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Contact dermatitis caused by polyethylene glycol-7 monooleate

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Case Report

A 28-year-old atopic female physiotherapist presented with a 6-month history of eczematous lesions affecting the palmar and lateral aspects of both hands and wrists, which improved with the use of topical corticosteroids. She suspected two products that she used to massage her patients. She was initially patch tested with the Spanish baseline, cosmetic and fragrance series, as well as her own products, and only a strong (D4++) positive reaction was found to the massage oil Chemodol® 'as is'. Further testing with individual ingredients of this product, supplied by the manufacturer (Chemodis, Alkmaar, The Netherlands), yielded D2++ and D4++ reactions to polyethylene glycol (PEG)-7 monooleate, which was tested 'as is', in Finn Chambers® (Smart-Practice, Phoenix, Arizona, USA), with 48 hr occlusion; readings were performed according to ICDRG recommendations. Eight controls showed no reactions to PEG-7 monooleate.

Subsequently, oleic acid and several PEG derivatives were tested, and there were no reactions to any of them.

Discussion

PEGs, also known as macrogols, are condensation polymers of ethylene glycol. They are widely used as vehicles in many different products, such as topical medicaments, cosmetics, or even foods. One of the reasons for their frequent use, in addition to their safety profile for consumers and their low cost, is that they can be formulated to have various physicochemical properties.

PEG-7 monooleate, or PEG-7 oleate (CAS no. 9004-96-0), is formed by the esterification of monooleic acid and a polymer containing seven ethylene glycol molecules. It is a clear, yellowish, odourless oily liquid, with an average MW of 608 kD. It is mainly used as a vehicle to facilitate skin penetration.

Contact allergy to oleic acid has never been reported, and only a few cases of allergy to oleate derivatives have been described. Allergies to ricinoleic acid (the C12-hydroxylated form of oleic acid and the main component of castor oil) and to ricinoleate derivatives, including PEG-7 hydrogenated castor oil (1), have been reported more frequently.

Contact dermatitis (2) and anaphylaxis (3) caused by PEGs and derivatives (4) have been infrequently reported. However, sensitization to these molecules might be underdiagnosed (5). It has been postulated that PEGs with lower MWs are more allergenic than high-MW PEGs (2). Cross-sensitization among different PEGs is not common. This case illustrates the molecular specificity of contact sensitization to PEG derivatives. In our case, this specificity posed the main difficulty in establishing the correct diagnosis, as it was necessary to test the exact molecule among the huge amount of different PEG derivatives, and the full cooperation of the manufacturer was needed.

With the common use of polymer derivatives such as PEG-7 monooleate in the cosmetic and pharmaceutical industries, contact allergies to them may be seen.

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