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Contact allergy caused by Tinosorb® M: let us not forget about xanthan gum

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Case Report

A 9-year-old girl was referred to us with a suspected contact or photocontact allergy to a sunscreen (cream, SPF 50) which, after being used for ~2 days, caused an itchy and burning dermatitis on the face (Fig. 1) and arms, with subsequent widespread involvement. The ingredient list of the cream mentioned, among other components, octocrylene and methylene bis-benzotriazolyl tetramethylbutylphenol as ultraviolet (UV) filters; the latter is part of a mixture – together with propylene glycol, decyl glucoside, xanthan gum, and water – known as Tinosorb® M.

Patch tests were performed with the Belgian baseline series, containing propylene glycol 10% aq., and a photopatch series (applied in duplicate and containing the 'pure' filter methylene bis-benzotriazolyl tetramethylbutylphenol without any additives), both from Chemotechnique Diagnostics (Vellinge, Sweden), as well as with her own sunscreen and, additionally, decyl glucoside 5% pet. (AllergEAZE®; SmartPractice®, Calgary, Canada) and xanthan gum 1% aq. (an in-house preparation).

The tests were occluded for 2 days and then removed; one part of the two identical photopatch test series was irradiated with UVA 5 J. At D2 and D4, positive patch test reactions were seen to the sunscreen (+), equally strongly in both photopatch series, and to xanthan gum 1% aq. (+). No late reactions were observed. In order to further clarify these results, the manufacturer of the sunscreen



Fig. 1. A skin eruption on the face after application of a sunscreen, SPF 50, containing xanthan gum.

was contacted, and provided us with the separate ingredients to perform a second test series. These ingredients, among others, included: Tinosorb® M 67% aqueous solution, as a mixture of methylene bis-benzotriazolyl tetramethylbutylphenol, decyl glucoside, propylene glycol, xanthan gum, and water; octocrylene 8% pet.; and xanthan gum 10% aq. At D2 and D4, reactions were seen to the mixture Tinosorb® M (+) and to xanthan gum 10% aq. (++) (Fig. 2).

A summary of the results is outlined in Table 1. There was no history of intolerance to other cosmetic products, and nor did the girl ever react to food. After avoidance of the sunscreen product, and other topical products containing xanthan gum, no further skin eruptions have been observed.

Discussion and Conclusion

Xanthan gum (CAS no. 11138-66-2), a natural water-soluble resin and polysaccharide produced through

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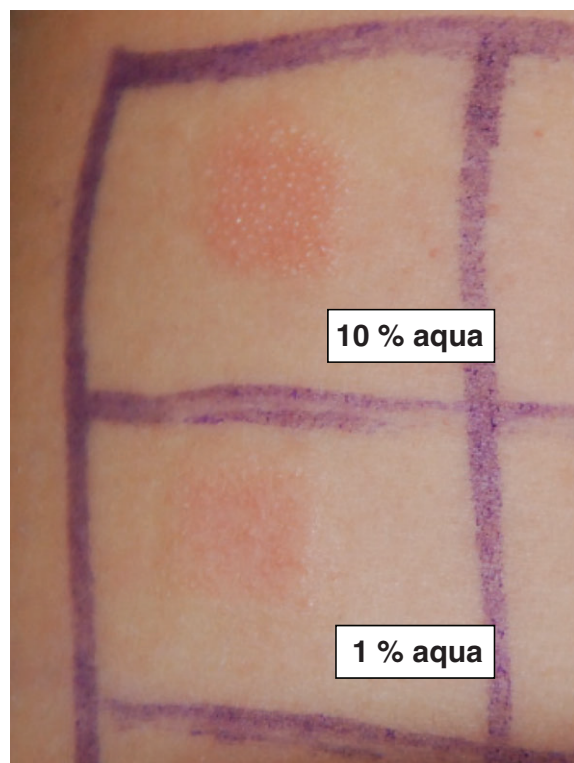


Fig. 2. Positive patch test reactions to xanthan gum 10% aq. (++) and 1% aq. (+) at D2.

Table 1. Summary of relevant patch test results

Allergen	D2	D4
Sunscreen (cream, SPF 50) 'as is'	+	+
Tinosorb® M 67% aq.*	+	+
Methylene bis-benzotriazolyl tetramethylbutylphenol 10% pet.†	–	–
Decyl glucoside 5% pet.	–	–
Xanthan gum 10% aq.	++	++
Xanthan gum 1% aq.	+	+
Octocrylene 10% pet.	–	–

*As provided by the manufacturer of the sunscreen: a mixture of methylene bis-benzotriazolyl tetramethylbutylphenol, propylene glycol, decyl glucoside, xanthan gum, and water.

†As article (catalogue) number M-037, from Chemotechnique Diagnostics (Vellinge, Sweden): 'pure' substance of methylene bis-benzotriazolyl tetramethylbutylphenol.

the fermentation of glucose, sucrose or lactose by the bacterium *Xanthomonas campestris*, is available as a fine powder and is widely used as a food additive (E415) in cosmetic products and in pharmaceuticals, in which it serves as a thickening agent, enhancing the viscosity. Moreover, hydrating, emulsifying, gel-forming and skin-conditioning properties have been attributed to it.

Less known applications include, for example, its use in thickening liquids for patients with swallowing disorders, as an alternative to gluten for gluten-allergic patients, as a key ingredient in 'fake blood' products, as a part of special effects makeup, and non-medical, recreational purposes (e.g. '81Zombie' Fake Blood; 81Zombie®, York, UK). Despite its widespread use, this large biopolymer seems to be an infrequent sensitizer, and up to now only one case has been mentioned, in which a maculopapular drug eruption was caused by it, owing to its presence in a syrup (1). Although allergy to saccharide polymers is considered to be rare, they have recently gained attention as relevant allergens in a body lotion and in a night cream (2, 3).

The exact sensitizing part of these large molecules remains unknown, and, taking into account the manufacturing process for xanthan gum, impurities probably cannot be excluded. Indeed, the fermentation process of bacteria can take place on many substrates (e.g. corn and wheat), and thus impurities from these substances, or residual bacterial contaminants, could theoretically still be present. In 2011, the US Food and Drug Administration discouraged the use of a particular xanthan gum-based thickening agent for premature infants, as concern had been raised that residual bacteria in the product might have been the cause of a necrotizing enterocolitis (4). From an occupational point of view, only one study has been published dealing with symptoms of nose and throat irritation in employees working with xanthan gum powder (5).

For patch tests, the test concentration and vehicle, as mentioned by de Groot, is a 10% aqueous solution (6), and although it is not available as a commercial patch test, it can be easily prepared by a (hospital) pharmacist. Our patient reacted down to 1% aq.

Xanthan gum, in a concentration range of 0.1–0.5%, is one of the four possible allergens present in the commercially used mixture of Tinosorb® M, which can cause photocontact or contact allergy through the use of sunscreens. In the majority of cases, decyl glucoside has been shown to be the main sensitizer, and this should always be tested for, in order not to miss contact allergy caused by this UV filter (7–10). However, as stressed in a recent report (7), whenever a mixture of ingredients is suspected as the cause, one should test all components in order to identify the actual sensitizer. Interestingly, two reports have been published showing contact allergic reactions to Tinosorb® M; in one case, no separate ingredients were tested (11), whereas in the other case, lauryl glucoside 3% pet., which is similar to decyl glucoside, which had

not been tested, was negative (12). Recently, a commercial patch test for the actual 'pure' filter has become available (methylene bis-benzotriazolyl tetramethylbutylphenol 10% pet., Chemotechnique Diagnostics) and future observations will show how important this compound may be in causing (photo)contact allergy.

In conclusion, we report a case of a young child with contact allergy to a sunscreen containing the mixture of Tinosorb® M, with methylene bis-benzotriazolyl

tetramethylbutylphenol as the UV filter, in which xanthan gum, and not decyl glucoside, was determined to be the culprit sensitizer. Our case shows the importance of testing all separate ingredients whenever a mixture of components is found to be the allergen source. Moreover, we confirm that carbohydrates, used without restrictions in cosmetics, pharmaceuticals, and food, may indeed cause allergic contact dermatitis.

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