

Occupational allergic contact dermatitis from bisphenol A in vinyl gloves

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Allergic contact dermatitis caused by polyvinyl chloride gloves is rarely reported, and in only 2 cases was bisphenol A considered to be the responsible sensitizer. We report a patient with occupational hand dermatitis after the use of a new type of high-density vinyl (HDV) gloves. Patch tests showed positive (++) reactions to both used and new HDV gloves and to bisphenol A. Chemical analysis by gas chromatography-mass spectrometry demonstrated the presence of bisphenol A in the HDV gloves. Replacement by nitrile rubber gloves resulted in complete clearance of the hand dermatitis.

Key words: contact allergy to bisphenol A; gas chromatography-mass spectrometry; hand dermatitis; occupational; polyvinyl chloride gloves. © Blackwell Munksgaard, 2004.

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Allergic contact dermatitis from rubber gloves is well known and mainly caused by natural rubber latex and rubber accelerators. In contrast, contact allergy to polyvinyl chloride (PVC) gloves is rarely described.

Case Report

A 37-year-old woman presented with hand dermatitis. She worked in the manufacture of silicone rubber ear implants. Washing of the hands with an antiseptic soap based on triclosan and chloroxylenol was obligatory as well as the use of non-powdered PVC gloves. She had no history of atopy nor contact allergy and used no medication.

Shortly after the use of a new type of high-density vinyl (HDV) gloves, an itchy, vesicular eczema developed on the dorsa of the hands and fingers and on the wrists. Patch tests with the Belgian standard and cosmetics series, including triclosan 2% in petrolatum (pet.) and chloroxylenol 0.5% pet., and with an epoxy series and (meth)acrylates series (Chemotechnique Diagnostics, Malmö, Sweden) showed a + reaction to nickel sulfate and triethylenetetramine at day 4 (D4). A plastics and glues series (Chemotechnique Diagnostics) gave a ++ reaction to bisphenol A at D2 and D4. A similar ++ reaction was noticed to both used and new HDV gloves moistened with water (Fig. 1). Treatment with a topical corticosteroid and the use of nitrile rubber gloves resulted in rapid and complete clearance of the hand dermatitis.

Sample treatment

Chemical analysis of the HDV gloves was performed by gas chromatography-mass spectrometry (GC-MS).

After extraction of the HDV gloves by accelerated solvent extraction, the extract was submitted to an on-column silylation reaction with bis-(trimethylsilyl)-trifluoroacetamide, following the procedure reported by Li et al. (1). Gas chromatographic analysis was performed on a Varian 3800 GC using a CP-Sil 8 column (10 m × 0.53 mm I.D.; $d_f = 1 \mu\text{m}$, Varian-Chrompack) under the following temperature programme: 50°C (2 min) → 100°C (20°C/min) → 200°C (10°C/min) → 290°C (20°C/

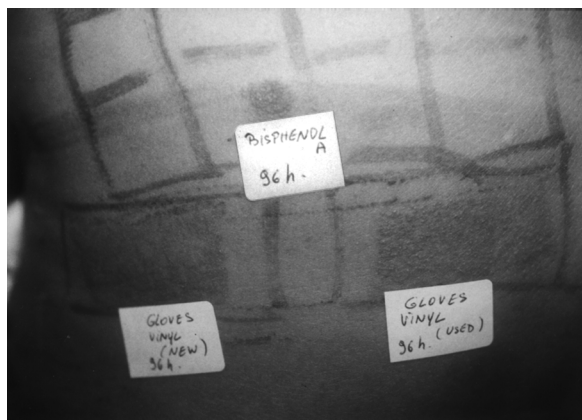


Fig. 1. Erythematous, papulovesicular patch test reaction to the high-density vinyl gloves and bisphenol A.

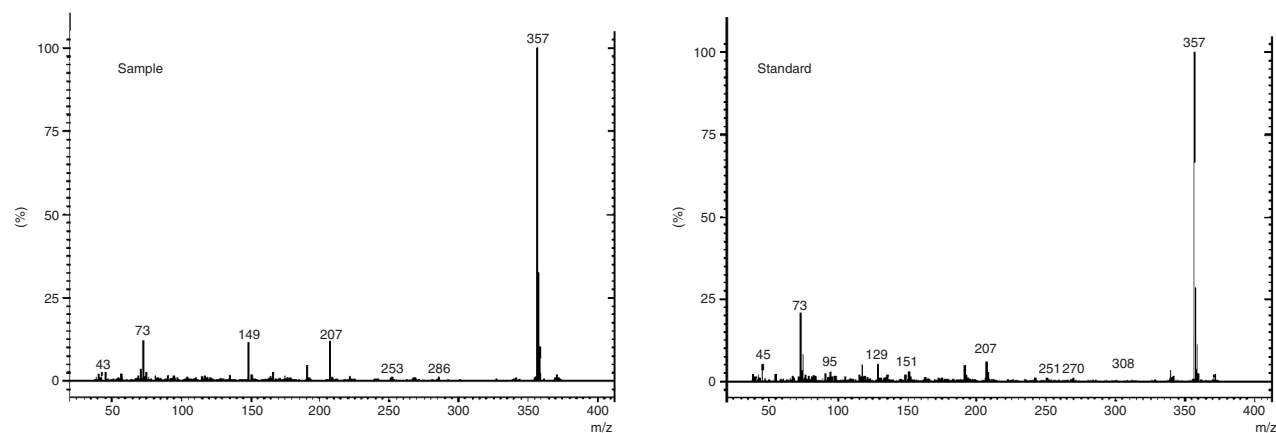


Fig. 2. Mass spectra of the authentic standard and the sample for bisphenol A derivatized.

min) (2 min). A Varian Saturn 2000 ion trap MS was used as detection system.

The bisphenol A compound was identified by its GC retention time, in comparison with an authentic standard, and by its recorded mass spectra by comparison with the NIST library (100 000 compounds). Its mass spectrum is very similar to that of the standard (Fig. 2). Through the comparison between sample and standard, it is possible to confirm the presence of bisphenol A in the HDV gloves.

Discussion

PVC polymers are not considered as allergens. However, allergic contact dermatitis due to the presence of certain additives in PVC plastics occasionally occurs (2).

Additives responsible for allergic reactions to vinyl gloves are an organic pigment Irgalite Orange F2G (3), epoxy resin of bisphenol A (4), the plasticizers tricresyl and triphenyl phosphate (5) and di(2-ethylhexyl)phthalate (6). The last caused severe contact urticaria in 1 patient. Recently, 2 Finnish patients with occupational hand dermatitis from PVC gloves were reported (7, 8). Similar to our patient, both developed a ++ reaction to bisphenol A but not to epoxy resin on patch testing. Bisphenol A was detected in the gloves by chemical analysis.

Bisphenol A (4,4'-isopropylidenediphenol) is used in the manufacture of epoxy resins of bisphenol A type, unsaturated polyester and polycarbonate resins and epoxy di(meth)acrylates. It is considered a weak sensitizer in humans. Jolanki et al. (9) found only 2 patients with a positive reaction to bisphenol A on patch testing with a plastics and glues series during 1974–90. In our department, only 2 of 217 patients tested with a plastics and glues series (Chemotechnique Diagnostics) from January 1996 to January 2003

reacted to bisphenol A. These results seem to confirm the rarity of sensitization. In the literature, cases of bisphenol A contact allergy have been reported from glass fibre (10), semisynthetic waxes (11), plastic footwear (12), epoxy resin (13) and, more recently, from dental composite resins (9), thermal recording paper (14) and PVC gloves (7, 8).

According to the manufacturer, one of the stabilizers in the gloves contains a phenol at low concentration (<0.5% of the total weight). However, the nature of the phenol is unknown, as well as the possibility of bisphenol A being formed during the manufacturing process.

Very recently, a further 3 cases of allergic contact dermatitis from bisphenol A in PVC gloves were reported from Finland (15). These authors also analysed 16 brands of disposable PVC gloves for medical use, finding only a very small amount of bisphenol A in 1 brand.

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