

Photosensitivity in atopic dermatitis complicated by contact allergy to common sunscreen ingredients

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doi:10.1111/cod.12477

Key words: atopic dermatitis; contact allergy; photoaggravation; photosensitivity; case report.

Atopic dermatitis is a common inflammatory skin disease. The majority of atopic dermatitis patients benefit from ultraviolet (UV) radiation therapy (1) and from exposure to the sun in a (controlled) natural setting. However, photosensitivity in atopic dermatitis is a well-known but ill-defined phenomenon that should be kept in mind (2). Photosensitivity is defined as abnormally increased skin sensitivity to UV radiation and often presents as an uncharacteristic, polymorphic rash. The main treatment is sun avoidance and protection with textiles and sunscreens (3).

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Conflicts of interests: None of the authors have conflicts of interest to declare.

Case History

A 16-year-old girl with severe atopic dermatitis from early childhood was admitted to our clinic. The patient repeatedly experienced aggravation of her dermatitis when exposed to sunlight (Fig. 1). Phototests showed increased sensitivity to both UVA (minimal erythema dose of 15 J/cm²) and UVB (minimal erythema dose of 20 mJ/cm²). Despite intensive treatment of the atopic dermatitis and careful UV protection with sunscreen products, her eczema worsened uncontrollably. Patch testing with the TRUE Test[®] (SmartPractice, Hillerød, Denmark) supplemented with the allergens from the European baseline series that are not included in the TRUE Test[®] (Chemotechnique Diagnostics, Malmö, Sweden) and the patient's own sunscreen products tested 'as is' showed contact allergy to formaldehyde, methylisothiazolinone, and all of the patient's own sunscreen products.



Fig. 1. Polymorphic rash in sun exposed areas; picture taken some years earlier.

Further photopatch testing with our sunscreen ingredient series was performed (Chemotechnique Diagnostics). The patch tests were performed with Finn Chambers® and Scanpor® tape (SmartPractice). Photo patch tests were occluded for 48 h and irradiated with 5 J/cm². Testing with the photopatch test series showed additional contact allergy to butyl-methoxydibenzoylmethane, octocrylene, and tocopherol, and doubtful reactions to terephthalylidene dicamphor sulfonic acid, and cyclopentasiloxane (Table 1). Interestingly, our patient showed a doubtful reaction to fragrance mix I that was aggravated by UVA, as we found a +1 reaction on D4 and D7 when the patch tests

were irradiated. Reactions to terephthalylidene dicamphor sulfonic acid and cyclopentasiloxane were doubtful. All sunscreen products contained octocrylene, and several also contained butyl-methoxydibenzoylmethane and tocopherol. As our patient suffered from severe photosensitivity, sun protection was of utmost importance. Hence, custom-made sunscreen products with alternative chemical UV filters were manufactured. The symptoms subsided, and the patient is now able to stay outdoors without any deterioration.

Discussion

Although sunlight may improve atopic dermatitis, an estimated 10% of patients are reported to show deterioration after sun exposure [cited after (4)], which is mostly termed 'photoaggravation'. In clinical practice, this can be difficult to recognize, as the symptoms may also be explained by other simultaneous exposures, such as humidity, heat, scratching, pollen exposure, psychological factors, and skin care products, and comorbidities such as polymorphous light eruption. In one study of 145 adult patients with photoaggravated atopic dermatitis, increased sensitivity to UVA and/or UVB rays was found in 74% (2). In any case of photoaggravated atopic dermatitis, a phototest should be performed to establish the diagnosis. Identification of the responsible wavelengths allows appropriate avoidance advice and correct treatment, and reduces the need for topical steroids and systemic therapy.

Table 1. Results of (photo)patch testing; results with own products not shown

Allergen	D2	D4	D7	Relevance
Baseline patch testing ^a				
Formaldehyde 180 µg/cm ²		+?	+	Current
Methylisothiazolinone 0.02% aq.		+	+	Past
Photopatch test irradiated ^b				
Butyl methoxydibenzoylmethane 2% pet.		+	+	Current
Octocrylene 2.5% pet.	+	++	++	Current
Tocopherol 20% pet.		+	+	Current
Fragrance mix I 8% pet.		+	+	Current
Terephthalylidene dicamphor sulfonic acid 9% aq.		+?		
Cyclopentasiloxane 10% pet.		+?	+?	
Photopatch test not irradiated ^b				
Butyl methoxydibenzoylmethane 2% pet.	+	+	+	Current
Octocrylene 2.5% pet.	+	++	++	Current
Tocopherol 20% pet.		+	+?	Current
Fragrance mix I 8% pet.		+?		

^aThe patient was patch tested with the TRUE Test® supplemented with allergens according to the European baseline series and all of her own sunscreen products.

^bPhotopatch testing was carried out with a sunscreen series.

The use of sunscreens is a key component in the treatment of photosensitivity, and is recommended by dermatologists and public health campaigns for the prevention of sunburn, early skin ageing, and skin cancer (5). Unfortunately, adverse reactions to sunscreens are common. Patients with photosensitivity may be at greater risk, as they are exposed to a wide variety of potential allergens from the use of sunscreen products. In a study of 7 young adults with atopic dermatitis and photosensitivity, all were sensitized to at least one allergen from the European baseline series, a sunscreen series, and/or a special medicament series (4). Our patient reacted to octocrylene, butyl methoxydibenzoylmethane and tocopherol in her own sunscreen products, and was further sensitized to fragrance mix I in terms of photoaggravated contact allergy, as well as to formaldehyde and methylisothiazolinone. From the list of chemical UV filters, the

dibenzoylmethanes and octocrylene are among the most common sensitizers (6). They are among the most frequently used chemical UV absorbers in sunscreens (7). However, in children, octocrylene causes mostly allergic contact dermatitis, rather than photoallergic contact dermatitis (8), which is also confirmed by our case.

Exacerbation of a well-known dermatosis that cannot otherwise be explained should always lead to the suspicion of a complicating contact allergy, and, in cases of photoaggravation, patients should be photopatch tested to detect any (photo)allergic contact dermatitis to UV filters and other ingredients.

Acknowledgements

The skilled technical assistance of Lone Kortbek, DermaPharm A/S, in formulating the custom-made sunscreen products for our patient is acknowledged.

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