CONFLICT OF INTEREST

The authors declare no conflict of interest.

ORCID

Sebastian Vigand Svendsen https://orcid.org/0000-0002-5528-1474

Charlotte G. Mortz https://orcid.org/0000-0001-8710-0829

REFERENCES

1. Johansen JD, 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(4):195-221.
2. Isaksson M, Andersen KE, Brandao FM, et al. Patch testing with corticosteroid mixes in Europe. *Contact Dermatitis*. 2000;42:27-35.
3. TRUE test™, *Patch Test for Contact Dermatitis*. Mekos Laboratories AS. www.Mekos.dk
4. Madsen JT, Andersen KE. Outcome of a second patch test reading of TRUE Tests® on D6/7. *Contact Dermatitis*. 2013;68(2):94-97.
5. Van Amerongen CCA, Ofenloch R, Dittmar D, Schuttelaar MLA. New positive patch test reactions on day 7—the additional value of the day 7 patch test reading. *Contact Dermatitis*. 2019;81(4):280-287.
6. Isaksson M. Corticosteroid contact allergy—the importance of late readings and testing with corticosteroids used by the patients. *Contact Dermatitis*. 2007;56:56-57.
7. Higgins E, Collins P. The relevance of 7-day patch test reading. *Dermatitis*. 2013;24(5):237-240.
8. Davis FS, Richardson DM. Low yield for extended reading of patch tests with topical corticosteroids. *Dermatitis*. 2005;16(3):124-126.
9. Chaudhry HM, Drage LA, El-azhary RA, et al. Delayed patch-test reading after 5 days: an update from the Mayo Clinic Contact Dermatitis Group. *Dermatitis*. 2017;28(4):253-260.
10. Svendsen SV, Bach RO, Mortz CG. Prevalence of contact allergy to corticosteroids in a Danish patient population. *Contact Dermatitis*. 2022;87(3):273-279.

How to cite this article: Svendsen SV, Mortz CG. The benefit of late patch test readings in corticosteroid allergy. *Contact Dermatitis*. 2022;87(5):466-468. doi:10.1111/cod.14197

Allergic contact dermatitis from pantolactone and dexpanthenol in wound healing creams

Gabriela Blanchard[1] | **Stefan Kerre**[2] | **Anna Walker**[1] | **Ella Dendooven**[3,4] | **Olivier Aerts**[3,4] | **An Goossens**[5] | **Michel Gilliet**[1,6] | **Teofila Seremet**[1]

[1]Department of Dermatology and Venereology, Lausanne University Hospital (CHUV), Lausanne, Switzerland

[2]Department of Dermatology, Imelda Hospital, Bonheiden, Belgium

[3]Department of Dermatology, University Hospital Antwerp (UZA), Antwerp, Belgium

[4]Research Group Immunology, Infla-Med Centre of Excellence, University of Antwerp, Antwerp, Belgium

[5]Department of Medicine, KU Leuven, Leuven, Belgium

[6]Faculty of Biology and Medicine, University of Lausanne, Lausanne, Switzerland

Correspondence
Teofila Seremet, Department of Dermatology, Lausanne University Hospital (CHUV), Avenue de Beaumont 29, 1011 Lausanne, Switzerland.
Email: teofila.caplanusi@chuv.ch

KEYWORDS: allergic contact dermatitis, CAS 599-04-2/79-50-5, CAS 81-13-0/1648510-2, case report, cosmetics, dexpanthenol, medical device, panthenol, pantolactone, patch testing

Pantolactone is used in the production of D-panthenol (dexpanthenol), the alcohol analogue of panthothenic acid (vitamin B5).[1] It is used as an animal feed additive, but also in pharmaceutical, health care and food products, and in cosmetics as a humectant and conditioning agent. Panthenol is also widely used in cosmetics because of its antistatic, hair and skin conditioning properties and in pharmaceutical products to treat dry skin and minor irritant reactions, and for its wound healing and anti-inflammatory properties. We report the first cases of allergic contact dermatitis (ACD) from pantolactone.

Gabriela Blanchard and Stefan Kerre contributed equally to this study.

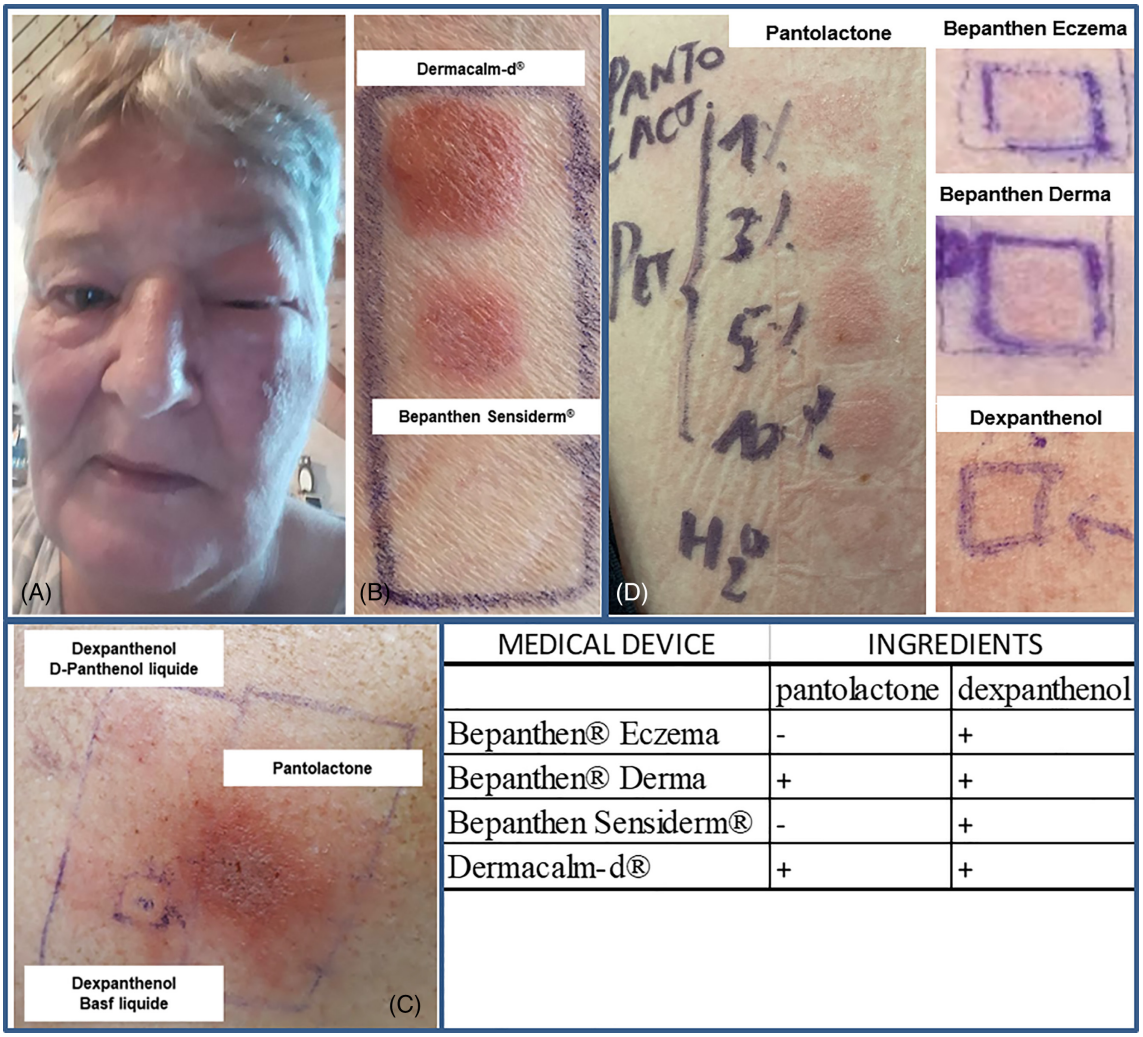
CASE REPORTS

Case 1

A 62-year-old Caucasian female had developed facial erythema due to mechanical irritation from a new oxygen mask. Her general physician had prescribed two wound healing creams, that is, Bepanthen Sensiderm and Dermacalm-d (Bayer AG). During the following days, however, she developed a severe, focally bullous, erythema of the face and periorbital oedema (Figure 1A). The topical agents were stopped and the patient was treated with oral prednisolone followed by topical corticosteroids until reaching complete remission. Patch tests were performed with the European baseline, cosmetic, preservative and excipient series (Chemotechnique Diagnostics and AllergEAZE) and with the patient's own products ('as is'). The patch test chambers used were IQ Ultra (Chemotechnique Diagnostics), fixed with Mefix for 48 h. Readings, performed on Day (D) 2 and D4 according to International Contact Dermatitis Research Group (ICDRG) criteria, showed a positive reaction Bepanthen Sensiderm (D2+, D4++) and Dermacalm-d (D2++, D4+++) (Figure 1B). Their individual ingredients, kindly provided by the manufacturer, were subsequently patch tested and showed a positive reaction to pantolactone (D2++, D4+++), Dexpanthenol liquid (D2+/−, D4+) and Dexpanthenol Basf liquid (D2+/−, D4+) (Figure 1C). The three haptens were tested undiluted as provided by the manufacturer (gel and liquid forms). We thus confirmed ACD from dexpanthenol and pantolactone present in Bepanthen Sensiderm and Dermacalm-d. Six unexposed controls were negative to the pantolactone and panthenol preparations.

Case 2

A 38-year-old Caucasian female atopic patient consulted because of a persistent hand dermatitis treated with topical corticosteroids, and during the last 6 months also with Bepanthen Eczema and Bepanthen



MEDICAL DEVICE	INGREDIENTS	
	pantolactone	dexpanthenol
Bepanthen® Eczema	-	+
Bepanthen® Derma	+	+
Bepanthen Sensiderm®	-	+
Dermacalm-d®	+	+

FIGURE 1 (A) Case 1: clinical manifestations of severe allergic contact dermatitis to dexpanthenol and pantolactone. (B) Positive patch test on D4 to Bepanthen Sensiderm (++) and Dermacalm-d (+++). (C) Positive patch test on D4 to pantolactone (+++), dexpanthenol D-panthenol liquide (+) and Dexpanthenol Basf liquide (+). (D) Case 2: positive reaction to pantolactone in pet. in a dilution series showing dose-dependent reactions: 1% +, 3% ++, 5% and 10% +++. Positive reaction on D4 to Bepanthen Derma (++) and a doubtful reaction to Bepanthen Eczema, as well as to dexpanthenol provided by the manufacturer. (E) Name of medical devices tested containing dexpanthenol alone, or together with pantolactone

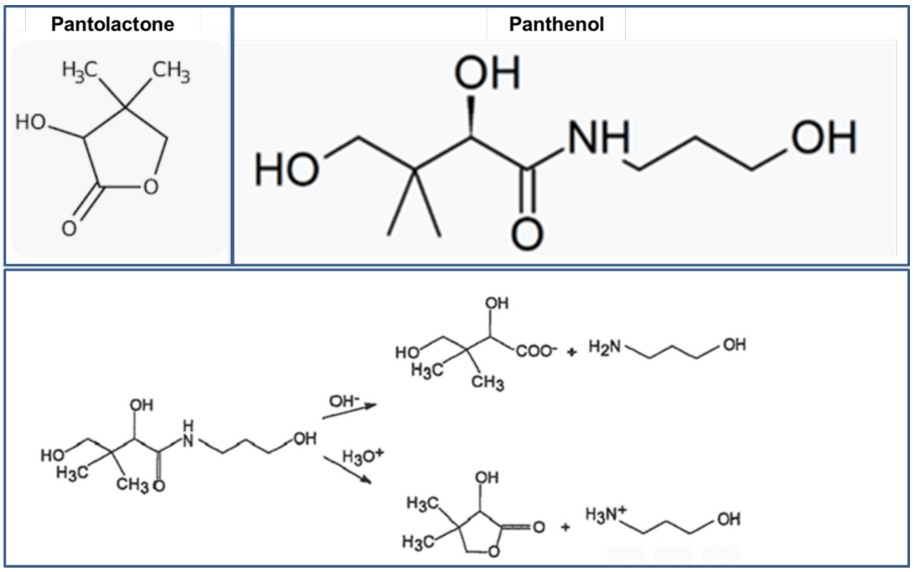


FIGURE 2 Chemical formulas of pantolactone and dexpanthenol. Dexpanthenol can disintegrate to pantolactone due to 'lactonization' in an acid aqueous environment such as the skin.

Derma (Bayer) with, however, only limited improvement. There was no clear correlation with her job (administration), nor any known allergies. Patch tests were performed, as in Case 1, and readings on D2 and D4 showed a positive reaction to Bepanthen Derma (D2+, D4++), and a doubtful reaction to Bepanthen Eczema. Other patch tests were negative, including dexpanthenol 5% pet. (Chemotechnique Diagnostics). The individual ingredients of Bepanthen Derma, kindly provided by the manufacturer, were patch tested and positive, dose-dependent reactions were observed to a dilution series of pantolactone in pet. (1% +, 3% ++, 5% and 10% +++) (Figure 1D). The 5% concentration tested negatively in five controls.

DISCUSSION

A worsening skin condition upon application of a wound healing cream should raise suspicion of ACD. Both products reported here contained dexpanthenol, which is a well-established contact allergen,[1,2] even in children.[3] Conflicting results have been published whether this allergen is a frequent or rare skin sensitizer, and in order to allow further surveillance it was recently included as a recommended addition to a newly proposed European cosmetic series.[4] Pantolactone is an impurity (~1%) of panthenol raw materials, and because it is likely formed from panthenol in acidic aquatic media (i.e., sweat), it might not be excluded that this here newly reported cosmetic allergen is the actual sensitizer in panthenol-containing preparations (Figure 2).[5,6] A possible argument in this direction is that pantolactone was also the strongest reactor in our two patients. Our cases once again highlight the utmost importance of identifying new emerging allergens through testing individual ingredients from all personal products used.

AUTHOR CONTRIBUTIONS

Gabriela Blanchard: Writing – original draft; conceptualization; writing – review and editing; methodology. **Stefan Kerre:** Conceptualization; investigation; writing – original draft; methodology; writing – review and editing. **Anna Walker:** Investigation; writing – review and editing. **Ella Dendooven:** Conceptualization; investigation; writing – review and editing; methodology. **Olivier Aerts:** Conceptualization; methodology; writing – review and editing; validation. **An Goossens:** Methodology; validation; conceptualization; writing – review and editing. **Michel Gilliet:** Writing – review and editing; conceptualization. **Teofila Seremet:** Conceptualization; methodology; investigation; writing – original draft; writing – review and editing; validation.

ACKNOWLEDGEMENT

Open access funding provided by Universite de Lausanne.

CONFLICT OF INTEREST

The authors declare no conflicts of interest.

ETHICS STATEMENT

Discussed patients gave consent for her photographs and medical information to be published in print and online and with the understanding that this information may be publicly available.

ORCID

Gabriela Blanchard https://orcid.org/0000-0001-7020-0751
Stefan Kerre https://orcid.org/0000-0003-0847-7578
Anna Walker https://orcid.org/0000-0002-9857-3004
Ella Dendooven https://orcid.org/0000-0002-3489-8010
Olivier Aerts https://orcid.org/0000-0002-0076-2887
An Goossens https://orcid.org/0000-0002-9805-3439
Michel Gilliet https://orcid.org/0000-0002-4609-3762
Teofila Seremet https://orcid.org/0000-0002-3789-6256

REFERENCES

1. Fernandes RA, Santiago L, Gouveia M, Gonçalo M. Allergic contact dermatitis caused by dexpanthenol-probably a frequent allergen. *Contact Dermatitis*. 2018;79(5):276-280. doi:10.1111/cod.13054

2. Clerens I, Goossens A. Allergic contact dermatitis caused by panthenol: a rare but relevant sensitizer. *Contact Dermatitis*. 2017;76(2):122-123. doi:10.1111/cod.12685
3. Chin MF, Hughes TM, Stone NM. Allergic contact dermatitis caused by panthenol in a child. *Contact Dermatitis*. 2013;69(5):321-322. doi:10.1111/cod.12116
4. Horton E, Uter W, Geier J, et al. Developing a cosmetic series: results from the ESSCA network, 2009-2018. *Contact Dermatitis*. 2021;84(2):82-94. doi:10.1111/cod.13690
5. Zhang QH, Yang L, Tang YB, Huang LN, Luo WF. Industrial kinetic resolution of d,l-pantolactone by an immobilized whole-cell biocatalyst. *RSC Adv*. 2021;11(48):30373-30376. doi:10.1039/d1ra05708a
6. Kesseler M. Biotechnological production of D-pantothenic acid and its precursor D-pantolactone. *Highlights in Bioorganic Chemistry*. Wiley; 2004. doi:10.1002/3527603727.ch6c

How to cite this article: Blanchard G, Kerre S, Walker A, et al. Allergic contact dermatitis from pantolactone and dexpanthenol in wound healing creams. *Contact Dermatitis*. 2022;87(5):468-471. doi:10.1111/cod.14198