

Pine processionary caterpillar as a new cause of immunologic contact urticaria

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Nowadays, caterpillars are included among the agents that elicit contact urticaria by a non-immunologic mechanism. Our objective was to find the rôle that an IgE-mediated mechanism could have among patients with suspected contact urticaria from pine processionary caterpillars. 16 patients with suspected contact urticaria from this caterpillar were studied by prick testing and specific IgE detection by immunoblotting. 87% of the patients had a positive prick test and immunoblotting for caterpillar extract. In these allergic patients, the symptoms associated with urticaria were: angioedema (79%), conjunctivitis (36%) and severe anaphylaxis (14%). The most frequent localizations of the wheals were the neck (100%) and forearms (93%). Angioedema was more frequent on the eyelids (79%). The IgE-immunoblot detected in the caterpillar extract several reactive bands, with apparent MWs from 45 to 4 kDa. A total of 5 major allergens were identified, but a band around 14 kDa proved to be the dominant allergen. Sensitization to *Thaumetopoea pityocampa* was found to be the most important mechanism of airborne contact urticaria from this caterpillar. Low-MW proteins are the main IgE binding components of crude caterpillar extract.

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Nowadays caterpillars are included among the agents that elicit contact urticaria by a non-immunologic mechanism (1–4). Pine processionary caterpillar (*Thaumetopoea pityocampa*) is one of the most important in Europe (5, 6). Its urticating hairs are capable of causing certain skin lesions, mainly contact urticaria (5), but also contact dermatitis (7). However, an IgE-mediated mechanism of hypersensitivity to this caterpillar has recently been demonstrated (5, 8–10). Therefore, our objective was to find the rôle that an IgE-mediated mechanism could have among patients with suspected contact urticaria from this caterpillar.

Materials and Methods

Valladolid province (north-west Spain) was selected for this study. It has areas of extensive defoliation caused by processionary caterpillar infestation.

16 patients were included in this study. The criteria for regarding a reaction as contact urticaria from *T. pityocampa* were: a clear history of pre-

vious exposure to caterpillar hairs showing whealing of skin, elicited within 60 min of walking or working in a pinewood, in which infestation by this caterpillar was documented by the patients or by us; cutaneous lesions should disappear within 24 h; in accordance with the biological cycle of this insect, patients should have such symptoms at least 1× during the months in which the caterpillar is urticating (September to April); no symptoms outside pinewood areas should be detected.

Prick tests

Pine processionary caterpillars in the last larval stage (L5) were collected on pine trees from Valladolid (Spain). Extract of whole caterpillars was prepared at a dilution of 1:10 w/v, in accordance with previous studies (8–10). The extract was tested on 30 subjects (15 atopic and 15 non-atopic) as a control.

Prick tests for pollens, moulds, mites and animal epithelia were also performed. Histamine dihydrochloride (10 mg/ml) was used as a positive control,

and physiologic saline solution as a negative control. Reactions were read after 15 min, and a response was recorded as positive if the mean diameter of the wheal was at least 3 mm.

SDS-PAGE and immunoblotting

SDS-PAGE of the extract was performed in 16% acrylamide minigels. Specific IgE detection by immunoblotting was performed using a diffusion method as described (11). The serum from 1 atopic patient was used as a control.

Results

Patients

SPT for the caterpillar extract was positive in 14 out of 16 patients (87.5%) and in only 1 of the 30 control subjects. The size of the prick-test reaction was equal to or greater than 25 mm² (mean, 61.3) in all of these patients. This group ranged in age from 4 to 73 years, with a mean of 30.7 years. 13 subjects (93%) were male and 12 (86%) lived in a rural or semirural environment. 9 subjects (64%) had a history of atopy. 8 patients (57%) had occupational exposure to the processionary caterpillar.

All patients had several previous episodes of suspected contact urticaria from this caterpillar. The parts of the body most often affected were the neck (100%), arms (93%) legs (79%), and less frequently the abdominal area, face, and hands. All patients had wheals in at least 3 of the cutaneous areas mentioned, the most frequent combination being the neck and the extremities (100%).

Other symptoms mentioned by the patients with positive prick tests were: angioedema 79% (11/14), conjunctivitis 36% (5/14) and severe anaphylaxis-itching wheals, facial angioedema, conjunctivitis, shortness of breath – 14% (2/14). Eyelids were the most frequent localization of angioedema (100%), followed by ears (45%) and more rarely lips, tongue and genitalia.

Both patients with negative prick tests had their symptoms after a clear exposure to caterpillars. The 1st had had several episodes of urticaria on the neck or arms, some the result of knocking caterpillar' nests while collecting pinecones with a long stick. The 2nd had had only 1 episode of eyelid angioedema and wheals on the neck while sweeping a "procession" of these caterpillars.

SDS-PAGE and immunoblotting

IgE-immunoblotting detected in the caterpillar extract several reactive bands with apparent MWs between 45 and 4 kDa in all patients with positive prick tests (Fig. 1). We observed a strong band of about 14 kDa in 86% (12/14) of allergic patients. Other reactive bands were localized over 17–18 kDa in 79% (11/14), around 33 kDa in 71% (10/14), 8 kDa in 71% (10/14) and 12 kDa in 64% (9/14). Both patients with negative prick tests and the 1 control serum showed negative results.

Discussion

The term contact urticaria describes a wheal-and-flare response elicited within 30–60 min after ex-

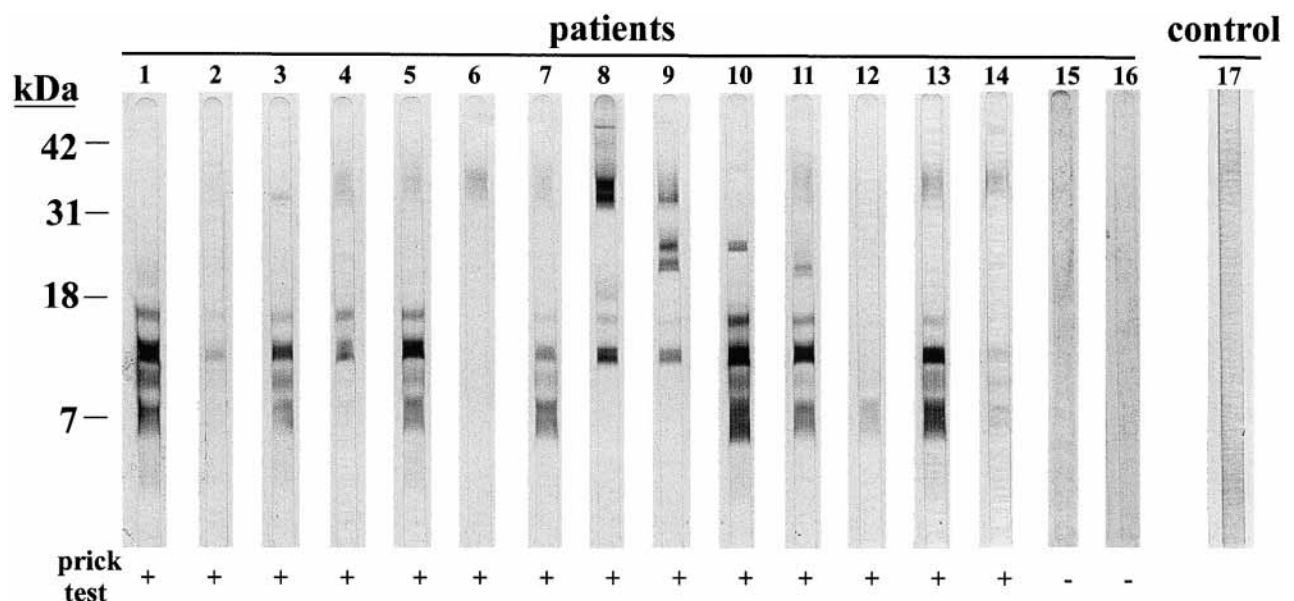


Fig. 1. IgE immunoblotting using whole processionary caterpillar extract.

posure to certain agents (12–15), that disappears within 24 h, and usually within a few hours (13, 14). Contact urticaria may be caused by allergic or non-allergic mechanisms or a combination of the two. In the non-allergic type, no previous sensitization has occurred, and the agents will produce contact urticaria in most individuals if the concentration and contact time are sufficient (2, 12). Nowadays, caterpillars are included among the agents that elicit contact urticaria by this mechanism (1–4).

One of the most important caterpillars in Europe is the pine processionary caterpillar (*Thaumetopoea pityocampa*) (5, 6). Urticating hairs of this caterpillar are detectable in the air using techniques designed for airborne micro-organism and pollen collection (16). Although its urticating effect has been associated with a toxic-irritant phenomenon (17), an immediate hypersensitivity mechanism has recently been demonstrated (5, 8–10).

This is the 1st study of a series of patients with suspected contact urticaria from pine processionary caterpillars. Contrary to what was expected, most of the contact urticaria cases involving this caterpillar were allergic. In this study, 57% of the patients had occupational exposure to this caterpillar. These results contrast with the data obtained in a Finnish statistical study of 815 cases of occupational contact urticaria, in which no cases elicited by caterpillars were reported (18), though this might simply be explained by processionary caterpillars not being found in that country.

As in other allergic contact urticarias, wheals appeared with minimal exposure, such as just walking through a pinewood. The parts of the body most often affected were the uncovered ones, although very often covered parts were also affected. The wheals joined up around the neck and on the flexor surface of the wrists and forearm, and involved several cutaneous areas. Angioedema was frequent, especially of the eyelids. Severe clinical pictures were seen in 2 patients with anaphylactic reactions and 1 patient with tongue angioedema. The 2 patients with non-allergic contact urticaria had more localized wheals and neither had severe symptoms.

Immunoblot demonstrated that the crude extract contained many IgE-binding proteins of several MWs and intense recognition of low-MW allergens was obtained in most of the patients. A total of 5 reactive bands were recognized by more than 50% of the patients with allergic contact urticaria, 4 of which were of MW below 18 kDa.

As in a previous study, the prick test was a helpful tool for distinguishing between an IgE-mediated and a non IgE-mediated mechanism in the reactions to this caterpillar. According to the re-

sults of that study, at least 72% of the patients with positive prick tests had specific IgE demonstrable by the IgE-immunoblot (10). In the present study, all patients with positive prick tests and contact urticaria had a positive IgE-immunoblot.

This study demonstrates that sensitization to *Thaumetopoea pityocampa* is the most important mechanism of airborne contact urticaria from this caterpillar. Low-MW proteins are the main IgE binding components of the crude caterpillar extract. Prick testing with caterpillar crude extract appears to be a helpful and safe tool in clinical practice for diagnosing IgE-mediated cases. As in other allergic diseases, treatment includes measures to relieve the prominent symptoms of pruritus with high dosages of antihistamines and at times corticosteroids. In anaphylactic reactions, rapid recognition and immediate treatment is essential. The incidence and severity of these reactions can be decreased by preventive measures, including correct diagnosis and adequate information about this new allergen.

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