

Danger from the workplace: allergic contact dermatitis from the first exposure to isothiazolinones

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The preservative mixture of methylchloroisothiazolinone and methylisothiazolinone (MCI/MI) is frequently used in wood stains, latex emulsions, adhesives, cooling tower water, metalworking fluids, cleaning and polishing agents, wood and leather preservatives, and cosmetic and toiletry products (1). The concentrated mixture is a potential irritant as well as a contact allergy-inducing agent. We present an unusual case of allergic contact dermatitis caused by MCI/MI occurring after a single exposure.

Case Report

A 29-year-old man presented with erythema, dermatitis with vesiculation, and large blisters on his upper thigh and left arm (Fig. 1a). A similar, but less pronounced, finding was made on the left arm, forehead, and fifth digit of his right foot. Fifteen days prior to presentation, he had been cleaning a cooling tower (Fig. 1b), using Calcolith-Z[®] and Biocil-I[®] during a 15-hr shift. The patient had used a dust mask with an activated charcoal filter and protection glasses. The day after exposure, erythema appeared on the left upper thigh and arm, which gradually cleared. Ten days after exposure (5 days prior to presentation), and with no further exposure to industrial chemicals or allergen-containing personal products, the pruritic, erythematous dermatitis relapsed in the same areas. Examination revealed vesicles and bullae on the two following days. Total serum IgE 20 days after exposure

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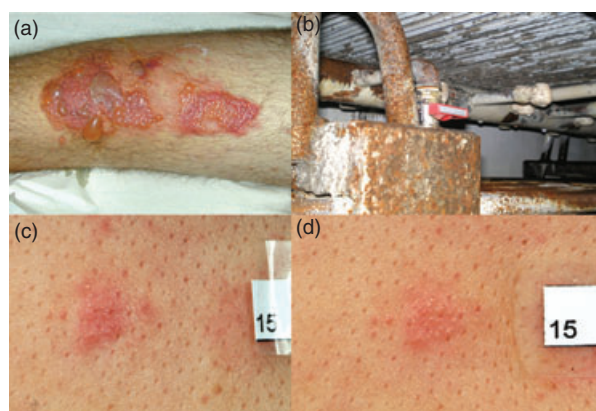


Fig. 1. (a) Clinical picture 15 days after cleaning the tower. The patient's left upper thigh showed erythema with sharply marked borders about 30 cm in size, vesicles, and bullae. (b) Inside the 'cooling tower', where exposure to the chemicals had occurred. (c) Positive patch test reaction to MCI/MI 100ppm aq. after 48 hr. (d) Positive patch test reaction to MCI/MI 100ppm aq. after 72 hr.

was elevated, at 135 kU/l. The patient had been previously healthy, with no personal or family history of atopy.

Chemical exposure

Calcolith-Z[®] is a component used to detach calcareous deposits. The supplier recommends a 1:16 dilution in water prior to use. The patient reported that he might have made a mistake in the dilution, and used a stronger concentration. Calcolith-Z[®] consists of <23% hydrochloric acid and <2% aryl ammonium chloride. The concentrated solution has a pH of <1, and has corrosive effects on the eyes, respiratory tract, and skin; however, so far, no sensitization to the component substances has been reported.

Biocil-I® is used as broad-spectrum biocidal substance. It contains a total isothiazolinone concentration of <3% with a ratio of methylchloroisothiazolinone (CAS 26172-55-4) to methylisothiazolinone (CAS 2682-20-4)) of 3:1. With a pH of <3, it can have corrosive effects on the skin, eyes, and respiratory/gastrointestinal tract, and is a well recognized skin sensitizer (2–4).

Patch testing

Patch testing and readings were performed with standardized techniques, with the application of Finn Chambers® (Epitest Ltd, Oy, Tuusula, Finland) affixed with Scanpor tape (Norgesplaster A/S, Vennesla, Norway) to the upper back. Allergens were purchased from Hermal (Reinbek, Germany). Tests remained in place for 2 days, and sites were initially evaluated at 2 days and 3 days (5). The patient showed a positive reaction to MCI/MI (100ppm aqua; Fig. 1c,d). The other substances of the European baseline series were negative.

Discussion

The patch test results support our hypothesis that exposure to a sensitizing and irritating substance led to primary sensitization persisting in the skin and leading to contact sensitization. Subsequently, an allergic

contact dermatitis developed after 10 days. An allergic type IV reaction would have typically started 48 hr after exposure in a sensitized individual. Primary sensitization normally takes about 10 days to develop. Because there was no known further exposure to MCI/MI, occupationally or in personal products, we assume that the isothiazolinones had persisted in the skin. This hypothesis is strengthened by the findings of Jayjock et al., who showed the persistence of radioactively labelled methylchloroisothiazolinone in the skin over several days (6). Upon topical steroid application and avoidance of further exposure at the working site, the patient experienced complete remission of the skin lesions within 6 weeks. Subsequently, he developed dermatitis and pruritus as a result of using personal care products such as shampoos and liquid soaps containing isothiazolinones. Besides the necessary change of workplace, he was advised to avoid isothiazolinones in cosmetic and toiletry products.

MCI/MI has a high frequency and potency of sensitization, and is included in baseline patch test series. Although contact dermatitis caused by MCI/MI is well described in industrial workers (7), this is an unusual case of a clinical manifestation of allergic contact dermatitis occurring after a single exposure.

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