

# Occupational allergic contact dermatitis caused by Solvent Orange 60 in protective gloves

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Solvent Orange 60 (CAS no. 6925-69-5; SO60) is a dye used in plastic materials such as automobile lights and spectacle frames, and a known contact sensitizer. We report the case of a patient with occupational contact allergy to SO60 in the orange-colored fabric of protective gloves.

## 1 | CASE REPORT

A 30-year-old woman working as a tile setter on construction sites developed hand eczema 1 month after she started using orange-colored textile protective gloves with black polyurethane coating on the palmar side (Prof Workgrip MF302710C, Nantong Qiansheng Safety Protection Technology, China; Figure 1). She had been involved in her current work for several years, and had no history of hand dermatitis. Her hand eczema spread to involve the whole glove area, and after 2 months, she also developed eczema on the lower part of her face. Her eczema quickly resolved when she was absent from work, recurred when she returned to work, and stopped recurring when she replaced the orange-colored protective gloves.

The patient was patch tested in a regional hospital with positive reactions to the protective glove "as is," and referred to us for further examination. Patch testing was performed with Finn Chambers (SmartPractice, Phoenix, Arizona) in accordance with ESCD guidelines.<sup>1</sup> The patch tests revealed extreme positive reactions to SO60, to the glove fabric "as is," and as ultrasonic extracts<sup>2</sup> (Table 1, Figure 1). The patient tested negative to a diisocyanate and rubber series, and to all other substances in a glues and plastics series, except SO60. Patch testing with baseline series revealed fragrance allergy, and in the fragrance series, positive reactions to *Evermia furfuracea* and *E. prunastri* were noted, which were considered irrelevant to the patient's current

hand dermatitis. Thin layer chromatograms (TLCs) were prepared from the acetone extracts of (1) wrist and (2) palm of the gloves, using dichloromethane-acetonitrile mixture (85:15) as eluent according to a previously described method with slight modification.<sup>3</sup> A strip from each of the plates was cut, taped tightly onto the patients back for 2 days, and read similarly to other patch tests. Positive patch test reactions were seen for both TLCs exactly where the orange spot was located. The respective spots on TLCs were cut out, extracted with acetone, and analyzed by gas chromatography-mass spectrometry (GC-MS), using pure SO60 as reference substance. The analysis revealed that the orange spots consisted of SO60.

The patient recalled occasionally touching her face with the gloved hands and with bare hands just after having removed the gloves. Therefore, not only the hand eczema but also the facial eczema was considered occupational allergic contact dermatitis caused by SO60 in protective gloves.

## 2 | DISCUSSION

Previously, allergic contact dermatitis caused by SO60 has been reported associated with solid plastic items such as the spectacle frames.<sup>4-8</sup> Also, two cases with occupational contact allergy to SO60 from the plastic industry have been reported, one of them from the manufacture of orange plastic chainsaw bodies<sup>7</sup> and the other from assembly of red-colored plastic helmets.<sup>8</sup>

We report a case of occupational contact dermatitis caused by SO60 present in the fabric of orange-colored protective gloves. To the best of our knowledge, allergic contact dermatitis caused by SO60 in textile material has not been reported previously. Because the agent in gloves that caused our patient's hand eczema was unknown, we patch

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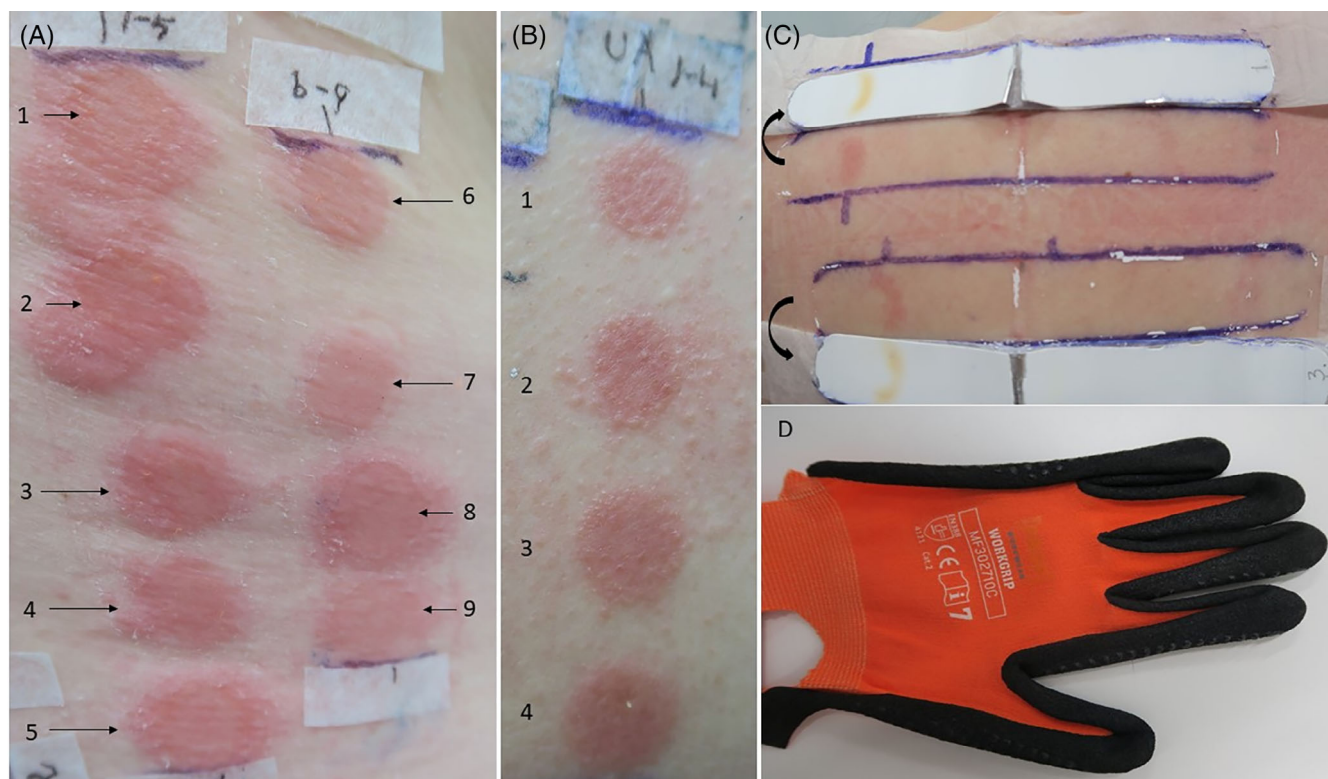


**FIGURE 1** Patch test reactions to glove material. (A) Glove, wrist *as is* in acetone (1), ethanol (2), and aqua (3); palm, inside "*as is*" in acetone (4), ethanol (5), and aqua (6); palm, outside "*as is*" in acetone (7), ethanol (8), and aqua (9) on day (D) 2. (B) Glove, ultrasonic extracts of wrist part in acetone (1), in ethanol (2), and of palm in acetone (3), and in ethanol (4) on D4. (C) Patch tests with thin layer chromatogram plates prepared from glove material (upper plate: wrist part, lower plate: palm) on D2. The plates were turned to side (arrows). (D) Glove sample

**TABLE 1** Patch test reactions to Solvent Orange 60 and to glove material on day 4 (D4)

| Test substance                                 | Patch test reactions, D4 |
|------------------------------------------------|--------------------------|
| Solvent Orange 60 0.1% pet <sup>a</sup>        | +++                      |
| Prof Workgrip glove <i>as is</i>               |                          |
| Wrist, in acetone/in ethanol/in aq.            | +++ / +++ / +++          |
| Palm, outside, in acetone/in ethanol/in aq.    | +++ / +++ / +++          |
| Palm, inside, in acetone/in ethanol/in aq.     | +++ / +++ / +++          |
| Prof Workgrip glove, ultrasonic extracts (UEs) |                          |
| Wrist, UE in acetone                           | ++                       |
| Wrist, UE in ethanol                           | ++                       |
| Palm, UE in acetone                            | ++                       |
| Palm, UE in ethanol                            | ++                       |
| Prof Workgrip glove, thin layer chromatograms  |                          |
| Wrist                                          | +                        |
| Palm                                           | +                        |

<sup>a</sup>Chemotechnique Diagnostics, Vellinge, Sweden.

tested the patient extensively with the glove material. As it turned out, the culprit allergen was a well-known contact allergen in plastic, which now appeared in a new context, as a textile dye.

#### CONFLICT OF INTERESTS

M.P. received a lecture fee from Leo Pharma.

#### AUTHOR CONTRIBUTIONS

**Maria Pesonen:** Conceptualization; data curation; investigation; methodology; writing-original draft; writing-review and editing. **Katri Suuronen:** Data curation; investigation; methodology; writing-review and editing.

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#### REFERENCES

- Johansen JD, Aalto-Korte K, Agner T, et al. European Society of Contact Dermatitis guideline for diagnostic patch testing - recommendations on best practice. *Contact Dermatitis*. 2015;73(4): 195-221.

2. Niklasson B. Mixing your own antigens. In: Guinn JD, ed. *Practical Contact Dermatitis: A Handbook for the Practitioner*. McGraw-Hill; 1995: 687-695.
3. Bruze M, Frick M, Persson L. Patch testing with thin-layer chromatograms. *Contact Dermatitis*. 2003;48(5):278-279.
4. Shono M, Kaniwa MA. Allergic contact dermatitis from a perinone-type dye C.I. Solvent Orange 60 in spectacle frames. *Contact Dermatitis*. 1999;41(4):181-184.
5. Shono M, Numata M, Sasaki K. Allergic contact dermatitis caused by Solvent Orange 60 in spectacle frames in Japan. *Contact Dermatitis*. 2018;78(1):83-84.
6. Isaksson M, Helwig H, Zimerson E, Ryberg K, Hagvall L. Allergic contact dermatitis from Solvent Orange 60 in spectacle frames. *Contact Dermatitis*. 2012;66(Suppl. 2):77.
7. Linauskiene K, Zimerson E, Antelmi A, et al. Solvent Orange 60 is a potent contact sensitizer in occupational and everyday life. *Contact Dermatitis*. 2018;79(3):123-126.
8. Yeo L, Kuuliala O, White IR, Alto-Korte K. Allergic contact dermatitis caused by Solvent Orange 60 dye. *Contact Dermatitis*. 2011;64(6):354-356.

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