

Contact urticaria caused by the ultraviolet absorber octocrylene in sunscreens

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Sunscreen products are increasingly being used, owing to the rising awareness of the potential dangers of ultraviolet (UV) radiation. Octocrylene (CAS no. 6197-30-4) is a UV filter introduced over 15 years ago that is frequently used in sunscreens and other cosmetic products. Since

its introduction, contact and photocontact allergies to octocrylene have been reported (1). We report a case of contact urticaria caused by octocrylene, which has not been described before.

Case Report

A 15-year-old healthy non-atopic female was referred to our dermatology department because, for the past 5 years, she had recurrently developed a generalized urticarial skin reaction within 5–8 h after localized application of sunscreen products that disappeared within 24–36 h (Fig. 1). The reaction occurred with different

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Fig. 1. Urticarial skin reaction on the trunk after the use of sunscreen products.

brands of sunscreen product. She did not notice any worsening of the complaints after sun exposure, and minimal erythema dose testing showed normal sensitivity to both UVA and UVB.

Patch testing was performed with our extended European baseline series using TRUE Test[®] panels 1 and 2, Mekos Laboratories, Hillerød, Denmark, and investigator loaded allergens supplied by Chemotechnique[®] (Vellinge, Sweden), a cosmetic series, fragrance series, photopatch series, and multiple sunscreen products previously used by the patient [Garnier Ambre Solaire sensitive SPF50+[®], (Garnier, Paris, France); Garnier Ambre Solaire clear protect SPF 10[®] (Garnier); Nivea SPF50 protect & bronze[®] (Beiersdorf, Birmingham, UK); Riemann P20 SPF50[®] (Riemann, Hillerød, Denmark); and Garnier Ambre Solaire protective oil SPF30[®] (Garnier)], tested in Van der Bend Chambers (Van der Bend, Brielle, The Netherlands) and fixed with Fixomull stretch[®] (BSN Medical, Hamburg, Germany). For the European baseline series, cosmetic series, and fragrance series, the patch tests were left on the back for 48 h, and readings were performed on day (D) 3 and D7, in agreement with ESCD recommendations (2). For photopatch testing, a duplicate set of photopatch series and the patient's own sunscreens were applied on the back, of which one set was removed and irradiated with UVA (5 J/cm²) after 24 h. The non-irradiated set was left on the back for 48 h. Readings were performed at 20 min (D0), 24 h (before and 20 min after UVA exposure, D1), on D3, and on D7.

Positive and doubtful reactions are shown in Table 1 and Fig. 2. On D1, urticarial reactions were seen to octocrylene, Garnier Ambre Solaire clear protect SPF 10[®], Nivea SPF50 protect & bronze[®], and Garnier Ambre Solaire sensitive SPF50+[®]. Irradiation with UVA did not

aggravate these reactions. Doubtful reactions to Garnier Ambre Solaire protective oil SPF30[®] and Riemann P20 SPF 50[®] were seen with and without UVA irradiation on D1. On D3, these doubtful reactions remained doubtful after 48 h of occlusion, without UVA irradiation. All tested sunscreens contained octocrylene.

A repeated open application test was performed with a sunscreen not containing octocrylene (La Roche-Possay Anthelios XL Comfortcrème SPF 50+[®]); the patient did not develop any complaints. She was provided with a list of sunscreens without octocrylene, for the continuation of suitable sun protection.

Discussion

Our case can be considered to be delayed-onset contact urticaria caused by octocrylene in sunscreens. (Photo)contact allergy could not be demonstrated.

Octocrylene is a highly photostable and miscible UV filter that covers UVB wavelengths and short UVA wavelengths, and has little tendency to cause irritation (1, 3). Because of these favourable features, octocrylene is frequently used in sunscreen products (in 2013, > 80% of sunscreens contained octocrylene in The Netherlands) (1). Octocrylene is often combined with other UV filters to achieve a higher sun protection factor (4).

Along with the increased use of octocrylene, photocontact allergy to octocrylene has also been increasingly reported, and accounts for ~80% of all skin reactions to octocrylene. In a large European multicentre photopatch test study, 41 of 1031 (4%) of patients reacted positively when they were photopatch tested with octocrylene. Of these patients, 34 (83%) co-reacted to ketoprofen (non-steroidal anti-inflammatory drug) and 18 (44%) co-reacted to benzophenone-3 (UV filter) (5). These data suggest that the majority of photocontact allergies to octocrylene results from ketoprofen photosensitization, the chemical basis of which remains unclear (1). Contact allergy to octocrylene occurs less frequently [0.7% of patients participating in the multicentre photopatch test study (5)], and mostly in children, owing to its presence in sunscreens (4).

Recently, a review on contact urticaria caused by cosmetic compounds was published (6). Benzophenone-3 was the only sunscreen ingredient found to cause contact urticaria and anaphylaxis in rare cases (7). Contact urticaria caused by octocrylene has not been described before. However, Macías et al. (8) did report 2 cases of contact dermatitis caused by octocrylene in young children, who both developed an erythematous pruriginous eruption within 3 h after application of sunscreens containing octocrylene.

Table 1. Positive (urticarial) and doubtful (photo)patch test reactions

Test material	Concentration	No UVA				UVA (5 J/cm ²)		
		D0 20 min	D1	D3 ^a	D7 ^a	D1 ^b	D3 ^c	D7 ^c
Octocrylene	10% pet.	–	+	–	–	+	–	–
Garnier Ambre Solaire clear protect SPF10®	'as is'	–	+	–	–	+	–	–
Nivea SPF50 protect and bronze®	'as is'	–	+	–	–	+	–	–
Garnier Ambre Solaire sensitive SPF50+®	'as is'	–	+	?+	–	+	–	–
Garnier Ambre Solaire protective oil SPF30®	'as is'	–	?+	?+	–	?+	–	–
Riemann P20 SPF 50®	'as is'	–	?+	?+	–	?+	–	–

D, day; SPF, sun protection factor; UVA, ultraviolet A; ?+, doubtful reaction.

^aForty-eight hours of occlusion.

^bAfter 24 h of occlusion, irradiated with UVA. Reading performed 20 min after UVA exposure on D1.

^cTwenty-four of hours occlusion.

**Fig. 2.** Positive patch test reactions on day 1 to the three products in the left and doubtful patch test reactions to the two products on the right.

In patients with contact urticaria, it is essential to perform patch test readings at 20 min and on D1, as subsequent readings on D2, D3 and D7 are usually

negative. Therefore, careful history-taking with a time-course of symptoms is important for awareness of the diagnosis.

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