.

Patch tests

All patients were patch tested to our standard series, an epoxy resin series, and patient nos. 1 and 2 to a formaldehyde resin series, as well as to their own resins and hardeners. The relevant positive allergic reactions are listed in Table 1. 50 controls were negative to tris-DMP 0.5% pet.

Discussion

Tris-DMP (1) is volatile compared to epoxy resin (2, 3). The safety data sheets referred to by Kanerva et al. (1) state that tris-DMP is a sensitizer, though the source of this information is unknown. Foussereau et al. (4) recommend patch testing at 2% in ethyl acetate (4), Adams (5) at 0.1% pet. The health and safety data sheets supplied with our samples simply state that tris-DMP is corrosive, with no mention of sensitizing potential. Kanerva et al. (1) recommended testing at 1% pet., though they were concerned that this might be irritant. Testing at 0.01%, however, was suspected to result in false-negatives. We tested at 0.5% pet. with no irritant reactions in 50 controls. It is important to patch test with the patient's own hardeners, as not all of them are covered by epoxy patch test series chemicals.

Penetration of protective clothing by a chemical increases with its volatility. As tris-DMP is relatively volatile, there is a greater likelihood of exposure and consequent sensitization. Furthermore, the extent and the se-



Fig. 2. (a). Marked symmetrical dermatitis of both forearms. (b). Dermatitis of the neck.

Table 1. Positive patch tests

Patch test substance (at D4)	Case no. 1	Case no. 2	Case no. 3
epoxy resin (standard series) 1% pet.	+	++	++
diaminodiphenylmethane 1% pet.	++	+	++
2,4,6-tris(dimethylaminomethyl)phenol 0.5% pet.	++	++	++
cresylglycidyl ether 1% pet.	++	++	
phenylglycidyl ether 1% pet.		++	
own epoxy resin 1% pet.	++	++	++
formaldehyde 1% aq.	++		
urea-formaldehyde resin 10% pet.		+	
melamine-formaldehyde resin 10% pet.	+	+	

verity of the contact allergy may be greater as a result. Although mentioned in the dermatological literature in 1955 as an epoxy hardener (6), detailed case reports on tris-DMP are only recent.

References

1. Kanerva L, Estlander T, Jolanki R. Occupational allergic contact dermatitis caused by 2,4,6-tris-(dimethylaminomethyl) phenol, and a review of sensitising epoxy resin hardeners. *Int J Dermatol* 1996; 35: 852–856.
2. Dahlquist I, Fregert S. Allergic contact dermatitis from volatile epoxy hardeners and reactive diluents. *Contact Dermatitis* 1979; 5: 406–407.
3. Ancamine K54 curing agent. Manufacturers safety data sheet, SDS Vers. 2.04.01, 06/11/1997.
4. Foussereau J, Benezra C, Maibach H I. *Occupational contact dermatitis. Clinical and chemical aspects*. Copenhagen: Munksgaard, 1982: 221.
5. Adams R M. *Occupational skin disease*. Orlando FL: Grune and Stratton, 1983: 238–266.
6. Savitt L E. Dermatitis encountered in the production of epoxy resins. *Arch Dermatol* 1955; 71: 212–213.