

Brief communications

Asthma caused by Dermestidae (black carpet beetle): A new allergen in house dust

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We report a case of asthma caused by a new allergen in house dust, Dermestidae larvae (DL), in a 12-year-old boy.

CASE REPORT

The patient was a 12-year-old male student with no family history of atopy. He had experienced sneezing and nasal itching in his house every day for 4 years with sporadic episodes of coughing, wheezing, and shortness of breath. He experienced house dust-related sneezing and nasal itching and could not run because he had asthmatic crises. He was only free of symptoms in summer, when he spent his holidays at his grandparents' home. There, the patient experienced no symptoms, even when he was handling dust. The floor of his parents' house was wooden, and there were stuffed animals on the wall. The patient had no contact with live animals.

The results of clinical examination and biochemical profile were normal. The white blood cell count was 6400 with 704 eosinophils (11%). The total IgE was 188 kU/L. The chest x-ray and results of basal spirometry were normal. Bronchial hyperreactivity to methacholine showed a PC₂₀ value of 1.25 mg/ml. Results of skin prick tests, performed according to a method previously described,¹ were negative in response to a commercially available allergenic extract battery (Alergia e Inmunología Abelló, S.A., Madrid, Spain) also including cockroaches, storage mites, and house dust.

METHODS

After a very detailed interview was conducted, DL became the suspected agent. Extracts of this dust were prepared with the method previously described.² DL

Abbreviation used

DL: Dermestidae larvae

from the patient's house were captured, killed by freezing, and then macerated. The total protein concentration of the extract was 2.3 mg/ml (Bio-Rad). The patient had a positive skin prick test result (12 mm diameter wheal with pseudopods). DL extract (10 mg/ml) was coupled to cyanogen bromide-activated filter paper disks. DL-specific IgE (RAST) was 3.7 PRU/ml.

To confirm that DL were able to elicit the patient's symptoms, we carried out both a specific conjunctival and a bronchial challenge¹; responses to both challenges were positive. The threshold dose that produced a positive conjunctival challenge response was 0.46 mg/ml (dilution 1:5). After bronchial challenge with the DL extract, the patient had an immediate response but no late response (Fig. 1). The bronchial response to the DL extract was inhibited by means of pretreatment with disodium cromoglycate (40 mg) (Fig. 1).

The fact that nonspecific responses to the extract are not playing a role was demonstrated by negative results when these tests (skin prick test, RAST, specific conjunctival and bronchial challenges) were carried out in 10 control patients with asthma (half atopic and half nonatopic).

The measures for beetle eradication consisted of scraping the wooden floor, deinfesting, and covering the scraped wood with a heavy layer of varnish. The stuffed animals were also removed from the wall. These environmental control measures were found to be sufficient to control the patient's symptoms, and he is now free of symptoms with no treatment.

DISCUSSION

The black carpet beetle is an insect belonging to the Dermestidae family and the Coleoptera order, which has also appeared in literature as *Attagenus unicolor*, *Attagenus piceus*, *Attagenus megatoma*. The adults are 3.0 to 5.0 mm in length with a black or dark brown color. Their larvae can be as long as

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SPECIFIC BRONCHIAL CHALLENGE Dermestidae Larva extract

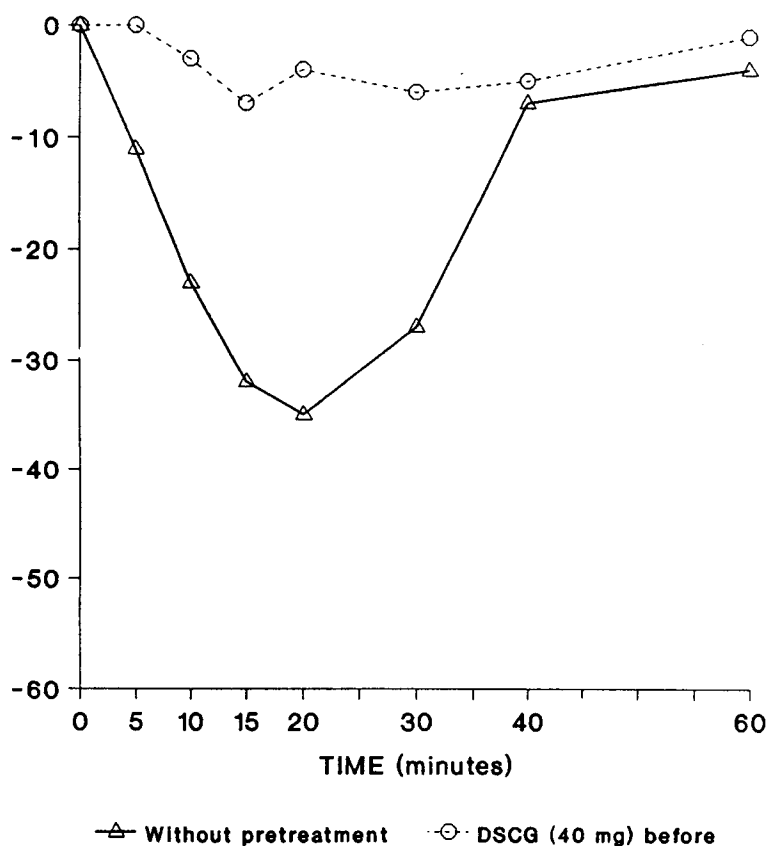


FIG. 1. Evolution of the change in FEV₁ during specific bronchial challenge with DL extract and its inhibition on inhalation of disodium cromoglycate (40 mg) 30 minutes before.

8.0 mm, are dark brown or yellowish brown, and have curved, tapered, and hairy bodies. The records dealing with their attacks on various commodities refer to (1) seeds, grains, and farinaceous materials in general or to (2) animal products or materials containing animal products. In North America the black carpet beetle is probably the most destructive of the carpet beetles or so-called "buffalo moths."

Some kind of coleoptera was very frequently found in 98.08% of the houses checked in an epidemiologic study³ carried out in Spain, but was not very plentiful. Dermestidae comprised 67.5% of the coleoptera collected.

Asthma caused by DL was first described in a museum curator who used DL for the cleaning of skeletons.⁴ Since then, this has only been reported as occupational asthma.

The importance of this report has been to demonstrate that DL in house dust were able to elicit the patient's symptoms and that an IgE hypersensitivity mechanism was strongly suggested by our findings. At present, we are unaware of the full importance of this new house dust allergen, although it may well be important because of its frequent presence in the house and its ability to elicit allergic reactions. Consequently, we should keep DL in mind as a possible etiologic agent in patients who are experiencing dust-related symptoms, in particular when they have negative skin test responses to common indoor allergens.

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Evaluation of Duotip-Test

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Duotip-Test (Lincoln Diagnostics) is a recently developed skin testing device used in detecting immediate hypersensitivity. It is a plastic disposable cylinder that measures 3 mm in diameter and 41 mm in length. At one end of the device there is a notched finish for grasping, and at the other end are two fine tapered points (Fig. 1). Duotip-Test is used with either a modified prick method or a rotation technique. We studied this new device, by using the rotation technique, to determine its reproducibility, sensitivity, and specificity with histamine and glycerosaline.

METHODS

This study was conducted in the outpatient Allergy and Immunology Clinic at St. Louis University Health Sciences Center. Subjects were recruited from patients seen in the clinic and from employees of St. Louis University Health Sciences Center. Institutional Review Board approval for the study was obtained, and each test subject gave written consent. Twenty subjects ranging in age from 26 to 65 years (mean age, 39.6 years) were tested. The subjects were nonatopic or atopic, were in good health, and had not used antihistamines or other

Abbreviation used

CV: Coefficient of variation

inhibiting medications. Skin testing was performed on the volar surface of the arm, the right arm for 10 subjects and the left arm for 10 subjects.

The points of the device are loaded by capillary action after immersion in the test solution.

When the rotation technique is used, the shaft of the device is placed at a 90-degree angle to the skin, and just enough pressure is applied from the points to cause a small dimple in the test subject's skin. When rapidly rotated, the device makes a small circular abrasion in the epidermis and deposits the test solution.

In a blinded fashion, using the new device, one investigator administered a row of five epicutaneous tests spaced approximately 2.5 cm apart, four of which were 27 mg/ml histamine phosphate (10 mg/ml histamine base) in 50% glycerosaline and one of which was the negative control (50% glycerosaline). Another investigator, also in blinded fashion, read and recorded the wheal sizes at 15 minutes. A circular caliper disk, marked in 1 mm increments from 0 mm to 45 mm, was used to measure the wheals. Test solutions were obtained from Center Laboratories (Port Washington, N.Y.). Test devices were obtained from Lincoln Diagnostics (Decatur, Ill.).

RESULTS

A total of 80 histamine and 20 glycerosaline test sites were graded in the 20 subjects. Mean histamine wheal size was 7.5 mm (range, 4.0 to 10.5 mm) with a standard deviation of 1.5 mm.

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