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Allergic contact dermatitis caused by the emulsifier triceteareth-4-phosphate

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Allergic contact dermatitis caused by emulsifiers in topical products is not uncommon, and has been documented in a series of cases (1–5). Triceteareth-4-phosphate (Hostaphat® KW 340N; CAS 86338-11-6) is a surfactant and emulsifying agent used in body and hand cosmetic products. This substance is the triester of phosphoric acid and cetareth-4, and belongs to the chemical class of compounds often used in cosmetic preparations as surfactants, emulsifiers, and wetting agents. Sodium dihydroxycetyl phosphate is an example of a compound previously described as a contact allergen (5). This report describes a case of allergic contact dermatitis caused by triceteareth-4-phosphate in a skin lotion.

Case Report

A 39-year-old woman with a previous history of atopic dermatitis and contact allergy to perfumes presented with a generalized dermatitis after 3 days of use of Landlord® body lotion without perfume (NOPA A/S, Hobro, Denmark). The dermatitis was treated with a topical steroid, and the patient was referred for diagnostic tests by her general practitioner. Patch tests with the European baseline series and her own products were performed according to the department's routine procedure, with readings on D3 and D7 [TRUE Test® panel 1–3 (Mekos, Hillerød, Denmark) supplemented with pet.-based allergens from Chemotechnique Diagnostics® (Vellinge, Sweden)].

The patient had positive patch test reactions to fragrance mix I (+++/+++) and fragrance mix II (+/+). Supplementary tests with fragrance mix ingredients

showed positive reactions to cinnamal and cinnamyl alcohol (both ++/not read). Furthermore, the patient reacted to tixocortol-21-pivalate (++/++) and had an unexpectedly a strongly positive reaction to the Landlord® body lotion (++/+).

The manufacturer of the body lotion provided ingredients for testing of the patient. On the basis of the list of ingredients, the emulsifier was suspected to be the contact allergen. Re-tests a few months later showed +++ reactions to Hostaphat® 340N 5% pet. and 2% pet., ++ reactions to 1% pet. and 0.5% pet., and a negative reaction to 0.1% pet. A +++ reaction to the Landlord® body lotion 'as is' without perfume was reproduced. Patch tests with Hostaphat® 340N were repeated, and showed again a ++ reaction on D3 to Hostaphat® 340N 2% pet. and 1% pet., and a + reaction to Hostaphat® 340N 1% pet. and 0.5% pet. Trioleoyl phosphate 1% pet., a chemically closely related surfactant to Hostaphat® 340N, did not produce a positive patch test reaction.

A repeated open application test (ROAT) was performed with the Landlord® body lotion 'as is', and produced a positive reaction within 3 days, whereas a ROAT performed for more than 1 week with triceteareth-4-phosphate 5% pet. produced a negative result.

Other ingredients, such as paraffin oil and glycerin 'as is', ethylhexyl glycerin 5% pet., Aloe Vera extract 10% in water, phenoxyethanol 1% pet., benzoic acid 5% pet., and ethyl stearyl alcohol 20% pet., gave negative patch test results. Prick tests produced a positive reaction to *Alternaria alternata*.

Twenty-five consecutive eczema patients were recruited as controls, and were tested with triceteareth-4-phosphate 2% pet.; they showed negative results.

Discussion

The case fulfils the criteria for a documented true contact allergy to triceteareth-4-phosphate by showing repeated

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positive patch test reactions to the compound at a non-irritant patch test concentration, positive reactions to a dilution series, and negative results in 25 consecutive controls. The positive ROAT result with the product used and the negative ROAT result with the product 5% in pet. is noteworthy, and might be explained by sustained release of the allergen from the pet. formulation as compared with the Landlord® body lotion 'as is', thereby decreasing bioavailability in the skin. The appearance of dermatitis after the use of the Landlord® body lotion for

only 3 days may suggest that previous sensitization had occurred.

Contact allergy to emulsifiers in topical products may be more common than is currently thought. They are difficult allergens to work with, because they are often weak allergens with an inherent propensity to cause skin irritation, and also because they are often technical products with a certain amount of batch-to-batch variation and, perhaps, impurities (5, 6). Collaboration with the manufacturer is important to obtain samples of the ingredients.

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