

The UV Filter Tinosorb M, Containing Decyl Glucoside, Is a Frequent Cause of Allergic Contact Dermatitis

To the Editor:

Tinosorb M (Chemotechnique Diagnostics, Vellinge, Sweden), an organic molecularly complex broad-spectrum UV filter composed of microparticles of methylene bis-benzotriazolyl tetramethylbutylphenol solubilized with decyl glucoside, propylene glycol, and xanthan gum, has rarely been described as a cause of allergic contact dermatitis (ACD). Because of its high efficacy and photostability, after 2000, it was introduced in the European and Australian markets but is still waiting approval by the Food and Drug Administration.

The authors performed a retrospective study to evaluate the frequency of ACD from Tinosorb M, patients' characteristics, and responsible allergens.

In the Unit of Cutaneous Allergology of the Dermatology Department of the University Hospital of Coimbra, Tinosorb M at 10% Petrolatum (pet) was included in the photoallergens series in 2009, initially within the European Multicentre Photopatch test study,¹ and since 2011, also in our cosmetic series for patch testing, patients with recurrent dermatitis localized mainly to the face.

Between February 2009 and April 2012, among the 1033 patients studied at the department, 92 were photopatch tested using the irradiation dosis of 5 J/cm² of UVA (Waldmann 7001 K), according to the guidelines published by the European Photopatch Test Task Force.² An additional 87 patients were patch tested with the cosmetics series including the UV filters, namely Tinosorb M (10% pet) and bis-ethylhexyloxyphenol methoxyphenol triazine (bemotrizinol or Tinosorb S, 10% pet) and lauryl glucoside (3% pet) from Chemotechnique Diagnostics. Patch tests were applied on the upper back, for 48 hours, using Finn Chambers on Scanpor tape (Epitest Ltd, Tuusula, Finland) or, occasionally, I-Q ultra chambers (Chemotechnique Diagnostics, Vellinge, Sweden). Readings were performed at D2 and D3/D4, according to the International Contact Dermatitis Research Group recommendations (Lindberg), considering only 1+ or more intense reactions. Several personal products (facial cosmetics, sunscreens, and topical drugs) were patch tested,

and rinse-off products (cleansing agents and shampoos) were tested using the semiopen method, applying a drop of the product in a 2 × 2 cm area and covering it, after drying, with a semipermeable tape for 48 hours (Mefix, Molnlycke Health Care, Finland).

During this period, positive patch tests to Tinosorb M were observed in 5 patients, 3 female and 2 male, between 39 and 66 years old. They had highly pruritic erythematous and scaly eczematous lesions with ill-defined borders, located mainly on the face and anterior neck (Fig. 1), with an evolution between 1 and 12 months, that recurred frequently despite topical corticosteroids (Table 1).

Positive reactions (1+ or 2+) to Tinosorb M at 10% pet (Fig. 2) had an equal intensity after irradiation with 5 J/cm² UVA in all patients.

Patient 1, the object of a previous publication,³ was patch tested with purified decyl glucoside at 5% pet, kindly supplied by An Goossens (Leuven, Belgium). He had a 2+ reaction to decyl glucoside and reacted to several cosmetics containing alkyl glucoside, specially lauryl-, xylityl-, cetearyl-, myristyl-, coco-, and arachidyl glucosides, and to his own sunscreen and to several other sunscreens containing Tinosorb M (Fig. 3).



FIGURE 1. Erythematous, scaly, pruriginous, and ill-defined plaques (face and cervical region) in patient 4.

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TABLE 1. Patient Characteristics and Patch Tests Reactions in the 5 Patients

	Patient 1, 2009	Patient 2, 2011	Patient 3, 2011	Patient 4, 2012	Patient 5, 2012
Sex/Age, y	M/66	F/52	F/64	M/64	F/39
Evolution	1 y	9 mo	1 mo	6 mo	4 mo
Localization	Face Anterior cervical region	Eyelids Anterior cervical region	Face Anterior cervical region	Face Anterior cervical region	Eyelids
Series tested	BS, CP, PA, OP	BS, CP, PA, OP	BS, CP, PA, OP	BS, CP, PA, OP	BS, CP, PA, OP
Tinosorb M 10% pet	D2++/D4++	D2+/D4+	D2+/D4+	D2+/D3++	D2+/D3++
Tinosorb S 10% pet	NEG	NEG	NEG	NEG	NEG
Glucosides	Decyl glucoside (5% pet) ++/++*	Lauryl glucoside (3% pet) +/+†	Lauryl glucoside (3% pet) +/+†	Lauryl glucoside (3% pet) ++/+++†	Lauryl glucoside (3% pet) ++/+++†
Other +PTs	Sunscreens containing Tinosorb M ++	Nickel ++ Myroxylon pereirae ++ Perfume mix I ++ Sunscreen ++	Sunscreen ++	Sodium metabisulfite ++	

*Lauryl glucoside was not tested.

†Decyl glucoside was not tested.

BS, Baseline Series of the European/Portuguese Contact Dermatitis Study Group; CP, cosmetics and preservatives series; F, female; M, male; OP, own products; PA, photoallergen series; PTs, patch test.

All the other 4 patients reacted with 2+ to 3+ to lauryl glucoside at 3% pet and 2 also reacted to their own cosmetics containing glucosides. Decyl glucoside was not commercially available for patch testing.

None of the 5 patients reacted to Tinosorb S (bisethyl-hexyloxyphenol methoxyphenol triazine or bemotrizinol).

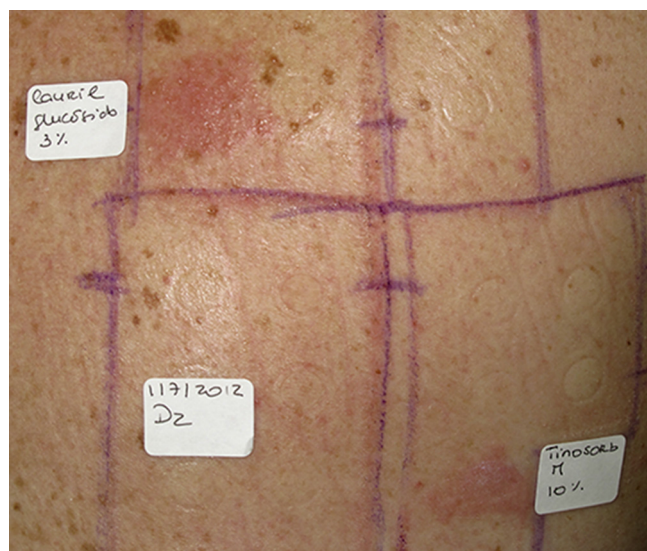


FIGURE 2. Patch tests: positive reaction (++) to Tinosorb M (10% pet) and lauryl glucoside (3% pet) in patient 5.



FIGURE 3. Patch tests: positive reaction (++) to Tinosorb M (10% pet), decyl glucoside (5% pet), and several commercial sun products with Tinosorb M in patient 1.

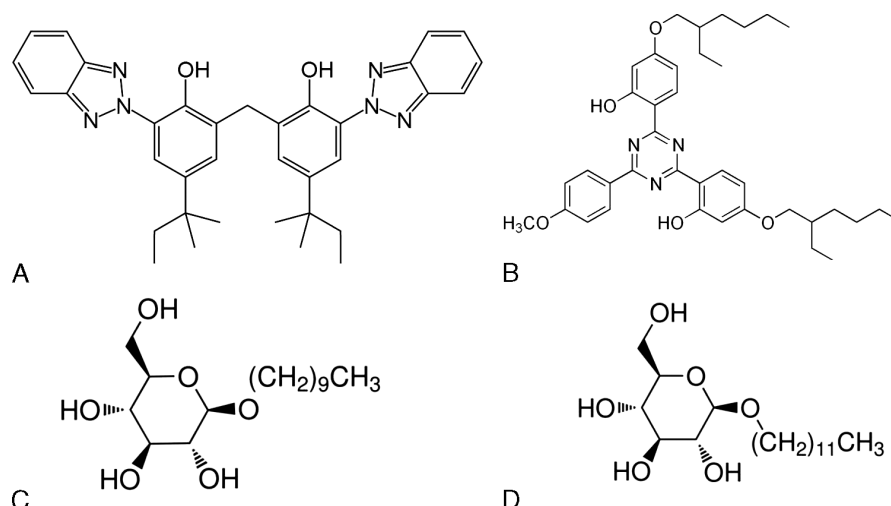


FIGURE 4. Chemical structure of (A) methylene bis-benzotriazolyl tetramethylbutylphenol also known as bisotrizole or Tinosorb M; (B) bis-ethylhexyloxyphenol methoxyphenyl triazine, also known as bemotrizinol or Tinosorb S; (C) decyl glucoside; and (D) lauryl glucoside.

The eviction of sunscreens with Tinosorb M and cosmetics with alkyl glucosides allowed the cure or very significant improvement of the facial dermatitis in these patients.

Tinosorb M is the first sunscreen of this kind that combines the advantages of organic and physical filters. Its active compound, with the International Nomenclature of Cosmetic Ingredients name methylene bis-benzotriazolyl tetramethylbutylphenol or bisotrizole (Fig. 4), forms small microparticles that are poorly soluble either in water or oil; therefore, they are stabilized by decyl glucoside to achieve dispersion in the aqueous phase of the cosmetic emulsions and also in the patch test formulation.

Although in these patients with ACD to Tinosorb M we did not test with the pure methylene bis-benzotriazolyl tetramethylbutylphenol, reactivity to alkyl glucosides in all 5 patients allow us to consider with a high probability decyl glucoside as the cause of ACD, as first noticed by Andersen and Goossens.⁴ Decyl glucoside was not tested in 4 patients because it is commercially unavailable for patch testing, but reactivity to lauryl glucoside (3% pet), interpreted as cross-reaction due to a similar chemical structure, also supports the responsibility of the glucoside in ACD from Tinosorb M.

Decyl glucoside, like other alkyl glucosides originating from the conjugation of an alkyl alcohol with glucose (Fig. 4), is a mild nonionic surfactant widely used in the cosmetic industry mostly as a mixture of several alkyl glucosides, especially in cleaning agents, shampoos, hair dyes, and occasionally, in leave-on products as in an antiseptic solution. Because of the difficulty in achieving a high purity and to their chemical similarity, either concomitant or cross-reactivity can explain contact allergy to several alkyl glucosides in the same patient,⁵ as in our case. Alkyl glucosides are very probably an

underreported cause of ACD in cosmetics,⁵ and a previous sensitization to alkyl glucosides through cosmetics may favor further reactivity to decyl glucoside in Tinosorb M.

Knowing the responsibility of decyl glucoside is also extremely important for the patient with contact allergy to Tinosorb M, given the great amount of cosmetics with alkyl glucosides, which should be avoided to achieve complete resolution of the facial dermatitis.

We also highlight, by ours and previous data,¹ the safety of bis-ethylhexyloxyphenol methoxyphenyl triazine commercialized under the trade name of Tinosorb S, a broad-spectrum UV filter whose chemical structure is very different from methylene bis-benzotriazolyl tetramethylbutylphenol (Tinosorb M, Fig. 4) and which does not need glucosides in the formulation.

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