

Allergic contact dermatitis caused by menthoxypropanediol in a lip cosmetic

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Case Report

A 46-year-old woman presented with perioral erythema and scaling (Fig. 1). She had been using several lip cosmetics including Blistex Med plus® (a brand of lip balm). Patch testing, performed elsewhere with the European baseline series, a cosmetic series, and her own cosmetics, showed a positive patch test reaction (++) at D3 to Blistex Med plus®, tested undiluted. At first, the patient was advised to avoid this Blistex® lip balm and to perform a repeated open application test (ROAT) for any new product. Because the perioral symptoms relapsed after a while, and the patient wanted to know which substance was causing this problem, she was referred to us. A biopsy taken for histopathology showed dermatitis. We advised the patient to perform a ROAT with the incriminated product; this caused an itchy erythematous and papular reaction after a few days (Fig. 2). We then consulted Consumer Exposure Skin Effects and Surveillance (CESES), a monitoring system, set up by the Dutch National Institute for Public Health and the Environment, in which undesirable reactions caused by cosmetics can be registered and investigated (1). Through CESES, we were able to patch test all of the ingredients of Blistex Med plus®: benzophenone-3, benzyl alcohol, camphor, cera microcristallina, *Daucus carota sativa* root extract, *Daucus carota* seed oil, ethylhexyl methoxycinnamate, *Eucalyptus globulus* leaf oil, *Eugenia caryophyllus* flower oil, lanolin, menthol, menthoxypropanediol, menthyl lactate, methyl salicylate, myristyl myristate, perfume, petrolatum, *Ricinus communis* seed oil, saccharin, and *Theobroma*



Fig. 1. Clinical presentation.



Fig. 2. Positive repeated open application test result after a few days.

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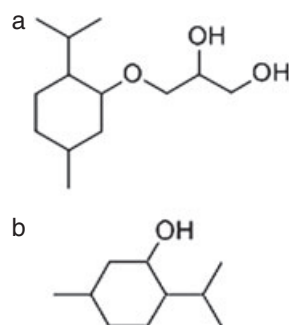


Fig. 3. (a) Chemical structure of menthoxypropanediol. (b) Chemical structure of menthol.

cacao seed butter. We found a positive reaction only to menthoxypropanediol 5% pet. (D2+; D3+); menthol 5% pet. was negative. Additionally, we tested the patient with a dilution series of menthoxypropanediol, with the following results: 5%, D2+/D3++; 2%, D2-/D3+; and 0.5%, D2-/D3?+. Menthoxypropanediol 5% pet. gave negative test results in 5 control subjects. The concentration of menthoxypropanediol in Blistex Med plus® is 0.4%.

Discussion

Menthoxypropanediol [synonyms: 3-(5-methyl-2-propan-2-ylcyclohexyl)oxypropane-1,2-diol; 1,2-propanediol, 3-[[5-methyl-2-(1-methylethyl)cyclohexyl]oxy]-; CAS no. 87061-04-9, EINECS 289-296-2] is a synthetic derivative of menthol. Its functions in cosmetics in the EU are described as 'masking' and 'refreshing' (2), and its functions in the United States are described as a

'flavoring agent' and a 'fragrance ingredient' (3). The structures of both chemicals are shown in Fig. 3a,b. This is the first case of allergic contact dermatitis caused by menthoxypropanediol.

It may not be used very much. In fact, only eight of > 62 000 products on file in the Environmental Working Group (EWG) Skin Deep® cosmetics database contain menthoxypropanediol. However, Blistex® is a very popular brand in The Netherlands. In our patient, there was no cross-reactivity with menthol. Menthol is used more often in cosmetics: it is listed as an ingredient in 510 recent products in the EWG Skin Deep® database (4). In pharmaceutical products, it is used far more often and in higher concentrations for the treatment of itch and itching dermatoses. In spite of this, only sporadic cases of contact allergy have been reported (5), often in combination with allergy to *Mentha piperita* (peppermint) oil, which contains 35–60% menthol (6). The infrequency of contact allergy to menthol was also shown in a recent study by the Information Network of Departments of Dermatology: of 1147 dermatitis patients tested with menthol between 2005 and 2008, only 1 (0.09%) had a positive reaction (7).

As a test concentration for menthoxypropanediol, we suggest 5% in pet.

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