

CONTACT POINT

Photoallergic contact dermatitis due to benzophenone contained in swimming goggles

Gemma Melé-Ninot¹  | Maribel Iglesias-Sancho¹ | Ola Bergendorff² |
Anna I. Lázaro-Simó¹ | Mònica Quintana-Codina¹ | Montse Salleras-Redonnet¹

¹Department of Dermatology, Hospital Universitari Sagrat Cor, Barcelona, Spain

²Department of Occupational and Environmental Dermatology, Lund University, Skane University Hospital, Malmö, Sweden

Correspondence

Dr Gemma Melé-Ninot, Department of Dermatology, Hospital Universitari Sagrat Cor, Viladomat Street 288, 08029 Barcelona, Spain.

Email: gemmameleninot@gmail.com

KEYWORDS: benzophenone, photoallergic contact dermatitis, photopatch test, swimming goggles

Photoallergic contact dermatitis (PACD) is a delayed-type reaction that occurs when an exogenous agent contacts the skin, which is then exposed to ultraviolet (UV) and/or visible radiation.¹ We herein present the first case of PACD caused by benzophenone in swimming goggles.

CASE REPORT

A 66-year-old man developed a red periorbital pruritic rash that began 12 hours after wearing his new Arena Orbit 2 swimming goggles in an outdoor pool. He presented with eyelid, periorbital, and scalp erythema as well as vesicles and edema (Figure 1). We performed a patch test with the Spanish baseline series, rubber and plastics/glues series (Martitor, Barcelona, Spain), and two pieces of rubber from the eye and the scalp zones of the goggles "as is". Test series were applied on

the back under occlusion for 48 hours in Curatest and readings were performed on day (D) 2, D4, and D8. Positive reactions were found to quaternium-15 1% pet. (D2, D4, and D8++), *p*-*tert*-butylphenol formaldehyde resin 1% pet. (D8++), and benzoyl peroxide 1% pet. (D4 and D8+) with unknown relevance. The patient showed no reaction to the pieces of the goggles.

Due to the impossibility of contacting the manufacturer (Arena), we performed high-performance liquid chromatography as well as gas chromatography with mass spectrometry; the results showed the presence of benzophenone (CAS no. 119-61-9) in the goggles. Chemical analysis could not identify any other compounds to which the patient had reacted previously. Suspecting contamination, we asked the patient whether he used sunscreen while wearing swimming goggles, which he denied because he had previous reaction to sunscreens. Photopatch testing with sunscreen series (Chemotechnique



FIGURE 1 Acute eczematous reaction in the area where the swimming goggles were in skin contact following sun exposure

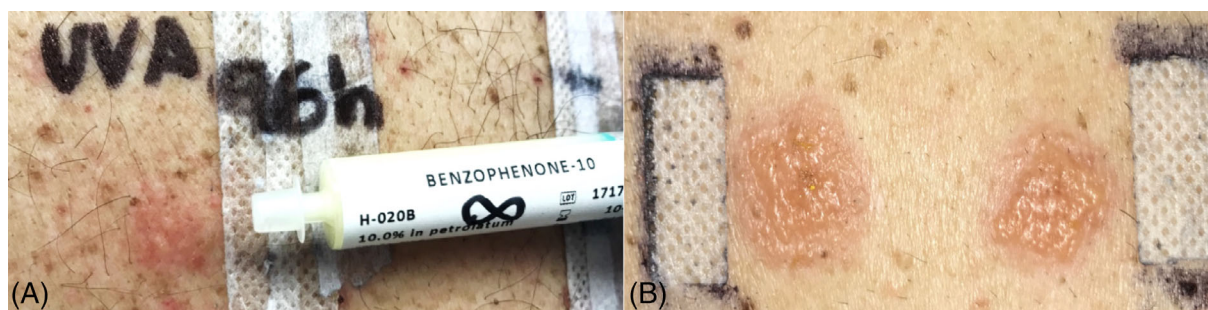


FIGURE 2 Photopatch test showing a reaction (D4, D7 ++) to benzophenone-10 10% pet. (A) and to the patient's own swimming goggles (B) only on sites irradiated with UVA at 5 J/cm²

Diagnostics) and with two pieces of rubber from his goggles “as is” was carried out by applying the allergens on one side of the back for 48 hours and exposing them to ultraviolet A (UVA) at 5 J/cm². Readings were performed on day D2, D4, and D7 according to ESCD guidelines. Photopatch tests showed photoallergy to benzophenone-10 10% pet. (++) and to the piece of the goggles (++) on D4 and D7 (Figure 2). Photopatch testing with a piece of rubber from the goggles “as is” yielded negative results in eight controls. After being able to identify benzophenone in his goggles, test results suggested that the patient suffered PACD caused by benzophenone contained in swimming goggles. He was also advised to avoid all sunscreens containing benzophenones.

DISCUSSION

Benzophenones are chemical UV light absorbers used in sunscreens and cosmetic and industrial products to reduce photodegradation. Benzophenones were named Contact Allergen of the Year by the American Contact Dermatitis Society in 2014 to raise awareness of allergic contact dermatitis (ACD) and PACD caused by these ubiquitous aromatic ketones.^{2,3} Benzophenone identified in our patient's goggles has recently been recognized as the culprit allergen in plastic amusement park wristbands³ and is the simplest and non-derivatized member of the benzophenone-type UV-absorbers. Research has shown that benzophenone-3 has a high share of cross-reactivity with octocrylene and ketoprofen.² In our patient, a reaction to octocrylene was negative. Unfortunately, it was not possible to test ketoprofen or non-derivatized benzophenone.

Several cases of ACD caused by swimming goggles have been reported due to dibutylthiourea,⁴ antioxidant amines,⁵ phenol-formaldehyde resin, and benzoyl peroxide,⁶ and one case presented as leukoderma with silprene-30A/B as the responsible allergen.⁷ Nevertheless, there are no previous reports of PACD caused by swimming goggles and we report the first case due to benzophenone contained in them.

CONFLICT OF INTEREST

None.

ORCID

Gemma Melé-Ninot  <https://orcid.org/0000-0003-0365-0634>

REFERENCES

1. Kerr A, Ferguson J. Photoallergic contact dermatitis. *Photodermatol Photoimmunol Photomed*. 2010;26:56-56, 65.
2. Heurung AR, Raju S, Warshaw EM. Benzophenones. *Dermatitis*. 2014; 25:3-10.
3. Tanahashi T, Sasaki K, Numata M, Matsunaga K. Three cases of photoallergic contact dermatitis induced by benzophenone in amusement park wristbands. *Contact Dermatitis*. 2019;80:191-193.
4. Alomar A, Vilaltella I. Contact dermatitis to dibutylthiourea in swimming goggles. *Contact Dermatitis*. 1985;13:348-349.
5. Romaguera C, Grimalt F, Vilaplana J. Contact dermatitis from swimming goggles. *Contact Dermatitis*. 1988;18:178-179.
6. Azurdia RM, King CM. Allergic contact dermatitis due to phenol-formaldehyde resin and benzoyl peroxide in swimming goggles. *Contact Dermatitis*. 1998;38:234-235.
7. Sakuragi Y, Sawada Y, Nakamura M. Leukoderma following allergic contact dermatitis caused by the silicone component silprene-30A/B in swimming goggles. *Contact Dermatitis*. 2017;77:418-419.

How to cite this article: Melé-Ninot G, Iglesias-Sancho M, Bergendorff O, Lázaro-Simó AI, Quintana-Codina M, Salleras-Redonnet M. Photoallergic contact dermatitis due to benzophenone contained in swimming goggles. *Contact Dermatitis*. 2019;1-2. <https://doi.org/10.1111/cod.13386>