

Allergic contact dermatitis caused by panthenol: a rare but relevant sensitizer

Ilse Clerens and An Goossens

Department of Dermatology, University Hospitals KU Leuven, 3000 Leuven, Belgium

doi:10.1111/cod.12685

Key words: allergic contact dermatitis; CAS no. 81-13-0; case report; cosmetics; dexpanthenol; panthenol; topical medicaments; vitamin B.

Panthenol is the alcohol analogue of panthothenic acid, known as vitamin B5, which is required for the biosynthesis of coenzyme A in cells. This compound exists as two stereoisomers, D-panthenol and L-panthenol, only the former being biologically active (1). It is a common ingredient in pharmaceutical products, for example in topical treatments for rhinitis, conjunctivitis, sunburn, and wounds, mainly because of its anti-inflammatory and wound-healing properties. Moreover, it is used in cosmetics, such as hair lotions, sunscreens, nail polish, and make-up, for its moisturizing and conditioning properties (1–4).

Methods and Results

From 2 January 1990 to 22 June 2016, a total of 3301 patients were patch tested with panthenol 5% pet. (Trolab[®], SmartPractice Europe, Barsbüttel, formerly Hermal, Reinbeck, Germany), either as a constituent of our pharmaceutical (n = 128) or cosmetic (n = 1759) series, or by aimed testing (when it was present in the products used). At first van der Bend chambers (van der Bend, Brielle, The Netherlands) were used, and later IQ Ultra chambers[®] (Chemotechnique, Vellinge, Sweden) were used, and fixed on the back with Mefix[®] (Mölnlycke,



Fig. 1. Allergic contact dermatitis in the axillae following the use of a fragrance-free deodorant containing panthenol (subject no. 23).

Göteborg, Sweden). Readings were performed according to ESCD guidelines (5), on day (D) 2 and D4, and sometimes also later.

Of the 3301 patch tested subjects, 23 had positive reactions to panthenol (0.7%). Table S1 shows their characteristics, the culprit products, and patch test results. Fifteen of the 23 were females, aged between 11 and 80 years, and 8 were males, aged between 18 and 80 years. A history of atopy was present in 7 cases. The anatomical sites most frequently affected were the face and hands; less common sites were the legs, feet, and trunk.

Correspondence: Professor An Goossens, Department of Dermatology, Contact Allergy Unit, University Hospitals Leuven – KU Leuven, Kapucijnenvoer 33, B-3000 Leuven, Belgium. Tel: +32 16 33 78 70; Fax: +32 16 33 78 72. E-mail: an.goossens@uzleuven.be

With regard to the causal products, in our series 4 subjects were sensitized via either Bepanthen® or Bepanthol® cream or ointment (Bayer, Diegem, Belgium, formerly Hoffman-La Roche, Brussels, Belgium), in which panthenol is the main active ingredient, and 19 via various cosmetic products, particularly moisturizing facial and body-care products (n = 12), but also shampoos and sunscreen products (n = 3 each), hand creams, hair-care products, 'repairing balms', eye make-up removers, deodorants (Fig. 1), and eye make-up removers (n = 2 each), and a tanning product, a shower gel, and a lipstick (n = 1 each).

Discussion

The low percentage of positive reactions to panthenol is quite similar to what has been found in other series, ranging from 0.2% to 0.7%, that is, 1 of 431 (0.2%) (6), 5 of 1474 (0.34%) (4 of which were considered relevant) (7), and 2 of 273 (0.73%) (8). The last-mentioned of these authors had started to test a series of patients with panthenol (between 1990 and 1993) following the detection of 7 positive reactions to it; moreover, in their article (8), they also reviewed the literature up to 1995, summarizing 40 cases. Most patients also reacted to several other allergens, mostly ingredients of cosmetic or pharmaceutical products, which is in agreement with the literature (8).

The reported cases of contact dermatitis caused by panthenol and its derivatives also concern D-panthenyl ethyl ether (ethyl panthenol, INCI: panthenyl ethyl ether,

CAS no. 667-83-4) in a hair lotion (9), whereas the panthenol cases were attributed to several products [see (8) for a review of the literature before 1995], such as Bepanthen® (10, 11), facial wipes (2), moisturizers (3, 4), and sunscreens (12). There has also been one case of contact urticaria caused by panthenol in a hair conditioner (13). Moreover, Hemmer et al. (7) reported a case of systemic contact dermatitis caused by nutritional vitamin B5 following contact sensitization resulting from its topical use. Finally, a positive lymphocyte transformation test result and evidence for microsomal-dependent allergen metabolism of panthenol was shown by Hahn et al. (14).

Conclusion

Although contact allergy to panthenol seems to be rare, panthenol is a relevant contact allergen, in both topical pharmaceutical products and cosmetics, with, according to the literature, possible systemic reactions in sensitized subjects following ingestion of vitamin B5.

Supporting Information

Additional Supporting Information may be found in the online version of this article:

Table S1. Characteristics, culprit products, lesion location and patch test results of patients reacting positively to panthenol (n = 23).

References

- 1 Biro K, Taçi D, Ochsendorf F R et al. Efficacy of dexpanthenol in skin protection against irritation: a double-blind, placebo-controlled study. *Contact Dermatitis* 2003; **49**: 80–84.
- 2 Chin M F, Hughes T M, Stone N M. Allergic contact dermatitis caused by panthenol in a child. *Contact Dermatitis* 2013; **69**: 311–322.
- 3 Stables G I, Wilkinson S M. Allergic contact dermatitis due to panthenol. *Contact Dermatitis* 1998; **38**: 236–237.
- 4 Roberts H, Williams J, Tate B. Allergic contact dermatitis to panthenol and cocamidopropyl PG dimonium chloride phosphate in a facial hydrating lotion. *Contact Dermatitis* 2006; **55**: 369–370.
- 5 Johansen J D, Aalto-Korte K, Agner T et al. European Society of Contact Dermatitis guideline for diagnostic patch testing – recommendations on best practice. *Contact Dermatitis* 2015; **73**: 195–221.
- 6 Bregnbak D, Johansen J D, Zachariae C. Contact dermatitis caused by panthenol used for aftercare treatment of a new tattoo. *Contact Dermatitis* 2016; **75**: 48–65.
- 7 Hemmer W, Bracun R, Wolf-Abdolvahab S. Maintenance of hand eczema by oral panthothenic acid in a patient sensitized to dexpanthenol. *Contact Dermatitis* 1997; **37**: 51.
- 8 Schmid-Grendelmeier P, Wyss M, Elsner P. Contact allergy to dexpanthenol. A report of 7 cases and a review of the literature. *Dermatosen* 1995; **43**: 175–178.
- 9 van Ketel W G. Hair lotion dermatitis with sensitization to d-panthenyl ethyl ether. *Contact Dermatitis* 1984; **10**: 48.
- 10 Gollhausen R, Przybilla B, Ring J. Contact allergy to dexpanthenol. *Contact Dermatitis* 1985; **13**: 38.
- 11 Fernandes S, Marcias V, Cravo M et al. Allergic contact dermatitis caused by dexpanthenol: report of two cases. *Contact Dermatitis* 2012; **66**: 159–162.
- 12 Jeanmougin M, Manciet J R, Moulin J P et al. Contact allergy to dexpanthenol in sunscreens. *Contact Dermatitis* 1988; **18**: 240–253.
- 13 Schalock P C, Storrs F J, Morrison L. Contact urticaria from panthenol in hair conditioner. *Contact Dermatitis* 2000; **43**: 223–251.
- 14 Hahn C, Röseler S, Fritzsche R et al. Allergic contact reaction to dexpanthenol: lymphocyte transformation test and evidence for microsomal-dependent metabolism of the allergen. *Contact Dermatitis* 1993; **28**: 81–83.