

Systemic allergic dermatitis following airborne exposure to 1,2-benzisothiazolin-3-one

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1,2-Benzisothiazolin-3-one (BIT) is a preservative used to prevent the growth of microorganisms in a number of industrial and household products, such as glues, cleaning agents, polishes, paint, and hardeners (1). BIT has been recognized as an allergen since 1976 (2), and has the ability to cause contact dermatitis with a sensitization rate of 1.3% (3). Severe skin reactions after direct cutaneous exposure to BIT have been reported in many different occupations (4–7). However, systemic contact dermatitis (8, 9) after inhalation, caused by airborne exposure to BIT, has, to our knowledge, never been described before.

Case Report

A 35-year-old man with no history of previous skin disease was referred to our department in 2009 with severe dermatitis affecting the hands and face after work-related exposure to Proxel™, in which the active agent is BIT. His

job involved pouring Proxel™ into a reservoir that was not completely closed tight, and this often led to spillage. The patient had handled Proxel™ while wearing cotton clothing, latex gloves, and a rubber facemask. Allergy testing performed at the time of referral showed a positive patch test reaction to BIT (test preparation, 0.1% pet.). No other allergies were detected, including a negative prick test result for latex. Further investigation did not show BIT in any other chemicals used in the factory. Even after moving to a different department without direct exposure to BIT, the patient had dermatitis aggravation when moving around in the factory or after contact with colleagues still working with Proxel™.

In 2011, the patient was referred again with chronic dermatitis, still affecting the face and hands, but now also intermittently affecting the axillae, abdomen, elbow flexures, and popliteal folds, even though the patient had been careful to avoid contact with BIT during the last 2 years (Figs. 1–3). The patient was still working in the same factory, but in a different department where BIT was not used. At this point in time, the patient also developed flares of severe systemic dermatitis in his spare time when entering newly painted rooms or stores selling paint. Patch testing was performed with the European baseline series, the extended series and the perfume series with Finn Chambers® (8 mm; Epitest Ltd, Oy, Finland) on Scanpor®

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Fig. 1. Dermatitis affecting the abdomen and elbows.



Fig. 2. Dermatitis affecting the axillae.



Fig. 3. Dermatitis affecting the popliteal folds.

tape (Norgesplaster A/S, Alpharma, Vennesla, Norway) applied to the upper back, occluded for 48 hr, and

read on day 2, day 4, and day 7. Readings showed a number of new contact allergies, such as those to sorbic acid, chlorhexidine diacetate, different perfume chemicals, and chrome, but also methylisothiazolinone (MI) and methylchloroisothiazolinone (MCI) used in paints. Because of the severe dermatitis, the patient had to discontinue work for a longer period, and his personal life had to be reorganized as a consequence of the new allergies. The dermatitis is now slowly subsiding upon treatment with local steroid, systemic prednisolone, and azathioprine.

Discussion

We present a case with severe contact dermatitis caused by both airborne and direct cutaneous exposure to the chemical agent BIT. Later testing showed that, over time, the patient had also developed allergy to a number of other chemicals, including MI/MCI.

This is the first reported case of systemic allergic dermatitis after airborne exposure to BIT. Systemic allergic dermatitis is characterized by a cutaneous reaction in response to systemic exposure to an allergen, owing to type IV hypersensitivity (10). Although contact dermatitis caused by direct contact with BIT is well known (4–7), systemic allergic dermatitis caused by BIT has never been reported previously. However, rhinitis and asthma caused by inhalation of BIT have been reported, indicating that airborne exposure to BIT can indeed cause harmful reactions (11).

In this case, the patient also developed an allergy to MCI/MI, which is also used as a preservative in various household and industrial products, and, like BIT, is known to be an allergen (1). MCI/MI is already recognized as a source of airborne contact dermatitis (12), but although BIT and MCI/MI are structurally related (3) and concomitant allergies have been reported before (4), it seems that these represent two separate sensitizations rather than a cross-reaction (6, 13, 14). However, it cannot be excluded that the often concomitant allergies could result from a common metabolic process.

The knowledge that airborne exposure to BIT can cause systemic contact dermatitis is important for the dermatologist, as a lack of awareness may result in underestimation of the clinical problem and lead to insufficient guidance of the patient. Although this case suggests that airborne exposure to BIT can cause systemic contact dermatitis, other cases and studies are warranted in order to fully establish this association.

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