

Contact dermatitis from modified rosin in footwear

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The majority of rosin (colophony) used commercially is chemically modified (1). For many applications, including tackifiers impregnated into shoe lining cloth, modification of rosin is a 2-stage process. The initial step is an adduct reaction with maleic anhydride (Diels-Alder reaction) (2). Abietic acid being the commonest resin acid in most rosins (1), the major product of this reaction is endo-maleopimaric acid (MPA) (Fig. 1), a potent sensitizer (1, 3). In the 2nd stage of rosin modification, esterification with a polyol such as pentaerythritol produces the tackifier.

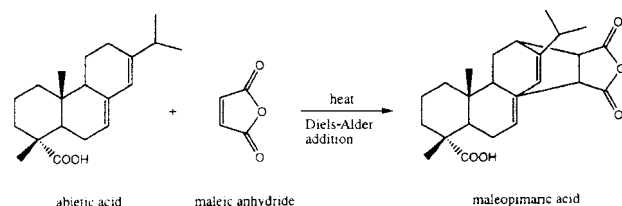


Fig. 1. Diels-Alder reaction between abietic acid and maleic anhydride.

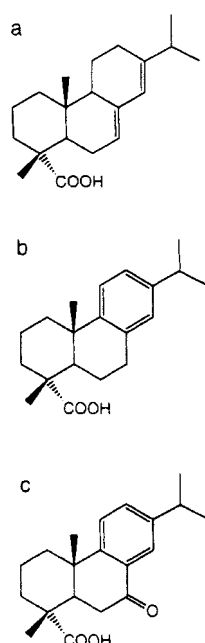


Fig. 2. (a) Abietic acid, (b) dehydroabietic acid, (c) 7-oxodehydroabietic acid.

Case Report

A 5-year-old girl, with a history of infantile eczema, presented with dermatitis of her feet and hands, particularly the heels and all round the forefoot. The child was patch tested with samples of several shoe materials obtained by her mother, our standard series and a series of shoe dyes, adhesives and fabrics. Positive reactions were obtained to unmodified rosin (colophony) 20% pet. (++) and to the shoe lining (++) at D2 and D4. This linen cloth impregnated with a modified-rosin tackifier lined both the heel and toe of the shoe-upper, and was glued beneath the leather insole with a polyurethane cement. A sample of this modified rosin gave ++ reactions at 1%, 5% and 10% pet. at D2 and D4. Since wearing unlined wood and leather clogs, our patients' foot dermatitis has resolved.

Further Studies

A sample of the modified rosin was subjected to gas chromatographic (G-C) analysis (4) for abietic acid, dehydroabietic acid, the oxidation product 7-oxodehydroabietic acid (Fig. 2) and MPA, methyl stearate being used as internal standard, free carboxylic acid groups being converted to methyl esters with diazomethane prior to analysis, and the methyl esters of abietic acid, dehydroabietic acid, 7-oxodehydroabietic acid and MPA being injected as references (Table 1).

Table 1. GC results (MPA=maleopimaric acid)

Rosin components	Concentration in modified rosin (%)
abietic acid	5.5%
dehydroabietic acid	1.1%
7-oxodehydroabietic acid	not detected
MPA	0.1%

Table 2. Positive patch test reactions at D4 in 30 patients

Case no.	Unmodified rosin (colophony) (20% pet.)	Modified rosin (10% pet.)
1	+	-
2	++	-
3	+	++
4	++	-
5	++	-

30 patients patch tested for leg or foot dermatitis had the modified rosin included as well as colophony. Positive reactions were seen in 5 cases at D2 and D4 (Table 2).

Discussion

It has been difficult to find any lined shoes free from such tackifiers. Despite modification, there is still unmodified rosin present in such material. Oxidation products of abietic and dehydroabietic acids are thought to be the allergens (5–8). The presence of MPA in the tackifier indicates that unesterified Diels-Alder adducts of rosin are also present. Our patient declined further patch testing with MPA, so the contribution of MPA to her footwear dermatitis remains unknown. Esters of MPA with polyols such as pentaerythritol are unlikely to be contact allergens (9).

In the further study of 30 patients, 4 reacted to unmodified rosin (colophony) alone and 1 reacted to both modified and unmodified rosin. Shoe tackifiers should therefore be considered as sources of colophony allergens. Furthermore, 2 studies (10, 11) have identified patients with positive reactions to modified rosin products, such as MPA, who did not react to unmodified rosin in the standard series. In patients where footwear dermatitis is strongly suspected, but colophony is negative, patch testing to MPA should therefore be considered.

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Localized dermographism: a differential diagnosis of latex glove allergy

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Key words: natural rubber; latex allergy; localized dermographism; gloves; differential diagnosis; health care workers; occupational. © Munksgaard, 1999.

Urticaria from rubber gloves was first described in 1979 (1) and has since become a frequent cause of referral of hospital personnel to dermatology departments. We prick test such patients with natural rubber latex (NRL) and latex extract (ALK – Abello, Hørsholm, Denmark), and also patch test them with NRL.

Case Reports

Case no. 1

A 29-year-old female renal physician gave a history of recurrent itching and inflammation of both hands exacerbated by wearing latex gloves. Patch tests were performed to a standard and rubber series. Latex patch test

and prick test were both negative. Clinical examination revealed marked dermographism.

Case no. 2

A 26-year-old renal nurse presented with a 4-month history of inflammation of both hands and wrists occurring after wearing latex gloves. Patch tests to standard and rubber series and samples of latex gloves were negative. A latex prick test was also negative. On examination, dermographism was demonstrated.

Case no. 3

A 41-year-old intensive care nurse gave a 2-month history of intermittent itching of both hands and wrists occurring only at work. Patch tests were performed to a