

# Airborne allergic contact dermatitis caused by isothiazolinones in water-based paints: a retrospective study of 44 cases

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## Summary

**Background.** Airborne allergic contact dermatitis caused by paints containing isothiazolinones has been recognized as a health hazard.

**Objectives.** To collect epidemiological, clinical and patch test data on airborne allergic contact dermatitis caused by isothiazolinone-containing paints in France and Belgium.

**Methods.** A descriptive, retrospective study was initiated by the Dermatology and Allergy Group of the French Society of Dermatology, including methylchloroisothiazolinone (MCI)/methylisothiazolinone (MI)- and/or MI-sensitized patients who developed airborne allergic contact dermatitis following exposure to isothiazolinone-containing paint.

**Results.** Forty-four cases were identified, with mostly non-occupational exposure (79.5%). Of the patients, 22.5% of also had mucosal symptoms. In several cases, the dermatitis required systemic corticosteroids (27.3%), hospitalization (9.1%), and/or sick leave (20.5%). A median delay of 5.5 weeks was necessary to enable patients to enter a freshly painted room without a flare-up of their dermatitis. Approximately one-fifth of the patients knew that they were allergic to MI and/or MCI/MI before the exposure to paints occurred.

**Conclusion.** Our series confirms that airborne allergic contact dermatitis caused by paints containing isothiazolinones is not rare, and may be severe and long-lasting. Better regulation of isothiazolinone concentrations in paints, and their adequate labelling, is urgently needed.

**Key words:** airborne allergic contact dermatitis; benzoisothiazolinone; isothiazolinones; methylchloroisothiazolinone; methylisothiazolinone; octylisothiazolinone; respiratory symptoms; water-based paint.

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Isothiazolinones are widely used as preservatives in cosmetics products, household detergents, and water-based paints. The latter contain methylisothiazolinone (MI) and/or benzisothiazolinone (BIT), and, to a lesser extent, also methylchloroisothiazolinone (MCI)/MI and/or octylisothiazolinone (OIT) (1). During the worldwide epidemic caused by MI, several reports of airborne allergic contact dermatitis caused by MCI/MI and/or MI in paint have been published (2–6). Here, we present our clinical experience with airborne dermatitis caused by paints containing isothiazolinones.

## Patients and Methods

To collect clinical and patch test data regarding airborne allergic contact dermatitis caused by paint, the Dermatology and Allergy Group of the French Society of Dermatology initiated a retrospective epidemiological study involving 17 dermatology departments and two private offices (comprising 23 dermatologists) in France and Belgium.

All cases were collected by use of an online questionnaire during a 1-year period, from the beginning of May 2015 until the end of May 2016; however, the patients had been diagnosed from the beginning of 2012 to January 2016. The inclusion criteria were: (i) a positive patch test reaction to MCI/MI and/or to MI alone; and (ii) a clinical diagnosis of airborne allergic contact dermatitis following exposure to paint. Additional data included: age, sex, time of onset of the dermatitis following exposure to paint, clinical presentation (including morphology, localizations, and duration), treatments prescribed, personal and professional consequences of the disease, results of patch tests, and, if available, the nature of the paint and labelling concerning isothiazolinones (if present). Moreover, the time that needed to elapse before a patient was able to enter a newly painted room without experiencing a relapse or flare-up of dermatitis was estimated, as was the potential existence of a previous allergic contact dermatitis caused by isothiazolinones (prior to the occurrence of the dermatitis related to paint).

## Results

The online survey yielded a total of 44 cases diagnosed between early 2012 and January 2016. The characteristics of the patients are shown in Table 1, and the results of their patch tests are shown in Table 2. Most patients were female (61%), more than half of the patients (52.5%) had a history of atopic dermatitis, rhinitis, or asthma, and the main age range was 35–45 years (25%); interestingly, 13.6% of cases concerned children aged <18 years (Fig. 1). Exposure to isothiazolinone-containing paints

mainly took place in a private, non-occupational setting (35 of 44 cases, 79.5%) rather than at work, and, in nearly half of the cases (16/35), the patients had painted the room themselves. In 52.3% of cases, allergic symptoms occurred 1–3 days following exposure to paint, although, in 3 patients, the delay was longer (ranging from 13 to 21 days), potentially indicating active (primary) sensitization (Fig. 2). A very short delay of <1 day was observed in 6 patients (13.6%).

Regarding the affected body localizations, 70.5% of the patients presented with dermatitis limited to non-covered body parts, whereas, in 2 patients (4.5%), the eczema had spread to anatomical sites covered by clothing and/or to the main body folds. Ten patients (22.7%) also had mucosal symptoms, such as breathing difficulties and/or rhinoconjunctivitis. Interestingly, in 3 patients who reacted positively to MCI/MI, photo-aggravation of dermatitis occurred after exposure to sunlight. Only 1 of them was tested with MI alone, with a positive result.

During the initial onset of eczema, as many as 86.4% of the patients required repeated consultations, hospitalization (9.1%), and/or sick leave (20%). Interestingly, only 3 patients were occupationally exposed to paints, that is, worked as painters, and all of them had been diagnosed with occupational allergic contact dermatitis. Furthermore, 42 of 44 of patients required treatment, in most cases with topical corticosteroids (88.6%); however, in nearly one-third (27.3%), systemic corticosteroids were needed as well.

In 34 cases, information on the duration of allergic symptoms was obtained; this ranged between 1 and 52 weeks, with a median of 6.9 weeks (Fig. 3). The very long-lasting dermatitis of some cases raised the question of whether cosmetics containing isothiazolinones may have maintained the dermatitis. In 15 cases for which this information was available, the median time span required to allow a patient to re-enter a freshly painted room, without experiencing a worsening or relapse of dermatitis, was 5.5 weeks.

Regarding the patch test results, 43 of 44 patients showed positive reactions to MI 0.2%, 0.05%, and 0.02% (all aq.), in 22, 15 and 6 cases, respectively, some patients having been tested simultaneously with different concentrations. A slightly lower number of patients (36 of 44; 82%) showed positive reactions to MCI/MI, tested at 0.02% and/or 0.01% in aq., in 29 and 16 cases, respectively (Table 2). The isothiazolinones OIT and BIT were patch tested (OIT at 0.1%; BIT at 0.05% or 0.1%; both in pet.) in 21 and 15 patients, respectively, with only OIT showing allergic reactions, in 9 of 21 cases, and all patch tests with BIT giving negative results. In 4 patients, the paint was tested as well, 'as is' and semi-open and/or

**Table 1.** Characteristics of 44 patients with airborne allergic contact dermatitis resulting from contact allergy to methylchloroisothiazolinone/methylisothiazolinone (MI) or MI

|                                                                                                   | Cases (n = 44)  |      |
|---------------------------------------------------------------------------------------------------|-----------------|------|
|                                                                                                   | No.             | %    |
| Female                                                                                            | 27              | 61.5 |
| History of atopy                                                                                  | 23              | 52.5 |
| Exposure to paint                                                                                 |                 |      |
| Exposure to paint in an occupational setting                                                      | 10 <sup>a</sup> | 22.5 |
| Exposure to paint in a private setting                                                            | 35 <sup>a</sup> | 79.5 |
| Patients used paint themselves                                                                    | 16/35           | 45.5 |
| Occupational exposure as painter                                                                  | 3               | 6.5  |
| Nature of the paint                                                                               |                 |      |
| Unknown                                                                                           | 6               | 13.5 |
| Water-based paint, name unknown                                                                   | 14              | 32   |
| Water-based paint, name known                                                                     | 24              | 54.5 |
| Isothiazolinone labelling                                                                         |                 |      |
| Isothiazolinone labelling (in 1 case <sup>a</sup> on the safety data sheet)                       | 11 <sup>a</sup> | 25   |
| No isothiazolinone labelling                                                                      | 10              | 22.7 |
| Unknown                                                                                           | 23              | 52.7 |
| Duration                                                                                          |                 |      |
| Median duration                                                                                   | 6.9 weeks       | –    |
| Unknown                                                                                           | 10              | –    |
| Time lag necessary to enable entering painted room without recurrence of dermatitis               |                 |      |
| Median duration                                                                                   | 5.5 weeks       | –    |
| Unknown                                                                                           | 29              | –    |
| Description (multiple morphologies possible)                                                      |                 |      |
| Squamous and erythema                                                                             | 24              | 54.5 |
| Erythema and vesicles                                                                             | 24              | 54.5 |
| Oedematous                                                                                        | 24              | 54.5 |
| Bullous                                                                                           | 1               | 2.2  |
| Non-skin symptoms (conjunctivitis, rhinitis, asthma, dyspnoea, cough, sinusitis)                  | 10              | 22.7 |
| Photo-aggravation (data available for 30 patients)                                                | 3               | –    |
| Treatments (multiple treatments possible)                                                         |                 |      |
| Oral corticosteroids                                                                              | 12 <sup>b</sup> | 27.3 |
| Topical corticosteroids                                                                           | 39              | 88.6 |
| Antihistamines                                                                                    | 8               | 18.2 |
| Other                                                                                             | 7               | 15.9 |
| Consequences (multiple consequences possible)                                                     |                 |      |
| Sick leave                                                                                        | 9               | 20.5 |
| Hospitalization                                                                                   | 4               | 9.1  |
| Recognized professional disease                                                                   | 3               | 6.8  |
| Repeated consultations                                                                            | 38              | 86.4 |
| Known previous allergy to isothiazolinone before the reaction with paint                          |                 |      |
| Yes                                                                                               | 9               | 20.5 |
| No                                                                                                | 34              | 77.3 |
| Unknown                                                                                           | 1               | 2.3  |
| Previous allergic contact dermatitis caused by other products possibly related to isothiazolinone |                 |      |
| Yes                                                                                               | 22              | 50.0 |
| No                                                                                                | 16              | 36.4 |
| Unknown                                                                                           | 6               | 13.6 |
| If yes, the allergy was related to:                                                               |                 |      |
| Cosmetics                                                                                         | 18 <sup>c</sup> | –    |
| Household products                                                                                | 9               | –    |
| Other industrial products                                                                         | 5 <sup>d</sup>  | –    |

<sup>a</sup>For 1 case, exposure in both a private and an occupational setting.<sup>b</sup>Nine patients received both topical and oral corticosteroids.<sup>c</sup>Including three wet wipes.<sup>d</sup>Including paint in one case.

**Table 2.** Results of allergy tests performed (n = 44)

| Patient    | MI 0.02% | MI 0.05% | MI 0.2% | MCI/MI 0.01% | MCI/MI 0.02% | BIT <sup>a</sup> | OIT 0.1% | Paint testing <sup>b</sup> |
|------------|----------|----------|---------|--------------|--------------|------------------|----------|----------------------------|
| P1         | NT       | +        | NT      | +            | +            | NT               | NT       | NT                         |
| P2         | NT       | +++      | NT      | ++           | NT           | NT               | ++       | NT                         |
| P3         | NT       | ++       | NT      | NT           | ++           | NT               | NT       | NT                         |
| P4         | NT       | ++       | NT      | NT           | –            | NT               | NT       | NT                         |
| P5         | NT       | NT       | ++      | NT           | ++           | NT               | NT       | NT                         |
| P6         | NT       | NT       | ++      | –            | NT           | –                | –        | NT                         |
| P7         | NT       | NT       | ++      | ++           | NT           | NT               | NT       | NT                         |
| P8         | ++       | NT       | NT      | –            | +            | NT               | NT       | NT                         |
| P9         | NT       | NT       | +++     | NT           | NT           | NT               | NT       | NT                         |
| P10        | NT       | ++       | ++      | NT           | NT           | NT               | NT       | NT                         |
| P11        | ++       | NT       | NT      | NT           | ++           | NT               | NT       | NT                         |
| P12        | NT       | NT       | NT      | +            | NT           | NT               | NT       | NT                         |
| P13        | NT       | NT       | +++     | NT           | +++          | –                | –        | ++ and +++                 |
| P14        | NT       | NT       | ++      | NT           | –            | NT               | NT       | NT                         |
| P15        | NT       | +        | +       | NT           | +            | +/-              | +        | NT                         |
| P16        | NT       | ++       | NT      | ++           | NT           | –                | –        | NT                         |
| P17        | NT       | ++       | NT      | +            | NT           | –                | –        | NT                         |
| P18        | NT       | +++      | NT      | ++           | NT           | –                | +        | NT                         |
| P19        | NT       | ++       | NT      | NT           | –            | NT               | NT       | NT                         |
| P20        | NT       | +++      | NT      | NT           | ++           | –                | ++       | NT                         |
| P21        | ++       | NT       | NT      | NT           | ++           | NT               | NT       | NT                         |
| P22        | ++       | NT       | NT      | ++           | NT           | NT               | NT       | –                          |
| P23        | NT       | ++       | NT      | NT           | ++           | NT               | NT       | NT                         |
| P24        | NT       | NT       | ++      | NT           | ++           | NT               | NT       | NT                         |
| P25        | NT       | NT       | +++     | NT           | ++           | NT               | –        | NT                         |
| P26        | ++       | NT       | NT      | –            | NT           | NT               | +        | NT                         |
| P27        | NT       | NT       | +++     | NT           | +++          | NT               | +        | NT                         |
| P28        | NT       | NT       | +++     | NT           | ++           | NT               | ++       | NT                         |
| P29        | NT       | NT       | ++      | NT           | –            | –                | –        | NT                         |
| P30        | NT       | NT       | ++      | NT           | –            | –                | +        | NT                         |
| P31        | NT       | NT       | ++      | NT           | ++           | –                | –        | ++                         |
| P32        | NT       | NT       | ++      | NT           | ++           | –                | –        | ++ and +                   |
| P33        | NT       | NT       | ++      | +++          | NT           | –                | –        | NT                         |
| P34        | NT       | +        | NT      | NT           | +            | NT               | NT       | NT                         |
| P35        | NT       | NT       | ++      | NT           | ++           | NT               | –        | NT                         |
| P36        | NT       | NT       | –       | +            | NT           | –                | +        | NT                         |
| P37        | NT       | ++       | NT      | ++           | NT           | NT               | NT       | NT                         |
| P38        | NT       | NT       | ++      | –            | NT           | –                | –        | NT                         |
| P39        | NT       | +++      | +++     | NT           | ++           | NT               | NT       | NT                         |
| P40        | ++       | NT       | NT      | NT           | +++          | NT               | NT       | NT                         |
| P41        | NT       | NT       | ++      | NT           | ++           | NT               | NT       | NT                         |
| P42        | NT       | NT       | NT      | ++           | ++           | NT               | NT       | NT                         |
| P43        | NT       | NT       | ++      | NT           | ++           | –                | –        | NT                         |
| P44        | NT       | NT       | +       | NT           | +            | NT               | NT       | NT                         |
| Result     | 6/6      | 15/15    | 22/23   | 12/16        | 24/29        | 15/15            | 9/21     | 3/4                        |
| % Positive | 100      | 100      | 95.6    | 75           | 82.7         | 100              | 42.8     | 75                         |

–, negative patch test result; BIT, benzisothiazolinone; MCI, methylchloroisothiazolinone; MI, methylisothiazolinone; NT, not tested; OIT, octylisothiazolinone.

<sup>a</sup>BIT tested at 0.05% or 0.1%.

<sup>b</sup>Paint testing: 'as is' and semi-open and/or diluted 10% aq.

diluted 10% in aq., and gave positive reactions in 3 of 4 patients (see Table 2).

Approximately 86.5% of patients knew that they had been exposed to water-based paints, but the actual trade name could be retrieved by only 24 of them (63.2%).

Only 11 paints were clearly labelled as 'containing isothiazolinones'. More precise information could be retrieved in 19 cases, for which, among the incriminated paints, BIT, MI, MCI/MI, and OIT, in 15, 14, 10 and 2 cases, respectively, were identified. Often, different

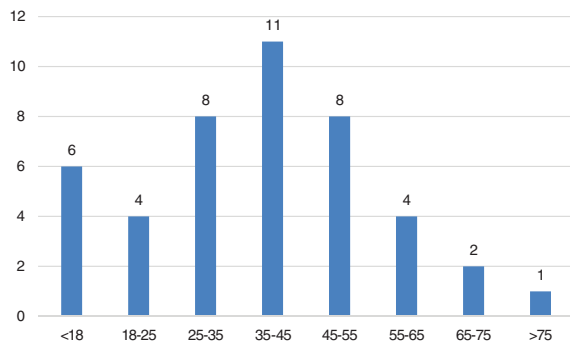


Fig. 1. Patients divided into age groups (n = 44).

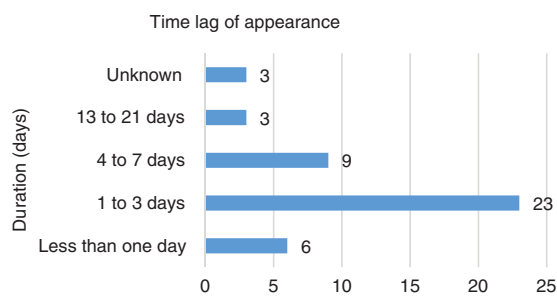


Fig. 2. Time lag of appearance of the eczema after airborne exposure (n = 44).

isothiazolinones were used together. Approximately one-fifth of the patients already knew that they were contact-allergic to MI and/or MCI/MI. Half of the patients had already experienced allergic contact dermatitis, possibly caused by isothiazolinones in cosmetics (18 cases), detergents (9 cases), and/or industrial products (5 cases).

## Discussion

MI is a preservative that is commonly used in cosmetics (including wet wipes), household detergents, and water-based paints, in which it has been used in a fixed 1:3 combination with MCI since the early 1980s (6). Since then, this mixture has been one of the most common causes of contact allergy to preservatives, and is now only permitted in rinse-off cosmetics, for which the use concentration has been limited to 15 ppm (6). Following the use of MI as a stand-alone preservative in industrial products, such as water-based paints, the first reports of occupational allergic contact dermatitis caused by MI-containing paints were published in 2006 (7). In 2005, MI alone was allowed in cosmetics up to 100 ppm, leading to an unprecedented, worldwide outbreak of allergic contact dermatitis, with 5–11.1% of consecutively patch tested patients being sensitized (2, 3,

6, 8). Other isothiazolinones, such as OIT and BIT, are also used as biocides in industrial and household products, but are currently not permitted as preservatives in cosmetic products (1), hence explaining the lower number of reports dealing with allergic contact dermatitis caused by them.

The paint industry has now substantially replaced solvent-based paints with water-based alternatives, mainly for ecological reasons; the latter, however, require the addition of biocides, such as isothiazolinones, to prevent microbial contamination. Isothiazolinones are now widely used as biocides in such paints (1, 9). A recent Danish study showed that, among 19 different paints, MI was present in all of them, BIT in 16 of 19, and MCI in only four of 19 (9); interestingly, although OIT is considered to be an important occupational allergen for painters, it seems to be only rarely used as a preservative in paint (10). The concentrations of MI and BIT in paints range widely, from 10 to 300 ppm for MI, and from 1.5 to 360 ppm for BIT, the higher concentrations mainly occurring in Scandinavian countries.

The different isothiazolinones are well-known contact allergens responsible for occupational hand dermatitis among painters (11). Since the first cases of airborne dermatitis caused by MCI/MI in 2000 (12), there has been a substantial increase in the number of reports describing airborne allergic contact dermatitis caused by isothiazolinone-containing paints, both in patients who performed painting themselves and, most notably, in children and adults who were exposed 'by proxy', that is, who moved into, or started working in, a freshly painted environment (4, 5, 13–15).

A recent study showed that, in a chamber experiment, the emission of MI, which is a very volatile allergen, peaked within hours of application, but then a slower evaporation rate was seen for >42 days (9). Consequently, professional and domestic painters are exposed to high concentrations of MI while painting, and during the following hours, whereas patients working or living in freshly painted rooms are exposed to lower, but long-lasting, concentrations of isothiazolinones (9). We here show, in a large clinical series, that patients sensitized to MCI/MI and/or MI can develop airborne allergic contact dermatitis after using water-based paints containing isothiazolinones, preventing them from (re-)entering a freshly painted room for approximately 5–6 weeks. This observation strongly supports previous experimental data showing long-lasting emission of isothiazolinones from painted walls (9).

More than 30% of our cases showed severe symptoms, leading to sick leave (20.5%) and/or resulting in hospitalization (9.1%). Furthermore, treatment with

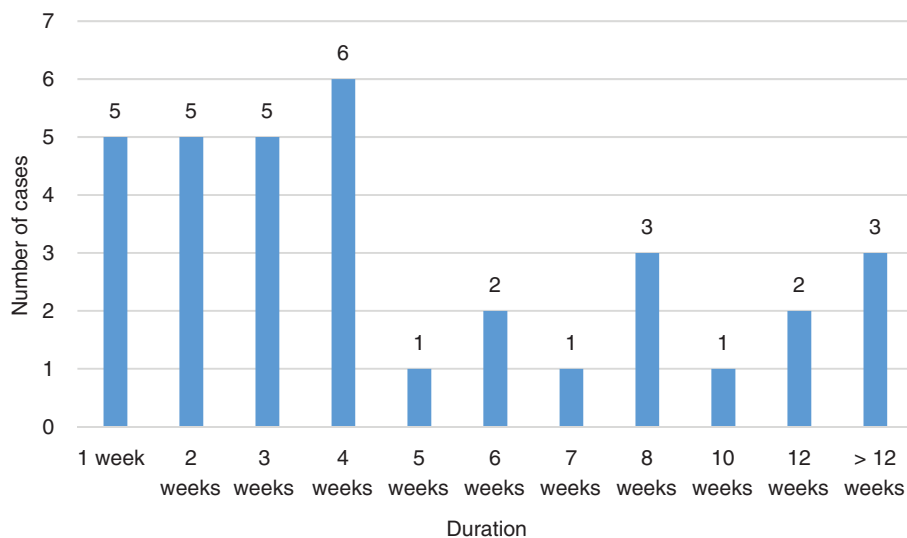


**Fig. 3.** Duration of the dermatitis ( $n = 34$ ). >12 weeks: 3 patients had durations of 22, 26 and 52 weeks.

systemic corticosteroids was often necessary (27.3%). Besides cutaneous lesions, 22.7% of our patients also reported mucosal symptoms, such as dyspnoea, rhinitis, cough, and/or conjunctivitis, indicating possible respiratory allergy, as has been suggested (3–5). Recently, however, an experimental study investigating the capacity of MI to induce asthma-like responses in a validated mouse model concluded that MI was not capable of producing asthma symptoms (16). Further research is needed to better describe the potential respiratory effects of MI, and of other isothiazolinones, in humans. Brazilian researchers recently reported, in 27 patients, a specific pattern of photo-aggravated allergic contact dermatitis caused by MCI/MI that was often difficult to distinguish from a (concomitant) airborne dermatitis (17); in the present study, 3 patients reported photo-aggravation of their dermatitis, but we have no information regarding photopatch tests in these patients.

In most of our cases, the delay before the onset of airborne dermatitis was short, suggesting elicitation in an already previously sensitized individual. However, in 3 cases, this delay was much longer, raising the question of potential active (primary) sensitization to isothiazolinones from airborne exposure to paint, as previously suggested by Kaae et al. (15), although concomitant sensitization from other sources (e.g. cosmetics) might still be an explanation.

The absence of adequate labeling of isothiazolinones on paint containers is a problem for sensitized patients. As previously reported (1, 9), and as observed in 19 of 44 patients, the presence of isothiazolinones in the suspected paints could eventually be shown, from the label, from the material safety data sheets, and/or by contacting the manufacturer, thereby confirming that BIT, MI, MCI/MI,

and OIT, often in combination, were present in all of them, which is in line with the findings of Schwensen et al. (1).

Surprisingly, whereas BIT is widely present in paints, none of our BIT-tested patients (15/44) showed a positive patch test reaction to this derivative, and, until now, no cases of BIT sensitization from paints have been reported in France or Belgium. This result clearly differs from the German Information Network of Departments of Dermatology data, according to which 1.6% of 8726 patients tested were sensitized to BIT, and up to 6.5% of the MI-positive patients (18). A possible explanation is the higher test concentration used for BIT in the German study (i.e. BIT 0.1% pet.) than in our study, in which BIT 0.05% pet. was mostly used (18). However, this is not the only explanation, as a recent Danish study of aimed testing reported that 5.5% of 183 patients tested with BIT 0.1% pet. and 5.6% of 392 patients tested with BIT 0.05% pet. had positive reactions, and emphasized the need for further study to establish the optimal patch test concentration of BIT (19). There are, in fact, few published data on simultaneous reactions (i.e. cross-reactions versus concomitant reactions) between the different isothiazolinone derivatives (18, 20, 22, 23). A recent experimental study analysed immune responses to MI, OIT and BIT in MI-sensitized female mice by using a modified local lymph node assay (20). Cross-reactivity was shown between MI, OIT, and BIT, but only if sufficiently high concentrations of the isothiazolinones were used (20). These experimental data are also in line with previous epidemiological studies suggesting the existence of partial cross-reactivity between MI and OIT (21), and with the recent observation that individuals sensitized to OIT from leather may show cross-reactivity to MI (22), but only if OIT and MI are patch tested in sufficiently high concentrations. Isaksson

et al. investigated the potential pattern of cross-reactivity between MCI, MI, OIT, and dichloro-OIT, and found three different groups of reactors (23).

In most of our cases, we suspected previous sensitization to MI and/or MCI/MI from cosmetics, wet wipes, or household detergents, and elicitation of dermatitis following airborne exposure to isothiazolinones in paints. Prior to the occurrence of airborne allergic contact dermatitis, some 20% of our patients already knew that they were sensitized to MI and/or MCI/MI, but they were not aware of the potential presence of isothiazolinones in non-cosmetic products such as paints, or of the risk of airborne exposure.

Better education, clear, adequate labelling of isothiazolinones on paint containers and, perhaps, stricter regulation of use concentrations of isothiazolinones in paints might have prevented some of these cases of airborne allergic contact dermatitis. As 50% of our patients experienced previous dermatitis that might have been caused by isothiazolinones, the need for patch tests in patients suspected of having allergic contact dermatitis, to determine the responsible haptens, and to educate them so that they can avoid all potential sources of isothiazolinones is stressed.

Currently, there is no regulation on the use of MI in non-cosmetic products, such as paints, except that products must not contain more than (the still very high) limit of 1000 ppm (0.1%). A regulation on MI in such products is expected in spring 2017 (24). MI-containing products are sometimes labelled (on a voluntary basis, by the manufacturers, within a self-regulatory context) as 'contains MI, may cause allergic sensitization' (1). This solution is, however, insufficient, as a recent study showed that, in all analysed (and problematic) paints, the MI concentration was far below this level (1), but the paints still carried the risk of eliciting airborne allergic contact dermatitis. In Europe, some decorative paint producers recently decided to mention 'contains methylisothiazolinone' on the containers whenever the paints contained  $\geq 15$  ppm of MI, and some manufacturers decided to do this when the paint contained even lower levels (e.g. 1 ppm by

AkzoNobel®; personal communication from Mrs Linda Lea, ESCD conference, Manchester, 15 September 2016) (3). We underline the fact that, in the future, adequate labelling (ideally of all isothiazolinones, regardless of their use concentration) would help patients already sensitized to MI, to avoid, or at least limit, their exposure to them. Apart from that, and considering the potential risk of primary sensitization to isothiazolinones from paint, use concentrations of all isothiazolinones in paints should be urgently re-evaluated.

## Conclusion

Notwithstanding our retrospective design, this is the largest clinical study reporting on different aspects related to airborne allergic contact dermatitis caused by isothiazolinone-containing paints, describing the clinical presentation, the evolution of dermatitis, and pertinent patch test data. Our findings mirror previous experimental data on emission of isothiazolinones from paints, and confirm that airborne allergic contact dermatitis in France and Belgium, caused (mainly) by MI and/or MCI in paints, is not rare, can be accompanied by respiratory symptoms, and may have far-reaching consequences, such as the need for systemic treatment, hospitalization, sick leave, and even job loss. Moreover, our data might support the existence of potential cross-reactivity to OIT in MI-sensitized patients. Better counselling of patients allergic to isothiazolinones regarding the risk of airborne dermatitis when they are exposed to isothiazolinone-containing paints is necessary. Furthermore, clear and adequate labelling of all isothiazolinones on paint containers is needed, and safer use concentrations of these derivatives in paints should be determined.

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