

Contact Dermatitis Caused by Glucose Sensors: More Than Allergy to Isobornyl Acrylate

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Contact dermatitis is a rare condition in the Spanish pediatric population, as reported in *Alergologica* 2015 [1]. Allergic contact dermatitis induced by glucose sensors has recently been described in children with diabetes. Isobornyl acrylate (IBOA) is the culprit allergen in most cases. Other allergens involved include N,N-dimethylacrylamide colophony, Abitol, N,N-dimethylacrylate, and 2-ethylcyanoacrylate [2]. Various acrylates have also been reported to be sensitizers in occupational contact allergy [3]. We report 2 cases of cutaneous sensitization to other contact allergens that could be relevant in skin reactions to glucose sensors.

The first patient was a nonatopic 12-year-old boy with type 1 diabetes who presented with an eczematous plaque in the contact area of the Free Style (Abbot) glucose sensor. He had used the sensor for the previous 2 years. The Free Style sensor was removed and replaced with an IBOA-free sensor (Dexcom G6, Novalab), which was well tolerated.

Patch tests were performed with the Spanish Contact Dermatitis and Skin Allergy Research Group (GEIDAC) standard series and acrylate series (Chemotechnique Diagnostics). After 2 days in occlusion, the tests were read at 48 hours (D2) and 96 hours (D4) according to the criteria of the International Contact Dermatitis Research Group.

The second patient was a nonatopic 17-year-old boy with type 1 diabetes who presented with erythematous and vesicular plaque in the contact area of the Free Style (Abbot) glucose sensor. The sensor was removed and replaced by a Dexcom G6 (Novalab) device. One year later, he experienced the same skin reaction with the Free Style sensor. He tried to insert the sensor through a hydrocolloid barrier film without success. The skin lesion resolved with residual hyperpigmentation after the sensor was removed.

Patch tests were performed as in the first patient.

Positive reactions to IBOA were observed at D2 and D4 (+++) in both cases and to other relevant contact allergens such as hydroxyethyl methacrylate, triethylene glycol methacrylate, benzoyl peroxide, sesquiterpene lactones, colophony, and fragrance mix 1 (Table).

Table. Results of the Patch Tests With Contact Allergens

Contact allergen	Case 1	Case 2
Isobornyl acrylate	(+++)	(+++)
Hydroxyethyl methacrylate	(-)	(+)
Triethylene glycol methacrylate	(-)	(+++)
Benzoyl peroxide	(-)	(+++)
Sesquiterpene lactone mix	(-)	(+++)
Colophony	(+)	(-)
Fragrance mix 1	(+)	(-)

IBOA is the most frequently implicated acrylate in allergic contact dermatitis in patients with glucose sensors [4], although other acrylates and related substances may be responsible for sensitization. These include Abitol, N,N-dimethylacrylamide, hydroquinone, N,N-dimethylacrylate, 2-ethylcyanoacrylate, 2,6-di-tert-butyl-4-cresol, hydroxyethyl methacrylate, triethylene glycol methacrylate, and sesquiterpene lactones [5]. Therefore, these chemicals should be tested in patients with suspected allergy. Previous observations in large patch test series showed low cross-reactivity between IBOA and other acrylates, suggesting concomitant reactions to acrylates with different chemical structures [6].

The presence of IBOA in the Free Style device and its association with sensitization to this device have been widely demonstrated. In the case of the Dexcom device (Novalab), Oppel et al [7] did not detect IBOA. By contrast, Svedman et al [8] detected IBOA in the Dexcom devices using gas chromatography–mass spectrometry (GC-MS) [8]. Patient 1 in the present report tolerated the Dexcom sensor, thus supporting the absence of IBOA in the device. This patient was also sensitized to colophony [2], which is present in other devices such as the Enlite sensor (Medtronic) and had not presented eczematous reactions to dressings or adhesives in the past. In patient 2, the skin reaction could be due to the presence of IBOA, although he was also sensitized to other acrylates and to substances involved in the acrylate polymerization processes, such as benzoyl peroxide, which may be present in the sensor device. Since the patient had not previously received benzoyl peroxide for acne, this substance cannot account for a possible contact sensitization before using the device. Herman et al [5] found that patients sensitized to IBOA were also sensitized to sesquiterpene lactones. GC-MS did not reveal sesquiterpene lactones in the Free Style sensor. The authors considered that the simultaneous sensitization observed could be the result of cosensitization rather than cross-reactivity, owing to the presence of a common precursor for IBOA and lactones, such as camphene.

Mowitz et al [9] recently described a new contact allergen in the Dexcom G6 system, namely, 2,2'-methylenebenis (6-tert-butyl-4-methylphenol) monoacrylate. This component is not commercially available for patch testing. Therefore, we could not assess the implication of this substance as a possible cause of sensitization in the cases we report.

FreeStyle Libre 2 is a new IBOA-free sensor and could be an option for the first patient.

2,6-Di-tert-butyl-4-cresol is part of the new adhesive and should be included in the allergen series used to assess patients who present with contact dermatitis after using FreeStyle Libre [2].

Patient 2 probably does not have an alternative glucose sensor owing to sensitization to multiple contact allergens, some of which are involved in acrylate production.

The new Eversense system, which is inserted subcutaneously into the arm, could be an option [10]. The transmitter is placed immediately above the sensor by a silicone adhesive; alternatively, it can be placed with an elastic band to avoid adhesives. These sensors are currently funded by the Spanish National Health System.

In conclusion, we present 2 cases of contact dermatitis due to glucose sensors. In the first, the change to an IBOA-free sensor was well tolerated, while in the second, after 2 reactions to different sensors, the patient is awaiting approval for tolerance testing with Eversense.

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Conflicts of Interest

The authors declare that they have no conflicts of interest.

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