

CONTACT POINT

A case of allergic contact dermatitis caused by goalkeeper gloves

Atsuko Aizawa¹  | Akiko Ito^{1,2}  | Yukiko Masui^{1,2} | Kazumi Sasaki³ | Yutaka Ishimura³ | Mitsuru Numata³ | Riichiro Abe¹

¹Department of Dermatology, Niigata University School of Medicine, Niigata, Japan

²Nagata Clinic, Niigata, Japan

³National Institute of Technology and Evaluation, Tokyo, Japan

Correspondence

Dr Atsuko Aizawa, Department of Dermatology, Niigata University School of Medicine, 1 Asahimachidori, Chuouku, Niigata 951-8510, Japan.

Email: a-nozawa@med.niigata-u.ac.jp

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CASE REPORT

A 16-year-old male presented with a 2-year history of pruritic erythema and fissures on the palms and dorsal skin of the hands and wrists. He had been a goalkeeper in soccer for 5 years. As his skin lesions were confined to the area of skin covered by his gloves (Figure 1), we suspected that these gloves had triggered contact dermatitis. We performed patch testing, with 2 days of exposure, with the Japanese baseline series by the use of Finn Chambers on Scanpor tape or Patch test tape Torii, in addition to the patient's gloves tested "as is", as well as shampoo, soap, and an ointment. Readings were performed on day (D) 2, D3 and D7 after application, according to ICDRG criteria. All 5 of the patient's gloves elicited positive reactions. Among the Japanese baseline allergens, *p*-tert-butylphenol-formaldehyde resin (PTBFR), carba mix, and 1,3-diphenylguanidine (1,3-DPG), a component of carba mix, also elicited positive reactions. The results of chemical analysis by gas chromatography-mass spectrometry showed that ingredients with a

similar structure to PTBFR were detectable in all of the gloves, whereas 1,3-DPG was detectable in only 1 type of glove (Table 1) (Figure 2).

TABLE 1 The results of a chemical analysis by gas chromatography-mass spectrometry

	Glove no.				
	1	2	3	4	5
PTBFR monomer	+	+	–	+	–
BHT	+	+	+	+	+
BKF	+	+	+	+	+
M.W.460	+	+	+	–	+
Irganox 1076	–	+	+	+	–
1,3-DPG	–	–	–	+	–

BHT, 2,6-di-*tert*-butyl-*p*-cresol; BKF, 2,2'-methylenebis(6-*tert*-butyl-*p*-cresol); M.W.460, 2,6-bis[[3-(*tert*-butyl)-2-hydroxy-5-tolyl]methyl]-4-methylphenol; Irganox 1076, octadecyl 3-(3,5-di-*tert*-butyl-4-hydroxyphenyl) propionate; PTBFR, *p*-tert-butylphenol-formaldehyde resin; 1,3-DPG, 1,3-diphenylguanidine.



FIGURE 1 The patient's goalkeeper gloves. He had used all gloves for 5 years

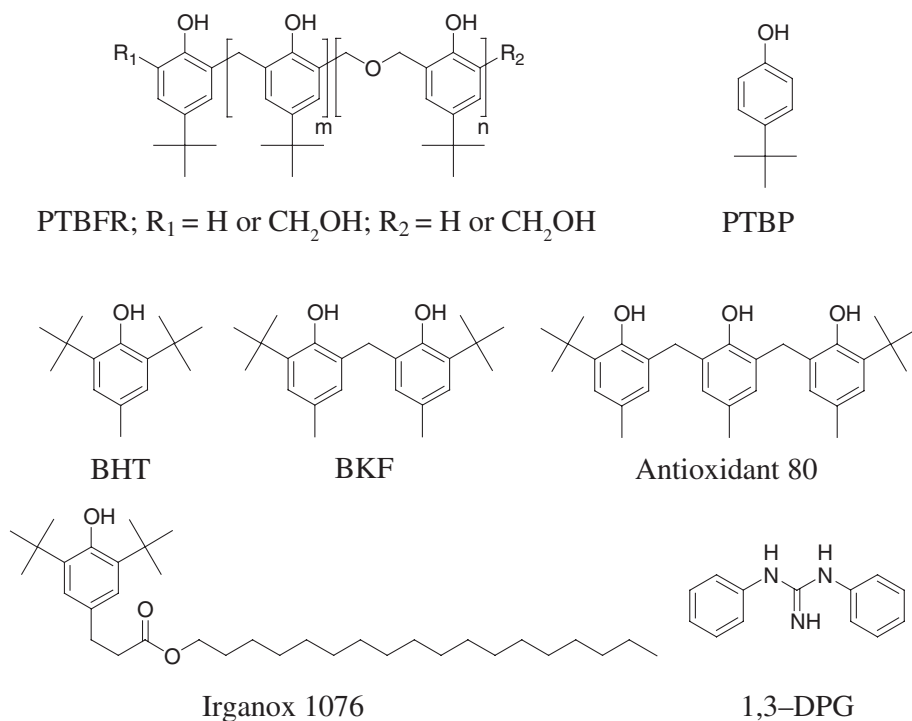


FIGURE 2 The structures of chemicals in the patient's 5 gloves analysed by gas chromatography-mass spectrometry were similar to those of *p*-*tert*-butylphenol-formaldehyde resin (PTBFR). BHT, 2,6-di-*tert*-butyl-*p*-cresol; BKF, 2,2'-methylenebis (6-*tert*-butyl-*p*-cresol); M.W.460, 2,6-bis [[3-(*tert*-butyl)-2-hydroxy-5-tolyl]methyl]-4-methylphenol; Irganox 1076, octadecyl 3-(3,5-di-*tert*-butyl-4-hydroxyphenyl) propionate; PTBP, *p*-*tert*-butylphenol

DISCUSSION

In this study, patch testing showed positive reactions to all 5 types of glove, PTBFR, and 1,3-DPG. PTBFR is a common component of glues in rubber products, and a known cause of allergic contact dermatitis.¹ In PTBFR, 2 main allergenic dimers have been described, namely, 4-*tert*-butyl-2-(5-*tert*-butyl-2-hydroxy-3-hydroxymethyl-benzyloxymethyl)-6-hydroxymethylphenol and 4-*tert*-butyl-2-(5-*tert*-butyl-2-hydroxy-benzyloxymethyl)-6-hydroxymethylphenol. PTBFR is manufactured by heating a mixture of *p*-*tert*-butylphenol and formaldehyde. This production method is not standardized.²

We hypothesize that the adhesive agent used in the patient's glove was not *p*-*tert*-butylphenol but another phenol compound. This phenol compound was added in a random order, so the resin had a very complicated chemical structure. Thereby, PTBFR consists of many substances, the majority of which are not chemically defined.³ In this case, we detected not the above-mentioned PTBFR dimers, but similar structures, the concentrations of which we were unable to determine. However, we consider that the structures similar to PTBFR might have caused allergic contact dermatitis as cross-sensitive allergens. 1,3-DPG is used as an accelerator in rubber products.⁴ We considered that 1,3-DPG was not the main cause, because it was detected in only 1 type of glove.

In Japan, any skin disorders resulting from contact with products used in daily life that require treatment for ≥ 30 days are classified as causing "serious health damage" and are reported by the National Institute of Technology and Evaluation (NITE) to the Ministry of Economy, Trade and Industry, so that inquiries can be made to the supplier. Investigation of ingredients in products that cause skin disorders is useful not only for affected patients, but also for promoting public health. The present inquiry showed that all 5 types of glove had been manufactured by the same German company and sold in

Japan by different sports equipment stores. In general, it is extremely difficult for dermatologists to obtain information about ingredients in products from manufacturers. A public system for the chemical analysis of products, such as the NITE, is important to ensure their safe use.

Conflict of interest

The authors declare no potential conflict of interests.

ORCID

Atsuko Aizawa <http://orcid.org/0000-0003-2929-6653>

Akiko Ito <http://orcid.org/0000-0002-6967-0710>

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