

Running head: Occupational/nonoccupational/airborne ACD from MI/MCI

**Allergic contact dermatitis and airborne allergic contact dermatitis from
methylisothiazolinone/methylchloroisothiazolinone on occupational and non-occupational basis:
all in one patient**

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Introduction

Methylisothiazolinone/methylchloroisothiazolinone (MI/MCI) and MI, commonly used antimicrobial preservatives in daily-life and industrial products, are well-known to cause mainly non-occupational or occupational allergic contact dermatitis (ACD) or airborne ACD.¹ Occurrence of different clinical pictures in the same patient has rarely been reported.² Herein, we present another rare patient who developed all of the above-mentioned combinations of MI/MCI allergy over a long period of time.

Case report

A 39-year-old nonatopic Turkish man presented with recurring hand eczema on the dorsum of both hands and fingers for 15 years, and additional face eczema mainly involving the periorbital area (Figure 1A) for the last 3 years. He has been working as a tramline worker for 16 years, and was mainly responsible for maintenance and repair. The patient had contact to surface cleaner and rust remover, machine oil, and metalworking fluids at work. He reported to wear protective rubber gloves infrequently. His eczema showed exacerbations during work but only partial remission at holidays. He had also contact to personal care products such as shampoos, liquid soap, moisturizing cream, and to topical corticosteroids, and during the last years also to a variety of household products including floor detergent, washing machine and dishwasher detergents.

Patch testing according to the ESCD patch test guideline showed ++ positive reactions to MI (0.2% aq.), MI/MCI in a 1:3 combination (0.02% aq.) (Figure 1B), and moisturizing cream (as is), whereas other allergens of the extended European baseline series, a cosmetic series including preservatives and emulsifiers, a rubber additive series, an oil&cooling fluid series including benzisothiazolinone, the

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‘used’ machine oil brought from the workplace (tested in a serial dilution of 50%-25%-12.5% in olive oil), and patient’s own topical medications gave negative results on day (D) 2, D3, D4, and D7. Patch test allergens were provided by Chemotechnique Diagnostics (Vellinge, Sweden). The available product labels of the suspected occupational and non-occupational items, i.e., surface cleaner, rust remover, shampoo, moisturizing cream, floor detergent, and washing machine and dishwasher detergent, confirmed that MI/MCI was an ingredient. Lesions resolved with topical corticosteroids within 10 days, and the patient remained free of lesions following avoidance of contact to MI/MCI-containing products at home and at work in a 1-year follow-up. However, after 1 year, he presented again with a severe attack of eyelid eczema (Figure 1C). The patient painted a wall in his living room with a water-based paint a week ago. The reaction rapidly resolved with systemic corticosteroids, but there was a flare during tapering of corticosteroid therapy. Over-painting with an isothiazolinone-free wall paint could not be performed. It took approximately 6-8 weeks for the lesions to subside completely.

Discussion

Concomitant or sequential occupational and non-occupational ACD and airborne ACD was diagnosed in the same patient from various products containing MI/MCI over a long period of 16 years according to history, clinical and patch test findings, and reading of the available product labels (Table 1).

MI/MCI and MI are best known to cause non-occupational ACD especially on hands and face mainly from leave-on cosmetics and personal care products.^{3, 4} The latest EU Cosmetic Regulation allowed the use of MI/MCI and MI only in rinse-off cosmetics at a maximum concentration of 15 ppm (0.0015%),¹

whereas in Turkey, MI is still allowed up to 100 ppm in rinse-off cosmetics.⁵ Leave-on cosmetics in Turkey may also contain these allergens although this was banned in 2015.⁵ Unfortunately, non-cosmetic household products such as detergents, or industrial products, e.g., water-based wall paints, metalworking fluids, adhesives, are out of the scope of these regulations worldwide, and are important sources of occupational/non-occupational ACD/airborne ACD from these preservatives.^{3, 4, 6} Besides, incomplete labelling of the products may complicate the identification of clinical and occupational relevance of positive patch test findings, especially in those who present with different clinical pictures of MI or MI/MCI allergy.

There was one similar challenging patient in the literature who first presented with occupational ACD on hands and face due to MI in cement, adhesives and wall paints which he had been exposed to as a construction worker, then with connubial ACD on the face from MI-containing hair colour of his girlfriend, and recently with non-occupational airborne ACD on face, ears, neck, and hands from MI-containing wall paint after moving to a freshly painted apartment.² Prolonged emission of isothiazolinones from a freshly painted wall up to 42 days⁷ may lead to treatment failure of airborne ACD as was the case in our patient. Painting-over of walls with isothiazolinone-free paint was recommended for the prevention of continuous exposure to isothiazolinones,⁸ or using a barrier cream containing 2% of glutathione as a treatment modality.⁹ Treatment of the painted walls with an inorganic sulfur salt solution was also reported to inactivate isothiazolinones. However, this procedure was not generally recommended as sodium bisulfite per se is a potential contact allergen.¹⁰

This was a rare case of concomitant and sequential development of different clinical manifestations of isothiazolinone contact allergy in a tram-line worker over 16 years. Considering the presumed lifelong persistence of contact sensitization, and the ubiquity of MI/MCI and MI in a wide variety of products both at work and at home, the diagnosis might sometimes be challenging. Total avoidance of these allergens in leave-on cosmetics, the reduction of the current allowed amount of MI from 100 ppm to 15 ppm in rinse-off cosmetics, and complete labelling of non-cosmetic products should be future legislative goals in Turkey as well.

References

1. Herman A, Aerts O, de Montjoye L, Tromme I, Goossens A, Baeck M. Isothiazolinone derivatives and allergic contact dermatitis: a review and update. *J Eur Acad Dermatol Venereol*. 2019; 33(2):267-276.
2. Gorris A, Valencak J, Schremser V, Bangert C, Kinaciyan T. Contact allergy to methylisothiazolinone with three clinical presentations in one patient. *Contact Dermatitis*. 2019 Aug 12. doi: 10.1111/cod.13384. [Epub ahead of print]
3. Aerts O, Goossens A, Lambert J et al. Contact allergy caused by isothiazolinone derivatives: an overview of non-cosmetic and unusual cosmetic sources. *Eur J Dermatol*. 2017; 27(2): 115-122.
4. Reeder M, Atwater AR. Methylisothiazolinone and isothiazolinone allergy. *Cutis*. 2019; 104(2): 94-96.
5. Turkish Cosmetic Regulation.
<https://www.mevzuat.gov.tr/Metin.Aspx?MevzuatKod=7.5.8157&MevzuatIliski=0&sourceXmlSearch=kozmetik>. Accessed February 4, 2020.
6. Amsler E, Aerts O, Raison-Peyron N et al. Airborne allergic contact dermatitis caused by isothiazolinones in water-based paints: a retrospective study of 44 cases. *Contact Dermatitis*. 2017; 77(3): 163-170.
7. Lundov MD, Kolarik B, Bossi R et al. Emission of isothiazolinones from water-based paints. *Environ Sci Technol*. 2014; 48(12): 6989-6994.

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8. Gruye LE, Yanovsky RL, Goldminz AM. Preventing relapses of airborne allergic contact dermatitis to isothiazolinones in wall paint by painting over with an isothiazolinone-free paint. *Contact Dermatitis*. 2020; 82(2): 130-131.
 9. Isaksson M. Successful inhibition of allergic contact dermatitis caused by methylchloroisothiazolinone/methylisothiazolinone with topical glutathione. *Contact Dermatitis*. 2015; 73(2): 126-128.
 10. Bohn S, Niederer M, Brehm K, Bircher AJ. Airborne contact dermatitis from methylchloroisothiazolinone in wall paint. Abolition of symptoms by chemical allergen inactivation. *Contact Dermatitis*. 2000; 42(4): 196-201.

Tables

Table 1. The chronological occurrence of occupational and non-occupational allergic contact dermatitis (ACD) and airborne ACD from methylisothiazolinone/methylchloroisothiazolinone (MI/MCI)-containing products including both *rinse-off and **leave-on personal care items, over a 16-year period.

Years	Diagnosis	Localization	Occupational products containing MI/MCI	Non-occupational personal care/household products containing MI/MCI
2003-2015	ACD	Hands	Surface cleaner, rust remover (liquid)	*Liquid soap, *shampoo
2015-2018	ACD + Airborne ACD	Hands +face (mainly periorbital)	Surface cleaner, rust remover (spray)	**Moisturizing cream, *shampoo, floor detergent, washing machine and dishwasher detergent
2018-2019	-	Lesion-free	None	None
2019	Airborne ACD	Periorbital	None	Water-based wall paint

Legends for Figures

Figure 1. Occupational airborne allergic contact dermatitis on the eyelids of a tramline worker from rust remover and surface cleaner aerosols containing methylisothiazolinone/methylchloroisothiazolinone (MI/MCI) (A), ++ positive patch reactions to MI/MCI (0.02% aq.) and MI (0.2% aq.) at D2 (B), non-occupational airborne allergic contact dermatitis on the eyelids of the same patient from freshly applied water-based wall paint containing MI/MCI at home after one year of lesion-free period (C).

