

Occupational allergic contact dermatitis caused by benzisothiazolinone in printing ink and soap

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Benzisothiazolinone (1,2-benzisothiazolin-3-one or BIT) is an antimicrobial agent used as a preservative in multiple water-based solutions, such as glues, cleaning agents, polishes, paints, varnishes, and hardeners (1). The use of this preservative is allowed in household and industrial products (2); however, its use in cosmetics is not allowed (3). It may occasionally be present in PVC gloves (4) and (imitation) leather shoes (5, 6).

BIT has been recognized as an allergen since 1976 (2), owing to its use in many different occupations, for example carpet, water-softener, air-freshener and paint manufacturing, in painters, pottery workers, paper makers, woodwork teachers, plumbers, metal workers, and laboratory technicians (4). In addition to reports of multiple cases caused by direct skin contact, systemic skin reactions following airborne exposure to BIT have been described (2).

Two previous reports concerned reactions to BIT in the printing industry, namely in a silk-screen printer (7) and a lithographic printer, respectively (8). In the latter case, gum arabic preserved with BIT was used to coat the printing roller. However, allergic contact dermatitis in professional printers caused by exposure to BIT in printing ink itself has, to our knowledge, not been previously described. Here, we present 2 such cases.

Case Reports

Case 1

A 31-year-old atopic male was referred with eczematous dermatitis affecting both hands. There was no history of previous contact allergy. As the patient was employed as a printer, he had contact with printing ink on a daily basis.

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Fig. 1. Allergic contact dermatitis on the back of the hands caused by benzisothiazolinone in printing ink and liquid soap (case 2).

Patch testing was performed with the European baseline series, an oil series, and the acrylates series (Chemotechnique, Vellinge, Sweden), by the use of van der Bend® chambers (van der Bend, Brielle, The Netherlands) mounted on Micropore® (3 M, St Paul, MN, USA), and the tests were fixed on the intact skin of the back with Mefix® (Mölnlycke® Health Care, Göteborg, Sweden).

Readings were performed according to ESCD (9) guidelines on day (D) 2 and D4. The patient only reacted positively (+ on both D2 and D4) to BIT 0.05% in pet., which was found to have been added as a biocide to the water-based printing ink used at the printing office in which he was employed. He was informed about his contact allergy to BIT, and advised to avoid exposure. He changed his job, which resulted in complete remission of his hand eczema.

Case 2

A 27-year-old non-atopic male presented to us with eczematous dermatitis on his hands (Figs. 1 and 2) and



Fig. 2. Hyperkeratotic lesions on the hand palms (same patient), with some spread of the dermatitis to the wrists.

feet. Patch testing 8 years previously had shown positive reactions to nickel and cobalt, which had not been considered to be relevant for his skin problem. His occupation consisted of printing foil, which was used to coat furniture, and parquet and laminate floor panels. During work, he would also wash his hands many times a day with a 'mild liquid soap'.

Patch testing was performed, by use of the same methods and materials as described for case 1, with the European baseline series, a shoe series, fragrance mix I ingredients, and the patient's own material. Positive reactions were observed to fragrance mix I (+ on D2, and ++ on D4), and to cinnamal (+ on both D2 and D4), which were not considered to be relevant to the present skin condition, but also to BIT (++ on both D2 and D4), which was found in the biocide added to the water-based printing ink, and to our surprise, also in

the liquid soap used at work. Upon our advice to avoid exposure to this preservative, he also changed his job and became completely symptom-free, including on his feet.

Discussion

Here, we describe 2 cases of occupational allergic hand dermatitis caused by BIT added as a biocide to printing inks, one used on paper, and the other on foils used for furniture and wooden floors. In case 2, BIT was also present in the liquid soap that the patient came into contact with daily at work. This biocide has been reported to be present in imitation leather shoes and in certain glues used in leather shoes (5, 6), and the dermatitis on the patient's feet also disappeared. However, combined foot and hand eczema is a common finding both in patients with occupational dermatitis and in those with non-occupational contact dermatitis (10).

These cases show occupation-induced sensitization to the isothiazolinone derivative BIT in printing inks, but also in a cosmetic product, that is, a liquid soap used at the workplace, in which use is illegal. Also, in 2012, the Scientific Committee on Consumer Safety (11) expressed its concerns about its sensitizing properties, which are similar to those of methylisothiazolinone; hence, use of BIT in cosmetics has not been considered to be safe. Furthermore, we would like to highlight again the importance of full ingredient labelling, independently of concentration, on products used at the workplace, e.g. one in which printing inks are used. The workers involved should also be educated about sensitizing chemicals and proper protective measures.

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