

## A Summary of shoe allergic contact dermatitis caused by dimethyl fumarate in Spain

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Dimethyl fumarate (DMF) has been recently related to two outbreaks of severe contact dermatitis, owing to its presence in furniture and footwear (1–8). The cases seen in Spain have been mostly shoe-induced contact dermatitis (4, 5).

We performed a retrospective study on all patients who suffered from a shoe contact dermatitis caused by

DMF studied by the Spanish Contact Dermatitis Research Group and related dermatologists between October 2008 and February 2010.

The aim of this study was to determine the different clinical forms of presentation, the appropriate concentration and vehicle for the DMF patch test, and the utility of patch testing with the patient's own shoe sample.

We included 44 patients with shoe contact dermatitis and positive patch test reactions to DMF. Demographic and clinical data, patch test results and DMF concentrations in shoe samples were registered. The variables recorded for each patient were sex, age, site of the lesions, clinical presentation, patch test results (Spanish baseline series, patient's own shoe textile extracts, DMF at different

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concentrations and vehicles, and a special acrylate and fumaric acid ester series), and source of exposure. DMF in shoe samples was analysed with gas chromatography–mass spectrometry.

All of our patients were female. Fifteen of 44 presented with acute dermatitis mimicking a toxic erythema as the initial clinical picture. The most frequently involved areas were the dorsum of toes and feet (59%), the whole foot (38.6%), and the lower third of the leg (22.7%). Twenty of 44 patients had a positive patch test reaction to DMF at 0.001% in pet. (15/20) or in water (5/20); 21 additional cases were diagnosed with DMF at 0.01% in pet. (19/21) or in water (2/21); and 2 cases needed DMF at 0.1% in pet. to be diagnosed. Twenty-one out of 27 patients had positive patch test reactions to their own shoe samples. Cross-reactivity with fumaric acid esters was observed in 9/11 cases, and cross-reactivity to acrylates in 3/11 cases. We found DMF in all shoe samples analysed (12/12).

## Discussion

All patients with shoe contact dermatitis caused by DMF registered in Spain and also in other European series are women (4–8). We do not think that can be explained by women using more pairs of shoes, or wearing more boots or closed shoes than men, in part because the majority of cases were related to sandals. It is, therefore, possible that the use of tighter shoes or differences in the composition of the shoes could determine variations in the fixation of DMF, with higher concentrations of DMF being present in women's shoes.

Probably the most frequent clinical picture caused by DMF is an acute irritant contact dermatitis irritant contact dermatitis, which was what most of our sensitized patients initially presented with.

When DMF is patch tested at 0.1%, there may be strong positive reactions, and because of this we recommend

patch testing with DMF at 0.01% in pet., although, at this concentration, 4.5% of our patients would have been misdiagnosed.

It should be pointed out that, in contrast to the situation with other allergens, patch testing with the patients' own shoe samples is very efficient.

Although we were able to show the presence of DMF in all shoes studied, we think that this analysis must be reserved for research studies and those cases with legal implications. In the same way, in irritant contact dermatitis with negative patch test reactions, it is useful to demonstrate the presence of DMF in the shoe sample.

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