

## SHORT COMMUNICATION

## Contact Urticaria Due to a Face Mask Coated with Disinfectant Liquid Spray

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Contact urticaria is defined as a wheal-and-flare reaction that occurs after epicutaneous contact with a causative agent (1). Contact urticaria usually appears within minutes after contact with the causative substances, including chemicals, animal products, antibiotics and cosmetics. We report here a case of contact urticaria resulting from exposure to a disinfectant liquid spray containing ethoxysilane-based quaternary ammonium salt (Chemical Abstracts Service (CAS): 62117-57-1).

## CASE REPORT

A 50-year-old housewife presented with pruritic oedematous erythema on the perioral, cheek, and eyelid areas for 5 days (Fig. 1a). The patient had worn a face mask (CampusMedico, Hiroshima, Japan) sprayed with disinfectant (Eisai Co. Ltd, Tokyo, Japan) for more than one month to protect against bacterial infection. The patient reported that the skin symptoms became aggravated after wearing the mask; therefore, we suspected contact dermatitis caused by the mask or the contents of the spray.

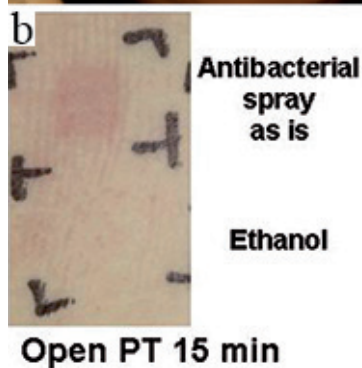


Fig. 1. Redness and swelling on the eyelids, cheeks, and perioral area after wearing a face mask sprayed with disinfectant (a). Open patch test (PT) findings (b). A written permission is given to publish this figure.

The spray contained ethoxysilane-based quaternary ammonium salt (0.1%), ethanol (50.0%), and water (49.9%). Open patch tests for the spray (as is) or 2% ethanol were performed on the patient's lower back. The open patch test to the spray (but not to ethanol) revealed an urticarial rash with pruritus at 15 min, which disappeared within 6 h (Fig. 1b). Closed patch tests (The Finn chamber, 8.0 mm diameter, Smart Practice, Phoenix, Arizona, USA) to sterile distilled water, petroleum jelly (Vaseline®), the mask as is, and the disinfectant product were all negative at 48 and 72 h after the patch test (results not shown), which excluded delayed-type hypersensitivity to them. The same examination was performed using 5 healthy volunteers as control, all results were negative. Therefore, we diagnosed the patient with contact urticaria due to the disinfectant sprayed on the face mask. The patient stopped using the spray and no symptoms recurred.

## DISCUSSION

Ethoxysilane-based quaternary ammonium salt was developed in the late 2000s and has been used as a disinfectant liquid spray with bactericidal, virucidal, and fungicidal properties on masks, towels, air-conditioner filters, etc. Ethoxysilane-based quaternary ammonium salt is classified as a quaternary ammonium compound (QAC) (Fig. S1a<sup>1</sup>). Contact dermatitis and contact urticaria resulting from QACs, especially benzalkonium chloride, have been reported previously (2, 3). Possible underlying mechanisms of QACs in contact dermatitis include immunological reaction and non-specific histamine release.

It remains unclear how the patient became sensitized to ethoxysilane-based quaternary ammonium salt. It is of note that the size of ethoxysilane-based quaternary ammonium salt (Fig. S1a<sup>1</sup>) is about 300 MW, and whole molecular weight of the unit (silane compound) is 0.538 kDa. The patient sprayed the product on both sides of the mask, which might have increased the risk of sensitization.

We report here a case of contact urticaria caused by a disinfectant spray containing ethoxysilane-based quaternary ammonium salt. It has been reported that QACs are associated with asthmatic symptoms, since the compounds can be absorbed via the respiratory tract (2). To date, the patient has not developed asthmatic symptoms. Novel disinfectant substances have recently been developed and are commonly used. Our case highlights that ethoxysilane-

<sup>1</sup><http://www.medicaljournals.se/acta/content/?doi=10.2340/00015555-1962>

based quaternary ammonium salt is a potential cause of allergic contact reactions when used as a disinfectant.

*The authors declare no conflicts of interest.*

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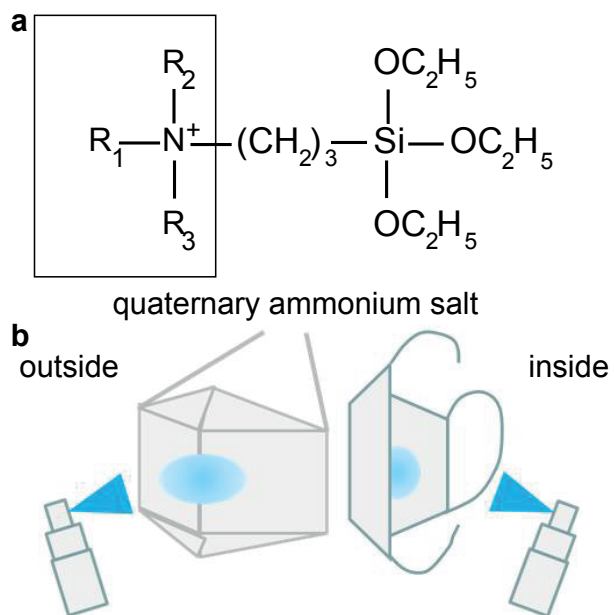


Fig. S1. Ethoxysilane-based quaternary ammonium salt. The structural formula of ethoxysilane-based quaternary ammonium salt.