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Key words: allergic contact dermatitis; di-(*n*-octyl) tin-bis(2-ethylhexylmaleate); poly(adipic acid-*co*-1,2-propylene glycol); vinyl chloride gloves.

Case Report

A 42-year-old woman had been suffering from severe hand eczema for 2 years in spite of the treatment with corticosteroid ointments. She had been using vinyl chloride gloves during her cleaning job for the last 3 years. We performed patch testing and she showed positive reaction to vinyl chloride gloves (as is) at D2, D3, and D7. To identify the causative chemicals, we carried out patch testing using 6 kinds of ingredients of the vinyl chloride glove and 3 kinds of other adipic polyesters not included in her gloves, which were kindly provided by the manufacturer. She showed positive reaction to 2 of the ingredients: poly(adipic acid-*co*-1,2-propylene glycol) [CAS no 25101-03-5 (5% pet.)], which is one of the adipic polyesters, as plasticizer and di-(*n*-octyl) tin-bis(2-ethylhexylmaleate) [CAS no. 10039-33-5 (0.5% and 1% pet.)] as stabilizer (Table 1, Fig. 1). All 5 control persons showed negative reactions to these allergens described above. The manufacturer experimentally made 7 kinds of gloves that contained variable adipic polyesters as plasticizers with or without the stabilizer described above (Table 2). On patch testing, she showed positive reaction only for 3 gloves that contain at least one of the 2 possible allergens (Table 2). She was advised to use the gloves containing neither of the allergens, resulting in remissions of the skin symptoms.

Allergic contact dermatitis caused by poly(adipic acid-*co*-1,2-propylene glycol) and di-(*n*-octyl) tin-bis(2-ethylhexylmaleate) in vinyl chloride gloves

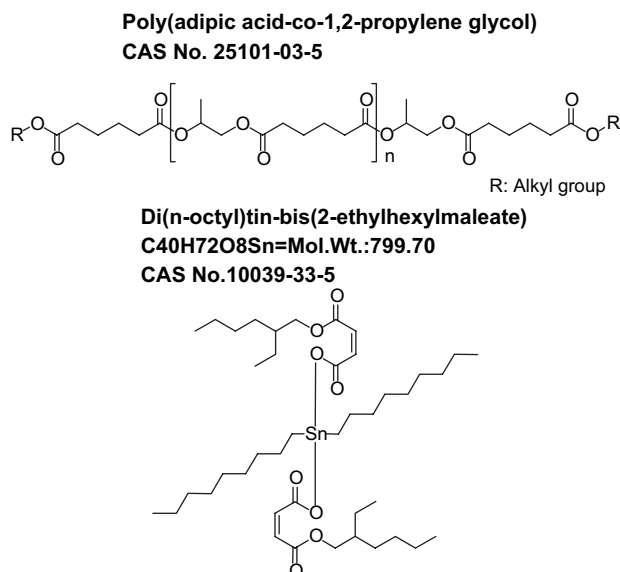
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Discussion

Recently, people often use gloves to protect their hands from various hazards during work or housekeeping. It is well known that latex gloves sometimes induce allergic contact urticaria



and/or allergic contact dermatitis. Contact dermatitis caused by vinyl chloride glove is rare (1–3). Hosono et al. (1) reported 5 cases of allergic contact dermatitis caused by vinyl chloride gloves. Among them, 1 patient showed doubtful positive reactions to adipic polyester (10% pet.). Sugiura et al. (2) reported an additional case who showed positive reaction to the glove extract containing adipic polyesters, but not to an adipic polyester (5% pet.). Sowa et al. (3) reported a case of allergic contact dermatitis caused by adipic polyesters that was confirmed by patch test using adipic polyester (5% pet.). Guin (4) reported allergic contact dermatitis caused by adipic acid in polyester synthesis. Thus, adipic polyesters might sensitize persons and provoke allergic contact dermatitis.

Fig. 1. Chemical structure of 2 allergens in the causative vinyl chloride glove.

Table 1. Result of patch test with ingredients included in causative vinyl chloride gloves and alternative kinds of adipic polyesters

Ingredient	Nature	CAS no.	Component level in causative vinyl gloves (%)	Patch test		
				Concentration in patch test material (%)	Result of patch test	
					D2	D4
Poly(adipic acid-co-1, 2-propylene glycol)	Plasticizer	25101-03-5	26.0	5.0	+	+
Alkyl sulfonic acid phenyl ester	Plasticizer	91082-17-6	12.0	5.0	–	–
Tributyl <i>O</i> -acetylcitrate	Plasticizer	77-90-7	4.0	5.0	–	–
Diisononyl adipate	Plasticizer	33703-08-1	4.0	5.0	–	–
Epoxidized soya bean oil	Plasticizer	8013-07-8	1.0	5.0	–	–
Di-(<i>n</i> -octyl) tin-bis (2-ethylhexylmaleate)	Stabilizer	10039-33-5	0.2	1.0	++	++
				0.5	++	++
Adipic polyester A ^a	Plasticizer		0.0	5.0	–	–
Adipic polyester B ^a	Plasticizer		0.0	5.0	–	–
Adipic polyester C ^a	Plasticizer		0.0	5.0	–	–

^aThe exact chemical structures of adipic polyesters A, B and C are unknown to us. They are used in the other manufacture of vinyl chloride gloves as plasticizers.

Table 2. The result of patch test with 7 kinds of gloves made experimentally

Seven kinds of gloves made experimentally	Component level in glove (%)					Stabilizer	Result of patch test	
	Plasticizer							
	Poly(adipic acid- <i>co</i> -1, 2-propylene glycol)	Adipic polyester A	Adipic polyester B	Adipic polyester C	Alkyl sulfonic acid phenyl ester			
	Di-(<i>n</i> -octyl) tin-bis (2-ethylhexyl maleate)	D2	D4					
1 (causative glove)	26	—	—	—	16	0.2	++	++
2	—	26	—	—	16	0.2	++	++
3	26	—	—	—	16	—	+	+
4	—	26	—	—	16	—	—	—
5	—	—	26	—	16	—	—	—
6	—	—	—	26	16	—	—	—
7	—	—	—	—	42	—	—	—

Furthermore, we confirmed that the patient can use other gloves containing some of the adipic polyesters other than poly(adipic acid-co-1,2-propylene glycol). Because adipic polyesters are polyesterized from adipic acid, various kinds of glycols and alcohols, the nature and allergenicity of adipic polyesters may not be uniform. On the other hand, because the patch test of di-(*n*-octyl) tin-bis (2-ethylhexylmaleate), showed very strong reaction in our case, the stabilizer may be sensitizer. Attention must be paid to vinyl chloride gloves as well as latex gloves in the treatment of incurable hand dermatitis.

References

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