

Allergy to phosphorus sesquisulfide: 0.5% pet. is a more appropriate concentration for patch testing

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Patch testing was performed with phosphorus sesquisulfide P_4S_3 in 2 groups containing equal numbers of patients using different concentrations (0.5% P_4S_3 in pet. and 1% P_4S_3 in pet., the usual suggested test concentration as recommended by the International Contact Dermatitis Research Group). We found that there was a statistically significant increase in the number of clinically irrelevant irritant reactions in the group tested with the concentration ($\chi^2=16$, $p<0.0004$). We recommend that patch testing with phosphorous sesquisulfide should be at a reduced concentration of 0.5% pet.

Key words: patching testing technique; phosphorus sesquisulfide; allergic contact dermatitis; irritant patch test reactions; patch test concentration. © Munksgaard, 1997.

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Phosphorus sesquisulfide (P_4S_3) is a well-known airborne allergen, capable of causing chronic facial eczema as well as contact urticaria (1, 2). Although it usually affects obviously exposed areas, it also causes dermatitis in the ear when phosphorus-sesquisulfide-containing non-safety matches are introduced into the ears; similar dermatitis has also been described affecting the upper thighs when persons carry used match boxes in their pockets.

Delayed hypersensitivity to phosphorus sesquisulfide is well-recognized and is practically always caused by a popular brand of 'strike anywhere' non-safety matches (1). On a worldwide basis, the concentration of this chemical for patch testing is usually recommended as 1% in pet. (4). We have found that with this concentration, a large number of clinically irrelevant irritant reactions are caused. Our aim was to compare 2 test concentrations (P_4S_3), 0.5% and 1% pet. in 2 separate groups of patients in 1994 and 1996, respectively, noting particularly any clinically irrelevant irritant reactions in the 2 different groups.

Patients and Methods

We conducted a study, comparing 2 groups of patients undergoing patch testing with the European standard series as well as other relevant allergens. The main difference between the 2 groups was the

concentration of phosphorus sesquisulfide used. This was 0.5% pet., which is the strength routinely used in our unit since the 1980s, based on initial preliminary studies, and produced by our own pharmacy, and the higher concentration of 1% pet., which was available from a commercial supplier. The patients were selected from the Contact Dermatitis Clinic in The Birmingham Skin Centre. Approximately 1000 patients are referred for patch testing by general practitioners and other dermatologists each year. The 2 groups were studied and their clinical details, including the sites of the dermatitis as well as the patch test results and final diagnoses, were recorded on all patients with positive reactions. The readings were done by trained clinicians who performed patch testing on a regular basis, and the criteria as outlined by the International Contact Dermatitis Research Group were used (5).

We compared the number of positive results and their clinical relevance between the 2 groups. The incidence of positive patch tests at each concentration were compared using the χ^2 test. The results are summarized in Table 1.

Results

4 out of 1000 patients tested in 1994 at a lower concentration of 0.5% in pet. showed positive re-

Table 1. 1994 phosphorus sesquisulfide 0.5% pet.

Patient nos.	Sex	Site of dermatitis	Patch test results	Final diagnosis	Clinical improvement on avoidance of P ₄ S ₃
1	F	face, hands	wool fat+, P ₄ S ₃ + neomycin+, Pivalone+ MBT+	CAD	+
2	M	face, fingers	Dowicil 200+, P ₄ S ₃ + formalin+	CAD	+
3	F	face	nickel+, pivalone+ MBT+, benzocaine+ P ₄ S ₃ ++, PABA+ hydrocortisone+	CAD	+
4	M	perioral generalized	potassium dichromate+ ethylenediamine+ P ₄ S ₃ +	CAD	+
1996 phosphorus sesquisulfide 1% pet.					
1	F	hands	nickel+, pivalone+ formalin+ P ₄ S ₃ +	CAD	-
2	F	hands	fragrance+, P ₄ S ₃ + thiuram+	CAD	-
3	F	vulval	nickel+, P ₄ S ₃ +	lichen simplex CAD	-
4	F	legs	balsam of Peru+ lanolin+, P ₄ S ₃ + thiuram+, gentamicin+ P ₄ S ₃ +	CAD	-
5	F	face, neck	fragrance+ P ₄ S ₃ +	atopic atopic CAD	-
6	F	eyelids, hands	nickel+, P ₄ S ₃ +	atopic	-
7	F	generalized	nickel+, P ₄ S ₃ +	atopic	-
8	F	hands	nickel+, P ₄ S ₃ +	CAD	-
9	F	legs	Type I latex-allergy cetostearyl alcohol+ lanolin+, P ₄ S ₃ +	latex allergy CAD	-
10	F	hands	hexamine+, P ₄ S ₃ + hexahydro 1-3-5-tris-triazine+ colophony+, P ₄ S ₃ +	CAD	-
11	F	legs	fusidic acid+, balsam of peru+ thiuram+, P ₄ S ₃ +	CAD	-
12	F	hands, legs	diphenyl thiourea	CAD	-

sults which were clinically relevant, and there was improvement of the facial dermatitis with avoidance of the allergen in 3 out of the 4 patients; the 4th patient was not followed up. They all had a history of prior exposure to phosphorus sesquisulfide. In contrast, 12 patients tested at 1% in 1996 had positive results that were of no clinical relevance. Out of these 12 patients, only 2 had a history of facial dermatitis, 1 of whom also had eyelid involvement. None of these patients had contact with phosphorus sesquisulfide or used 'strike anywhere' matches which are the common source of the allergen in the United Kingdom. The result is statistically significant ($\chi^2=16$, $P<0.0004$).

Discussion

Both contact dermatitis and contact urticaria are well described in association with phosphorus sesquisulfide (1-3). In our centre, up to the beginning of 1996, all our patients were tested at 0.5%. On

increasing to a concentration at 1%, we noted a statistically significant increase in the clinically irrelevant reactions. We attributed this to the irritant effect caused by the increased strength of the test substance. One of the main suppliers in England has recently deleted phosphorus sesquisulfide as a standard patch test product. This has been done because of a marked reduction of the number of truly allergic individuals to this substance (personal communication). It is claimed to be a rare cause of delayed hypersensitivity. This may well be explained by the fact that the general population as a whole is tending to use safety matches or lighters rather than the older non-safety matches. Rare as it may seem, this form of allergy will still enter the long list of differential diagnoses in any case of chronic eczema related to an aeroallergen. In the future, however, patients who are suspected of having allergy to phosphorus sesquisulfide which would include anyone thought to have a reaction to an aeroallergen, are likely to be tested by

substances prepared by the local contact dermatitis unit rather than being supplied by the commercial suppliers. On the basis of our study, we would recommend the test concentration to be 0.5% phosphorous sesquisulfide in pet., which would give a more accurate indication of clinically relevant allergy.

References

1. Stramberg J. Investigations re: the so called 'match eczema' and its causes. *Acta Dermato-venereologica* 1920; 1: 116-127.
2. White I R, Rycroft R J G. Contact urticaria from phosphorus sesquisulphide. *Contact Dermatitis*. 1983; 9: 162.
3. Burge S M, Powell S M. Contact urticaria to phosphorus sesquisulphide. *Contact Dermatitis* 1983; 9: 424.
4. Fisher A A. *Contact dermatitis*, 3rd edition. Philadelphia: Lea and Febiger, 1986.
5. Fregert S. *Manual of contact dermatitis*, 2nd edition. Munksgaard, Copenhagen, 1981.

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