

# Occupational contact allergy to methylchloroisothiazolinone/methylisothiazolinone and methylisothiazolinone

Anna-Reetta Vauhkala<sup>1,2</sup>, Maria Pesonen<sup>1</sup>, Sari Suomela<sup>1</sup>, Outi Kuuliala<sup>1</sup>, Katri Suuronen<sup>1</sup> and Kristiina Aalto-Korte<sup>1</sup>

<sup>1</sup>Occupational Medicine, Finnish Institute of Occupational Health (FIOH), FI-00250, Helsinki, Finland and <sup>2</sup>Department of Dermatology, Skin and Allergy Hospital, Helsinki University Central Hospital (HUCH), FI-00029, Helsinki, Finland

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## Summary

**Background.** Methylchloroisothiazolinone (MCI)/methylisothiazolinone (MI) and MI are common preservatives in industrial and household products and in cosmetics. Occupational contact allergy to MCI/MI or MI has been reported among painters and paint factory workers in particular.

**Objectives.** To retrospectively describe patients with occupational contact allergy to MCI/MI and MI at the Finnish Institute of Occupational Health (FIOH).

**Methods.** Patch test files and clinical records of patients examined at the FIOH between January 2002 and February 2013 were reviewed to identify the patients.

**Results.** Seventy-two of 1745 patients showed positive reactions to MCI/MI and/or MI. Of these, 36 were occupational cases, and 31 were diagnosed during the second half of the study period. Hairdressers and beauticians, mechanics and repairmen, and machinists were the most significant occupational groups, followed by painters and paint factory workers, and café and restaurant workers.

**Conclusions.** We observed a sixfold increase in the number of occupational cases in the second half of the study period as compared with the first half. Liquid soaps and industrial hand cleansers were common sources of exposure to MCI/MI or MI. A total of 33% of the patients used products without any mention of MCI/MI or MI in safety data sheets or product declarations.

**Key words:** beauticians; detergents; fountain solution; hairdressers; hand cleansers; liquid soaps; machinists; mechanics and repairmen; metalworking fluids; shampoos.

The combination of methylchloroisothiazolinone (MCI) and methylisothiazolinone (MI) at a ratio of 3:1 (CAS no. 55965-84-9) has been widely used as a preservative in cosmetic, industrial and household products since the

beginning of the 1980s. In the 1990s, the concentration of MCI/MI was restricted, because of a clear increase in contact allergy rates (1, 2). The maximum permitted concentration of MCI/MI in cosmetic products in the EU has been 15 ppm (3). For several years, the frequency of MCI/MI contact allergy among patch tested patients was constantly ~2% (4, 5). For leave-on products, there will be a total ban on the use of MCI/MI in the EU, starting in July 2015 (6).

MI (CAS no. 2682-20-4) has been used alone as a preservative in industrial products since the early 2000s. In the EU, it was approved for the preservation of cosmetics at a concentration of 100 ppm in 2005 (7). Since then, an epidemic of both MI and MCI/MI allergies has

*Correspondence:* Anna-Reetta Vauhkala, Department of Dermatology, Skin and Allergy Hospital, Helsinki University Central Hospital (HUCH), Meilahdentie 2, FI-00029 Helsinki, Finland. Tel: +358 9 4711. E-mail: anna-reetta.vauhkala@fimnet.fi

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**Table 1.** Patch test concentrations of methylchloroisothiazolinone (MCI)/methylisothiazolinone (MI), octylisothiazolinone (OIT) and benzisothiazolinone (BIT) at the Finnish Institute of Occupational Health between January 2002 and February 2013

| Year of testing                | Substance | Concentration      | Series                           |
|--------------------------------|-----------|--------------------|----------------------------------|
| January 2002 to November 2010  | MCI/MI    | 0.01% aq.          | Modified Finnish baseline series |
| December 2010 to February 2013 | MCI/MI    | 0.02% aq.          | Modified Finnish baseline series |
| February 2006 to March 2009    | MI        | 0.1% and 0.03% aq. | Modified Finnish baseline series |
| April 2009 to February 2013    | MI        | 0.03% aq.          | Antimicrobial series             |
| January 2002 to February 2013  | OIT       | 0.1% pet.          | Antimicrobial series             |
| January 2002 to February 2013  | BIT       | 0.05% pet.         | Antimicrobial series             |

been observed in several European countries (8–10). MI is no longer recommended for use in leave-on cosmetic products (11). However, the use of MI in industrial products is not currently restricted in the EU. Occupational contact allergy to MCI/MI has been reported among, for example, machinists (12, 13), mechanics (14, 15), and workers involved in the manufacture of binders for paints and glues (16). The first cases of occupational contact dermatitis caused by MI alone were reported in 2004 and 2006 (17, 18). In these cases, contact allergy to MI was associated with paint, wallpaper glue, and a chemical burn.

The objective of the present study was to retrospectively describe patients with occupational contact allergy to MCI/MI and MI, examined at the Finnish Institute of Occupational Health (FIOH) during the period 2002–2013. We especially wanted to identify occupational groups and products that were the cause of the dermatitis.

## Materials and Methods

### Patients

All patients at the FIOH are examined because of a suspected occupational disease. They come from all over Finland. We reviewed our skin test files from January 2002 to February 2013 in order to identify patients with allergic reactions (+/++/++) to MCI/MI and MI. From the medical records, we collected data on the patients' diagnoses, occupations, symptoms, exposures, and eventual patch test reactions to octylisothiazolinone [2-*N*-octyl-4-isothiazolin-3-one (OIT)], benzisothiazolinone [1,2-benzisothiazolin-3-one (BIT)], and other contact allergens. Patients whose contact allergy to MCI/MI and/or MI was considered to be of occupational origin were selected for further analysis. Ethical permission was not needed.

### Patch testing

MCI/MI was tested in the baseline series (modified Finnish baseline series) at a concentration of 0.01% aq. (Trolab,

Reinbek, Germany) until November 2010, and thereafter at 0.02% aq. (Chemotechnique Diagnostics, Vellinge, Sweden) (Table 1). MI was tested at 0.1% aq. and 0.03% aq. as part of the baseline series from February 2006 to March 2009, and thereafter in an antimicrobial series at 0.03% (aq.). We tested OIT (CAS no. 26530-20-1) at 0.1% in petrolatum (Chemotechnique Diagnostics) and BIT (CAS no. 2634-33-5) at 0.05% pet. (Chemotechnique Diagnostics) in the antimicrobial series. The patch tests were performed with Finn Chambers® (SmartPractice, Phoenix, AZ, USA), in accordance with the recommendations of the ICDRG. The occlusion time was 48 hr. We read the tests two or three times, on D2/D3/D4, D2/D3/D6, or D2/D5, depending on the day of application (i.e. Monday, Tuesday, or Wednesday).

## Results

During the study period, a total of 1745 patients were patch tested, 72 of whom (4.1%) showed an allergic reaction to MCI/MI and/or MI. Positive patch test reactions to MCI/MI were seen in 45 patients (2.6%), positive patch test reactions to both MCI/MI and MI were seen in 24 patients (1.4%), and positive patch test reactions to MI only were seen in 3 patients (0.2%).

In 36 (50%) cases, MCI/MI and/or MI contact allergy was considered to be occupational. The patch test results and data on the exposure of the 36 occupational cases are shown in Table 2. The majority of these patients had occupational exposure to MCI/MI. In 6 (16.7%) cases, only MI was found in the products from their workplace: these were diagnosed with occupational allergic contact dermatitis caused by MI alone. Two of the patients had only past exposure to MCI/MI. Of the total 36 patients, 2 (5.5%) also had contact allergy to BIT, and 4 (11%) to OIT. In addition, most of the patients had other contact allergies.

The most significant occupational groups among our 36 patients with occupational contact allergy to MCI/MI and/or MI were hairdressers and beauticians ( $n = 7$ , patients 26–32 in Table 2), mechanics and repairmen ( $n = 6$ , patients 5–10), machinists ( $n = 5$ , patients

**Table 2.** Patients with occupational contact allergy to methylchloroisothiazolinone (MCI)/methylisothiazolinone (MI) or MI, and their occupations, patch test reactions to various isothiazolinones, exposure to isothiazolinone-containing products, other contact allergies, and year of diagnosis

| Patient no. | Occupation                  | Patch test reactions |              |         |          |     |   | BIT | OIT | Exposure to MCI/MI or MI at work                                                                                | Other contact allergies                             | Year of diagnosis |
|-------------|-----------------------------|----------------------|--------------|---------|----------|-----|---|-----|-----|-----------------------------------------------------------------------------------------------------------------|-----------------------------------------------------|-------------------|
|             |                             | MCI/MI 0.01%         | MCI/MI 0.02% | MI 0.1% | MI 0.03% | MI  |   |     |     |                                                                                                                 |                                                     |                   |
| 1           | Painter                     | NT                   | +            | NT      | +        | +   | – | –   | –   | Several paints: MCI/MI and MI <sup>a</sup>                                                                      | Cobalt, MDA, isocyanates, IPDA                      | 2012              |
| 2           | Coating worker              | +                    | +            | NT      | +        | +   | – | –   | ++  | Anti-condensation paint: MI and OIT <sup>a</sup>                                                                | Nickel                                              | 2010              |
| 3           | Paint factory worker        | ++                   | NT           | NT      | NT       | NT  | – | –   | +   | Two different biocides for paints: I, MI <sup>a</sup> , and II, OIT <sup>a</sup>                                | –                                                   | 2005              |
| 4           | Vehicle painter             | ?                    | NT           | NT      | ++       | ++  | – | –   | –   | Hand cleaner: MCI and MI <sup>b</sup>                                                                           | Formaldehyde                                        | 2009              |
| 5           | Welder/mechanic             | +                    | NT           | NT      | ?        | ?   | – | –   | –   | Abrasive hand cleaner: MCI/MI <sup>c</sup>                                                                      | –                                                   | 2009              |
| 6           | Repairman                   | +                    | NT           | NT      | NT       | NT  | – | –   | –   | Dishwashing liquid: MI <sup>b</sup>                                                                             | –                                                   | 2005              |
| 7           | Repairman                   | NT                   | ++           | NT      | –        | –   | – | –   | –   | Liquid soap: MCI/MI <sup>b</sup>                                                                                | –                                                   | 2005              |
| 8           | Car mechanic                | NT                   | ++           | NT      | ++       | ++  | – | –   | –   | Two different hand cleaners: MCI and MI <sup>b</sup>                                                            | Cobalt, PPD                                         | 2011              |
| 9           | Assembler                   | NT                   | ++           | NT      | ++       | ++  | – | –   | –   | Abrasive hand cleaner: MCI and MI <sup>b</sup>                                                                  | –                                                   | 2011              |
| 10          | Car mechanic                | ++                   | NT           | NT      | +++      | +++ | – | –   | –   | Liquid soap: MCI and MI <sup>c</sup>                                                                            | Formaldehyde                                        | 2011              |
| 11          | Metal worker                | ++                   | NT           | +       | –        | –   | – | –   | –   | Hand wipes: MCI and MI <sup>b</sup>                                                                             | –                                                   | 2009              |
| 12          | Tool maker                  | ++                   | ++           | NT      | –        | –   | – | –   | –   | Detergents for car surfaces: MI and MCI <sup>b</sup>                                                            | –                                                   | 2009              |
| 13          | Machinist                   | +                    | NT           | NT      | NT       | NT  | – | –   | –   | Abrasive hand cleaner: MI and MCI <sup>b</sup>                                                                  | –                                                   | 2008              |
| 14          | Turner                      | ++                   | NT           | NT      | NT       | NT  | – | –   | –   | Hand cleansing gel: MI and MCI <sup>b</sup>                                                                     | Fragrances                                          | 2010              |
| 15          | Machinist                   | NT                   | +            | NT      | ?        | ?   | – | –   | –   | Liquid soap: MCI/MI <sup>b</sup>                                                                                | Nickel                                              | 2010              |
| 16          | Printer                     | +                    | NT           | NT      | NT       | NT  | – | –   | –   | Liquid soap: MCI/MI <sup>b</sup>                                                                                | –                                                   | 2003              |
| 17          | Printer                     | NT                   | +            | NT      | –        | –   | – | –   | –   | Metalworking fluid: MI 24 mg/l <sup>d</sup>                                                                     | Nickel                                              | 2003              |
| 18          | Cook                        | NT                   | +            | NT      | +        | +   | – | –   | –   | Biocides of metalworking fluid: MCI/MI <sup>c</sup>                                                             | Colophonium                                         | 2003              |
| 19          | Cafe worker                 | NT                   | +            | NT      | +        | +   | – | –   | –   | Biocide of metalworking fluid: MCI/MI < 1% <sup>a</sup>                                                         | Myroxylon pereirae, fragrances, methacrylates       | 2012              |
| 20          | Restaurant worker           | +++                  | +++          | NT      | –        | –   | – | –   | –   | Fountain solution additive: MCI/MI 0.056% <sup>c</sup>                                                          | –                                                   | 2002              |
| 21          | Restaurant and hotel worker | NT                   | +++          | NT      | –        | –   | – | –   | –   | Fountain solution additives: (A) MCI/MI <sup>a</sup> < 0.1%, (B) < 0.1% <sup>a</sup> , (C) < 0.06% <sup>a</sup> | 1,3-DPG                                             | 2012              |
| 22          | Carpenter                   | NT                   | +            | NT      | –        | –   | – | –   | –   | Rinse-aid: MCI/MI <sup>c</sup>                                                                                  | Nickel                                              | 2012              |
| 23          | Tile layer                  | NT                   | ++           | NT      | ++       | ++  | – | –   | –   | Two detergents: MCI/MI <sup>c</sup>                                                                             | –                                                   | 2013              |
|             |                             |                      |              |         |          |     |   |     |     | Dishwashing liquid: MI <sup>b</sup>                                                                             | –                                                   |                   |
|             |                             |                      |              |         |          |     |   |     |     | Two detergents: MI <sup>a</sup>                                                                                 | –                                                   |                   |
|             |                             |                      |              |         |          |     |   |     |     | Dishwashing liquid: MI <sup>b</sup>                                                                             | –                                                   |                   |
|             |                             |                      |              |         |          |     |   |     |     | Detergent: MCI/MI < 0.0015% <sup>a</sup>                                                                        | –                                                   |                   |
|             |                             |                      |              |         |          |     |   |     |     | Dishwashing liquid: MI <sup>b</sup>                                                                             | –                                                   |                   |
|             |                             |                      |              |         |          |     |   |     |     | Several glues and adhesives: MCI/MI <sup>a</sup> , <sup>c</sup>                                                 | –                                                   |                   |
|             |                             |                      |              |         |          |     |   |     |     | Water-proofing material: (A) MI and BIT < 0.001% <sup>c</sup> ;                                                 | –                                                   |                   |
|             |                             |                      |              |         |          |     |   |     |     | (B) MI 0.0021%, MCI < 0.0002%, BIT 0.0045% <sup>d</sup>                                                         | PPD, chromium, cobalt, MDA, MXDA, Solvent Orange 60 |                   |

Table 2. Continued

| Patient no. | Occupation                           | Patch test reactions |              |         |          |    |    | BIT | OIT | Exposure to MCI/MI or MI at work                                                                                                                                                                                                                                                                  | Other contact allergies                                | Year of diagnosis |
|-------------|--------------------------------------|----------------------|--------------|---------|----------|----|----|-----|-----|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------|
|             |                                      | MCI/MI 0.01%         | MCI/MI 0.02% | MI 0.1% | MI 0.03% | MI | MI |     |     |                                                                                                                                                                                                                                                                                                   |                                                        |                   |
| 24          | Assistant nurse                      | NT                   | ++           | NT      | –        | –  | –  | –   | –   | Epoxy seaming material: OIT <0.2% <sup>a</sup><br>Two dishwashing liquids: MCI and MI <sup>a</sup><br><br>Detergent: MI <sup>a</sup><br>Shampoo: MI <sup>b</sup><br>Detergents: MCI/MI and MI <sup>b</sup><br><br>Vinyl gloves: BIT 0.0025% (25 ppm) <sup>d</sup><br>Shampoo: MCI/MI <sup>b</sup> | Colophonium, thiurams, neomycin                        | 2011              |
| 25          | Home help                            | ++                   | NT           | +       | ?+       | ++ | –  | ++  | –   |                                                                                                                                                                                                                                                                                                   | Cobalt, nickel, <i>Myroxylon pereirae</i> , fragrances | 2008              |
| 26          | Hairdresser                          | ++                   | NT           | NT      | –        | –  | –  | –   | –   |                                                                                                                                                                                                                                                                                                   | Fragrances, ammonium persulfate                        | 2009              |
| 27          | Hairdresser                          | NT                   | –            | NT      | +        | –  | –  | –   | –   | Shampoos, conditioners, and hair styling products: MCI/MI <sup>b</sup>                                                                                                                                                                                                                            | PPD, nickel, formaldehyde, 4-aminoazobenzene           | 2011              |
| 28          | Hairdresser                          | NT                   | +            | NT      | +        | –  | –  | –   | –   | Shampoos, conditioners, and hair styling products: MCI/MI or MI <sup>b</sup>                                                                                                                                                                                                                      | –                                                      | 2012              |
| 29          | Hairdresser                          | NT                   | ++           | NT      | –        | –  | –  | –   | –   | Shampoos, conditioners, and hair styling products: MCI/MI or MI <sup>b</sup>                                                                                                                                                                                                                      | –                                                      | 2011              |
| 30          | Hairdresser                          | NT                   | ++           | NT      | +        | –  | –  | –   | –   | Shampoos, conditioners, and hair styling products: MCI/MI or MI <sup>b</sup>                                                                                                                                                                                                                      | –                                                      | 2011              |
| 31          | Beautician                           | NT                   | ++           | NT      | +++      | –  | –  | –   | –   | Skin care products: MI <sup>c</sup>                                                                                                                                                                                                                                                               | Colophonium                                            | 2012              |
| 32          | Beautician                           | +++                  | NT           | ++      | ++       | –  | –  | –   | –   | Skin care products: MCI and MI <sup>b</sup>                                                                                                                                                                                                                                                       | Chromium                                               | 2008              |
| 33          | Visual artisan                       | NT                   | ++           | NT      | +++      | –  | –  | –   | +++ | Acrylic colours: MCI/MI < 17 ppm <sup>c</sup><br>Gouache colours: MCI/MI < 15 ppm and OIT <sup>c</sup>                                                                                                                                                                                            | Butylphenyl methylpropional                            | 2012              |
| 34          | Navigating officer                   | ++                   | NT           | NT      | +        | –  | –  | –   | –   | Liquid soap: MCI/MI <sup>b</sup>                                                                                                                                                                                                                                                                  | Formaldehyde                                           | 2009              |
| 35          | Glass fibre factory worker           | –                    | ++           | NT      | –        | –  | –  | –   | –   | Glass fibre surface protection product: (A) MCI/MI < 0.01% <sup>a</sup> , (B) MCI/MI < 15 ppm <sup>c</sup>                                                                                                                                                                                        | –                                                      | 2011              |
| 36          | Foreman in a plastic product factory | ++                   | ++           | NT      | –        | –  | –  | –   | –   | Liquid soap: MCI/MI <sup>c</sup>                                                                                                                                                                                                                                                                  | Formaldehyde                                           | 2010              |

BIT, benzisothiazolinone; 1,3-DPG, 1,3-diphenylguanidine; HC-17-butyrate, hydrocortisone-17-butyrate; IPDA, isophorone diamine; MDA, 4,4'-diaminodiphenylmethane; MXDA, m-xylylenediamine; NT, not tested; OIT, octylisothiazolinone; PPD, p-phenylenediamine.

The concentrations of MCI/MI and MI were changed during the study period when the recommendations of the Finnish Contact Dermatitis Group were changed.

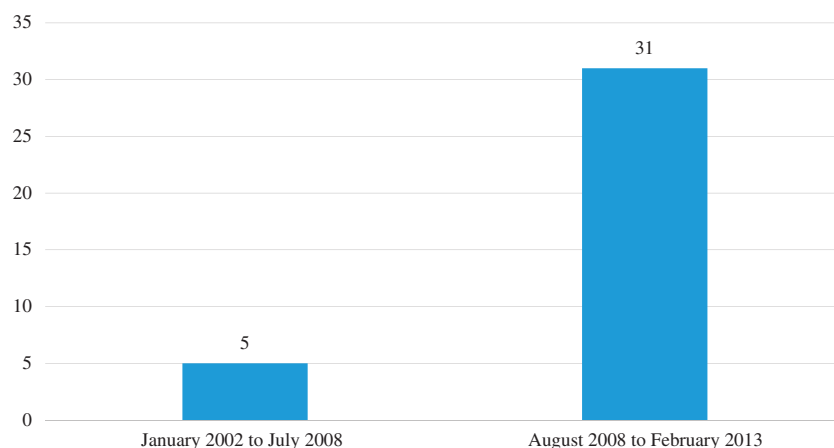
<sup>a</sup>Material safety data sheet.

<sup>b</sup>Product declarations.

<sup>c</sup>Information from the manufacturer or importer.

<sup>d</sup>Chemical analysis.

**Fig. 1.** Numbers of patients diagnosed with occupational contact allergy to methylchloroisothiazolinone (MCI)/methylisothiazolinone (MI) or MI.



11–15), painters and paint factory workers ( $n=4$ , patients 1–4), and café and restaurant workers ( $n=4$ , patients 18–21).

Only 2 of our occupational cases did not have hand eczema (patients 2 and 35). Both of these had worn protective gloves at work. Three patients (8%) also had eczema on the face.

Patients with occupational contact allergy to MCI/MI or MI had been exposed to these preservatives through the work-related use of detergents, liquid soaps and industrial hand cleansers, skin care products; and industrial products such as paints, metalworking fluids and their biocides, and fountain solution additives used in printing work. The most common sources of exposure were liquid soaps and industrial hand cleansers (11 cases). Nine of our patients (25%) had been exposed to MCI/MI or MI by using only rinse-off products such as liquid soaps, hand cleansers, or shampoos. Single patients had been exposed to glues and adhesives, water insulation materials, glass fibre surface protection products, and gouache colours that contained MCI/MI or MI. Different kinds of detergent, such as dishwashing liquids and household and car surface detergents, were also common sources of MCI/MI and MI exposure. Two beauticians had been exposed to MCI/MI and MI by using leave-on skin care products on their customers. The hairdressers had handled not only rinse-off products such as shampoos and hair conditioners, but also leave-on hair styling products. One patient, an assembler, had used hand cleansing wipes that contained MCI/MI. Six patients were exposed to MI only. The products containing MI in these cases were an anti-condensation paint, a biocide for paints, a metalworking fluid, dishwashing liquids, and skin care products.

In 12 cases (33%), the products used by the patients had safety data sheets or product declarations that did not report the presence of MCI/MI or MI; this was shown

only after inquiries to the manufacturers or sales representatives. In 1 case, chemical analysis of the suspected product, a metalworking fluid, was needed to confirm the presence of MI (patient 13). Five of the patients had used cosmetic products or detergents, which are products that should be labelled with all preservatives.

## Discussion

Finland is among the countries affected by the current epidemic of MI and MCI/MI allergy: Lammintausta et al. reported frequencies of positive patch test reactions as high as 13.2% for MI and 14.9% for MCI/MI in eight Finnish dermatology clinics during the first 5 months of 2013 (10). In 2006–2008, the corresponding figures were as low as 0.9–1.8% for MI and 1.3–2.1% for MCI/MI (19). This significant increase in the prevalence of contact allergy among general dermatology patients was attributed to cosmetic products containing MI. Similar findings have been reported from all over Europe (8, 9, 20).

In the present study, only 5 patients were diagnosed with occupational contact allergy to MCI/MI or MI during the first half of our study period (January 2002 to July 2008). During the second half (August 2008 to February 2013), as many as 31 patients received the same diagnosis (Fig. 1). A sixfold increase in such a short time is so substantial that it must reflect a considerable increase in occupational exposure to MCI/MI and MI in Finland. Similarly, when they studied contact sensitization to MCI/MI in German-speaking countries in 1992–2010, Uter et al. found a significant increase in the frequency of sensitization to MCI/MI in occupational cases aged < 40 years (4).

The literature reports painters and paint factory workers as the most significant occupational group associated with contact allergy to MCI/MI or MI (21–23),

and, vice versa, MI and MCI/MI are significant sensitizers among painters (24, 25). In the present study population, 11% of the cases were paint-related, but they did not constitute the largest occupational group. MI is extensively used in paints all over Europe (26), which poses a risk not only to professional users but also to consumers.

In our study, hairdressers and beauticians constituted the largest occupational group. This is not surprising, as the current epidemic of MI contact allergy has been attributed to MI in cosmetic products. Uter et al. found a much higher prevalence of MCI/MI contact allergy among female hairdressers than among hairdressers' clients (27). In another study in German-speaking countries, the third highest prevalence of MI contact allergy, after painters and pottery and glass makers, was among beauticians (22). In a recent Danish publication on high-risk occupations for isothiazolinone sensitization, contact allergy to MCI/MI was associated with cosmetology, and with painting, welding, and operating machinery (28).

Among our patients, 2 printers had been exposed to fountain solution additives containing MCI/MI. There are only two previous case reports on printers with occupational contact allergy to MCI/MI caused by MCI/MI in fountain solutions (29, 30).

MCI/MI and MI are widely used in industrial products. A recent Danish register study that utilized a database on hazardous chemical products for occupational use (PROBAS; Danish Product Register Database) investigated the presence of different isothiazolinones in commercial products. The most common product types that contained MI or MCI/MI were paints and varnishes, cleaning/washing agents, and polishing agents. The MI and MCI/MI concentrations varied by up to 10% and 14%, respectively (31). Of these products, the cleaning and washing agents category was also prominent in our clinical study population. In the Danish study, the products with the highest content of isothiazolinones were car care products (31). Our data included 2 car mechanic cases, 1

of whom had used MI-containing and MCI-containing car surface detergents.

Of our patients with occupational contact allergy to MCI/MI and/or MI, as many as 33% had used products that were not declared as containing MCI/MI or MI by their safety data sheets, labelling, or other product information. The EU regulation on cosmetics states that all ingredients, including preservatives, must be declared in an International Nomenclature of Cosmetic Ingredients (INCI) list. Similarly, the EU regulation on detergents (No. 648/2004) demands full declaration of preservatives in detergents for consumer use. Nevertheless, no surveillance of legislation is watertight. In 2014, we found very high concentrations of MI in several leave-on cosmetic products that were produced outside the EU. They were used in a beauty salon, but MI was not mentioned in the INCI lists. Rapid alert system for non-food dangerous products (RAPEX) notifications were made by the Finnish authorities.

At present in the classification, labelling and packaging of substances and mixtures (CLP) regulation (No. 1272/2008), there is a harmonized classification for MCI/MI: it must be declared in the safety data sheet if the concentration in a product is  $\geq 0.0015\%$ . For MI, a harmonized classification is still lacking. In our opinion, a full declaration of all ingredients should also be mandatory for industrial products and detergents for professional use. Without such a declaration, sensitized patients have great difficulties in avoiding MCI/MI-containing and MI-containing products in their work, and their skin symptoms may not heal, owing to continuous, unidentified exposure. In addition, incomplete declaration of product ingredients may compromise the identification of cases of occupational allergic dermatitis. Moreover, the present results show that the safety of MCI/MI and MI (at the currently allowed concentrations of 15 and 100 ppm in the EU) in rinse-off cosmetic products is questionable, because, in one-quarter of our patients, the sole identified exposure to MCI/MI and/or MI was via hand cleansers and liquid soaps.

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