

CONTACT POINT

Allergic contact dermatitis caused by plastic items containing the ultraviolet absorber drometrizole

Marianne Hald¹  | Ola Bergendorff² | Marlène Isaksson² | Jeanne D. Johansen³

¹Department of Dermatology and Allergy, Herlev and Gentofte Hospital, University of Copenhagen, Hellerup, Denmark

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

³Department of Dermatology and Allergy, National Allergy Research Centre, Herlev and Gentofte Hospital, University of Copenhagen, Hellerup, Denmark

Correspondence

Dr Marianne Hald, Department of Dermatology and Allergy, University of Copenhagen, Herlev and Gentofte Hospital, Kildegårdsvej 28, 2900 Hellerup, Denmark.
Email: marianne.hald@regionh.dk

KEYWORDS: allergic contact dermatitis, CAS no. 2440-22-4, case report, drometrizole, plastic allergy, Tinuvin P

Various types of additive are used in the production of plastic products. Some plastics contain considerable amounts of these additives, which may migrate to the surface and cause irritant or allergic contact dermatitis. Drometrizole (2-[2-hydroxy-5-methylphenyl] benzotriazole) (CAS no. 2440-22-4) (Figure 1) is an ultraviolet (UV) light absorber and stabilizer used in plastic and rubber products, and in dyes, synthetic and natural fibres, waxes, and detergents. Drometrizole may be used as an ingredient in cosmetics without any restrictions.¹ The extent of use in cosmetics is unknown, but it has been reported in hair care products and nail care products. The purpose of drometrizole is to prevent UV light from causing discolouration and deterioration of the material to which it is added.² Only a few reports of contact allergy to drometrizole have previously been published. We report a patient who developed allergic contact dermatitis after using different consumer products made of plastic containing drometrizole.

CASE REPORT

A 27-year-old woman was referred with a history of eczema that had developed on 3 different occasions. One episode of eczema occurred where the nose pads of a pair of sunglasses were in contact with the skin. Furthermore, the patient developed eczema on the tops of her feet after using a pair of flip-flops with rubber straps. Finally, she noticed eczema on her left wrist in a period during which she used a Misfit watch with a wristwatch rubber strap (Figure 2). After she ceased using the respective items, the eczema totally disappeared.

At our clinic, patch testing was performed with the European baseline series, including departmental extensions to it, as well as with more specialized series with fragrances and rubber chemicals and plastics/glues (AllergEAZE, Barsbüttel, Germany), and the test

material from the patient's own nose support pads, wristwatch strap, and sandal rubber straps. Test series were applied on the back under occlusion for 48 hours in Finn Chambers (8 mm; Smartpractice, Phoenix, Arizona) on Scanpor tape (Norgesplaster, Alpharma, Vennesla, Norway). Patch test readings were all performed on day (D) 2, D4, and D8, according to ESCD guidelines.³ Positive reactions were found to drometrizole (+? on D2; + on D4; +? on D8) and the sandal rubber straps (+ on D4; +? on D8), and a doubtful reaction was found to the Misfit wristwatch strap on D4. The patient had no reaction to the sunglasses.

In the department of Occupational and Environmental Dermatology, Skåne University Hospital, Malmö, Sweden, chromatographic analyses were performed with a high-performance liquid chromatography (HPLC) method suitable for identifying allergens in rubber items.⁴ Each sample from the sandal rubber straps, wristwatch strap and nose pads was cut into small pieces. The samples were placed in 10-mL test tubes with Teflon-lined screw caps containing 5 mL of acetone (Scantec, Nordic Partille, Sweden). The test tubes were placed on a rocker and, after 10 minutes of extraction at room temperature, the extracts were pipetted into round-bottomed flasks and evaporated under vacuum. The extracts were then dissolved in 1 mL of acetonitrile, which was filtered before injection onto the HPLC

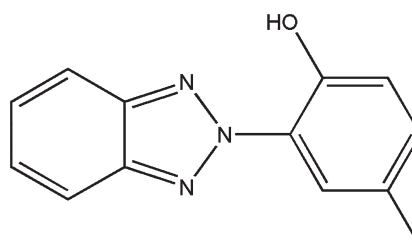


FIGURE 1 Chemical structure of drometrizole



FIGURE 2 Allergic contact dermatitis caused by drometrizole in a rubber wrist strap

column. A reversed-phase column (Alltima C18, 4 mm, 150 × 4.6 mm, polyether ether ketone [PEEK]-lined; Alltech Associates, Deerfield, Illinois) was eluted with acetonitrile and aqueous zinc sulfate (10^{-5} mol/L) at a ratio of 50:50 for 5 minutes, and then with a linear gradient to 100% acetonitrile for 35 minutes. The eluent was pumped with an Agilent 1260 (Agilent Technologies, Santa Clara, California) at a flow rate of 1 mL/min, and monitored at 325 nm with an Agilent 1100 Series diode-array detector (Agilent Technologies). All devices in contact with the mobile phase after the injector were made of PEEK. Drometrizole was identified after comparison of retention times and UV spectra of a reference sample obtained from Sigma-Aldrich (Steinheim, Germany) recorded by the diode-array detector, and the concentrations in the samples were determined after comparison of areas of sample peaks with the area of the reference with a known concentration. Duplicate analyses were performed for each sample.

The chromatographic analysis used is suitable for the identification of a large number of rubber allergens, but nothing other than drometrizole could be identified from the chromatograms (Figure S1). The retention time of drometrizole was 23 minutes, and all sample peaks eluting at 23 minutes had a UV spectrum that was completely identical to that of drometrizole (Figure S2). We determined the concentrations of drometrizole to be 1.8 mg/g in the plastic from the sunglasses, 0.7 mg/g in the wristwatch strap, and 1.1 mg/g in the strap from the rubber sandal. Hence, the patient was diagnosed with allergic contact eczema caused by drometrizole in her sunglasses, flip-flops, and Misfit wristwatch strap.

DISCUSSION

Allergic contact eczema caused by drometrizole has only been reported a few times. The previous reports concern allergic contact

eczema caused by drometrizole used as a cosmetic ingredient in a sunscreen cream, a nail varnish, and a face cream.^{5,6} Reports of contact allergy caused by drometrizole in a plastic wrist strap⁷ and a spandex tape⁸ sewn into underwear have also been published.

When patients with eczema caused by plastics are examined, it is important to obtain detailed information about the composition, in order to establish the possible presence of any UV absorber. However, information on the contents of plastic consumer products, in this case sunglasses, a wristwatch, and flip-flops, can be difficult to obtain, which complicates the identification of the relevant allergen. In this case, chromatographic analyses were applied to detect drometrizole in the used items.

Conflict of interest

The authors declare no potential conflict of interests.

ORCID

Marianne Hald  <http://orcid.org/0000-0001-9535-8846>

REFERENCES

1. http://ec.europa.eu/growth/tools-databases/cosing/index.cfm?fuseaction=search.details_v2&id=33741. Accessed February 14, 2018.
2. The Cosmetic Ingredient Review Expert Panel. Amended final report of the safety assessment of drometrizole as used in cosmetics. *Int J Toxicol*. 2007;27(suppl 1):63-75.
3. Johansen JD, Aalto-Korte K, Agner T, et al. European Society of Contact Dermatitis guideline for diagnostic patch testing—recommendations on best practice. *Contact Dermatitis*. 2015; 73:195-221.
4. Bergendorff O, Persson C, Hansson C. High-performance liquid chromatography analysis of rubber allergens in protective gloves used in health care. *Contact Dermatitis*. 2006;55:210-215.
5. Hughes TM, Martin JA, Lewis VJ, Stone NM. Allergic contact dermatitis to drometrizole trisiloxane in a sunscreen with concomitant sensitivities to other sun screens. *Contact Dermatitis*. 2005;52:226-227.
6. de Groot AC, Liem DH. Contact allergy to Tinuvin P. *Contact Dermatitis*. 1983;9:324-325.
7. Niklasson B, Björkner B. Contact allergy to the UV-absorber Tinuvin P in plastics. *Contact Dermatitis*. 1989;21:330-334.
8. Arisu K, Hayakawa R, Ogino Y, Matsunaga Y, Kaniwa M. Tinuvin P in a spandex tape as a cause of clothing dermatitis. *Contact Dermatitis*. 1992;26:311-316.

SUPPORTING INFORMATION

Additional Supporting Information may be found online in the supporting information tab for this article.

How to cite this article: Hald M, Bergendorff O, Isaksson M, Johansen JD. Allergic contact dermatitis caused by plastic items containing the ultraviolet absorber drometrizole. *Contact Dermatitis*. 2018;1-2. <https://doi.org/10.1111/cod.13007>

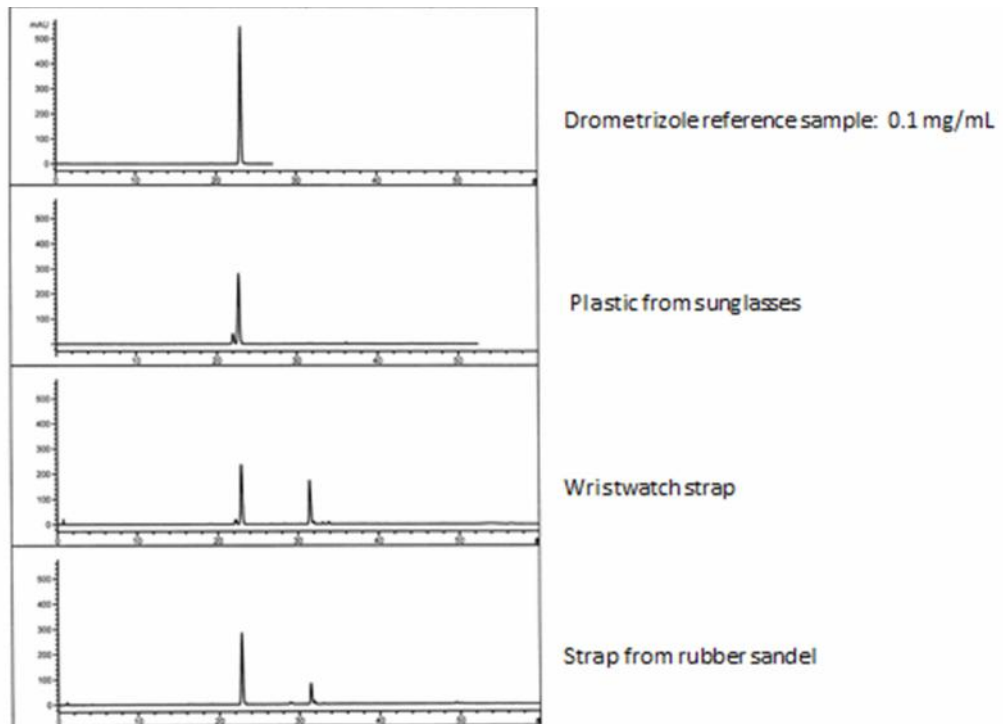


Fig. 1:
Chromatographic analyses identifying drometrizole were performed with a high-performance liquid chromatography (HPLC) method suitable for identifying allergens in rubber items.

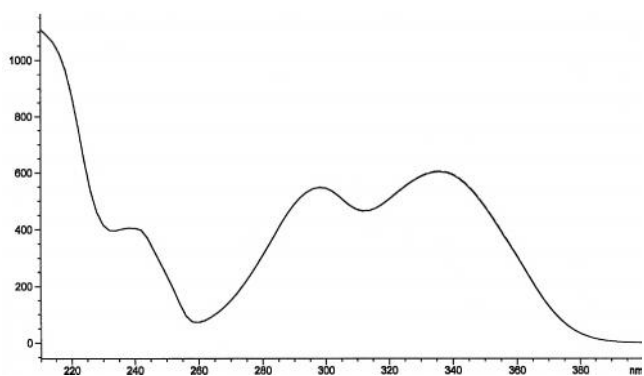


Fig. 2:

UV-Spectrum of the peak at 23 min in the chromatograms obtained from the chemical analysis of the patient's products. An identical spectrum was obtained from a reference sample of drometrizole.