Allergic contact dermatitis caused by polyester-8 (Polycrylene®) in a sunscreen moisturizer

Ben Esdaile and Susan M. Cooper

Department of Dermatology, Churchill Hospital, Headington, Oxford OX3 7LJ, UK

doi:10.1111/j.1600-0536.2012.02067.x

Key words: allergic contact dermatitis; Polycrylene®; polyester-8; sunscreens.

Allergic contact dermatitis caused by components of sunscreens is well documented. We present the first reported case of an allergic contact dermatitis caused by a novel component, Polycrylene® (polyester-8). This photostabilizer is a copolymer, with part of the molecule having structural similarities to octocrylene. The exact nature of the hapten in this large molecule is unknown.

Case Report

A 29-year-old woman developed a severe eczematous reaction to her SPF25 moisturizer during the summer. She had used the product for a number of days prior to developing the reaction on her cheeks and upper neck on the day after application. The reaction resolved after 7 days. She had no personal or family history of atopy, and she was otherwise fit and well and on no medication. She had no history of previous reactions, and had tolerated previous sunscreens without complication.

Patch testing was performed with the British Society of Cutaneous Allergy baseline series and cosmetic series, a fragrance and sunscreen series, and the suspected product (allergens supplied by Chemotechnique Diagnostics, Vellinge, Sweden, and Trolab, Reinbek, Germany), using IQ Ultra® chambers. Patches were removed after 2 days, and final readings were taken on day 4. Photopatch testing was performed, according to the British Photodermatology Group guidelines, with the sunscreen series and the suspected product [irradiated with ultraviolet (UV)A light at 5 J/cm²]. Results were graded according to the criteria of the International Contact Dermatitis Research Group.

Positive reactions were observed to nickel sulfate 5.0% pet. (D2+, D4+), propolis 10.0% pet. (D2+, D4+) and farnesol 5.0% pet. (D2−, D4+). None of these allergens appeared to be relevant to the patient’s reaction, and they were not listed in the moisturizer product ingredients. She did, however, develop a + reaction to the SPF25 moisturizer on days 2 and 4 on both covered and uncovered sites. The sunscreen series, including octocrylene, was entirely negative.

The patient was then further patch-tested with the 50 ingredients of the cream, and retested with the cream ‘as is’. A + reaction was observed to polyester-8 (3.0% pet.) on day 4, and a 2+ reaction to the cream itself was observed on day 4. We tested 20 control patients with polyester-8 (1.0 and 3.0% pet.), with entirely negative results on days 2 and 4.

Discussion

Polyester-8 (Polycrylene®/CAS 862993-96-2) is a novel photostabilizer used in sunscreens. In our case, it was present in a Clinique® sunscreen moisturizer. It is a copolymer of adipic acid and neopentyl glycol that is terminated with cyanodiphenyl propenoic acid. To improve handling, a small percentage of polymer molecules are terminated at one end with octyldodecanol. The cyanodiphenyl propenoate moiety has the ability to absorb in the UVB range, with a peak at 303 nm. Part of the polyester-8 molecule has structural similarities to octocrylene (CAS 6197-30-4). Octocrylene is a frequently used UV absorber and stabilizer, and is a recognized sensitizer (1). Like octocrylene, polyester-8 photostabilizes the UVA absorber avobenzone (butyl methoxydibenzoylmethane) to provide SPF enhancement. It also improves the waterproofing
of sunscreen formulations as measured by their resistance to water.

Copolymers are large molecules with high molecular weights (>1000), and are used frequently in cosmetics. Polyester-8 has an average molecular weight of approximately 1900. Copolymers are thought to be unlikely to sensitize, owing to their large size, but it is becoming clear that their sensitizing capacity has been underestimated (2). There are now a number of reports in the literature of allergic contact dermatitis caused by copolymers in cosmetics (2–4), but the exact nature of the haptens are still unknown. Possible explanations include impurities in the products, byproducts formed during polymerization, residual monomers, or degradation products.

The hapten in the case of polyester-8 remains unknown. The structural similarity to octocrylene may be relevant. We report the first case of allergic contact dermatitis caused by this novel copolymer, which may be an emerging allergen.

References