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Hand dermatitis aggravated by contact allergy to methylisothiazolinone in protective nitrile gloves

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Methylisothiazolinone (MI) is a frequent sensitizer in cosmetics, household detergents and industrial products.¹ In the occupational setting, the use of protective (nitrile) gloves is often recommended to limit exposure to this preservative, and to prevent allergic contact dermatitis. We here describe a case of hand dermatitis aggravated by MI sensitization, and we discuss different exposure sources.

CASE REPORT

A 57-year-old non atopic man, working as a plumber, suffered from hand eczema since 10 years, which improved when being off work. Although he used protective nitrile gloves (ActivArmr Hycron 27-805; ANSELL), he described worsening of his hand dermatitis 3 days after resuming work. Patch tests were performed with the European base-line series, preservatives and a piece of his (used) gloves (semi-open test). Patch test materials were mounted on IQ Ultra patch test chambers (Chemotechnique Diagnostics) occluded for 2 days, and read on Day 2 (D2) and D4. We observed extremely positive (+++) reactions to MI 0.2% aq., but no reactions to methylchlorisothiazolone/MI 0.01%, benzisothiazolinone (BIT) 0.1% pet. nor to octylisothiazolinone (OIT) 0.1% pet. The test with the (used) glove showed + and ++ reactions on D2 and D4, respectively.

Chemical analysis of a series of used and new gloves were performed in the Official Food and Veterinary Control Authority (Table 1). Briefly, 0.5 g of nitrile was dissolved in 5 ml of methanol, sonicated during 15 min, and centrifuged during 10 min at 3500 RCF. After filtration, the extract was analysed by high pressure liquid chromatography coupled to a diode array detector following a previously published procedure.²

Significant concentrations of MI were identified in the patient's used nitrile glove (26.4 ppm). Interestingly, we also observed traces of MI in a new (unused) nitrile glove (4.9 ppm), and BIT in both new and used gloves (7.8 ppm and 6.9 ppm, respectively). OIT was present only in a new glove, again at only a low level (4.6 ppm). Details of protocol are explained in Appendix S1.

DISCUSSION

Results pertaining to the new gloves, containing MI, as well as BIT and OIT, were interpreted as being likely due to the industrial manufacturing process of the gloves. Allergic contact dermatitis due to a high BIT content (>20 ppm) in (reusable) polyvinyl chloride gloves has previously been described.³ In our case, however, neither BIT nor OIT showed any reactions on patch testing. Our case is interesting

TABLE 1 Chemical analyses of new and used gloves

	MI content (mg/kg)	MCI content (mg/kg)	BIT content (mg/kg)	OIT content (mg/kg)	DCOIT content (mg/kg)
New glove (hand)	4.9	ND	7.8	4.6	ND
New glove (wrist)	4.4	ND	7.7	ND	ND
Used glove (hand)	26.4	ND	6.9	ND	ND
Used glove (wrist)	7.7	ND	5.3	ND	ND

Abbreviations: BIT, benzisothiazolinone; DCOIT, dichlorooctylisothiazolinone; MCI, methylchlorisothiazolinone; MI, methylisothiazolinone; ND, not detected; OIT, octylisothiazolinone.

because it demonstrates a combined mechanism of MI hand dermatitis: (i) although not traceable, a probable direct contact with MI present in (a) product(s) of the patient's working environment (canalisations and plumbing at private citizens home), (ii) confirmed contact with nitrile protective gloves, likely contaminated by MI from the work environment, and (iii) additional exposure to (low/residual levels of) MI in new protective gloves. Although in the present case it concerned nitrile gloves, it has been previously described that some rubber gloves (i.e., natural latex rubber) might not always prevent MI penetration⁴; however, this particular feature (penetration of MI through nitrile rubber gloves) was not investigated in our case. Finally, we cannot exclude that MI-dependent contact dermatitis was further maintained due to frequent exposure to rinse-off cosmetics or detergents.⁵ In our patient, regular changes of new gloves every 3 days lead to a relative improvement, but no clearance, of his hand dermatitis. In practice, clinicians must be aware that, occasionally, protective nitrile gloves might contain isothiazolinones, inherently or by contamination, which might potentially aggravate existing hand dermatitis.

AUTHOR CONTRIBUTIONS

Raphaël André: Writing – original draft; investigation; validation.
Yassaman Alipour Tehrany: Writing – review and editing. **Aurélié Bugey:** Conceptualization; investigation; writing – review and editing.
Patrick Edder: Investigation. **Pierre Piletta:** Conceptualization; methodology; validation; writing – review and editing; investigation.

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CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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SUPPORTING INFORMATION

Additional supporting information may be found in the online version of the article at the publisher's website.

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