

Contact urticaria and rhinitis from latex surgical gloves

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Latex used in the manufacture of surgical gloves should be included in a list of allergens. It is found in the tree *Hevea brasiliensis*.

For approximately the last year, minutes after using surgical gloves, a female doctor had severe pruritus followed by a rash and angio-oedema of the contact areas. During the last 4 months, on opening the glove-bag, she experienced severe rhinitis and respiratory distress. The symptoms ceased in 1 h. Standard patch tests and with substances used in the manufacture of rubber were negative.

Prick tests with glove and natural latex were strongly positive. The presence of specific IgE against natural latex was demonstrated by means of a histamine release assay as well as by immunoenzymatic methods. The antigen seems to have a MW higher than 30,000 d and is trypsin-sensitive. These facts suggest that the allergen could be a protein present in the "crude natural latex".

Key words: Urticaria - rhinitis - histamine release - enzyme immunoassay - latex.

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A large number of substances have been implicated as causes of contact urticaria during the last 10 years (1). But an immunological mechanism involving IgE antibodies has only been found in a small number of cases.

Urticaria as a result of contact with latex used in the manufacture of surgical gloves was described in 1979 by Nutter (2). Other investigators have since described new cases (3-5). We describe here a case of contact urticaria and rhinitis following the use of sterile surgical gloves.

Material and Methods

A 35-year-old female doctor had a 4-year history of seasonal rhinoconjunctivitis.

For approximately 1 year, 3-4 min after using sterile surgical gloves, she developed severe pruritus affecting the areas in contact with the gloves. It was followed by maculo-papules

and significant angio-oedema. These features subsided in 60 min without treatment.

For the past 5 months, on opening the bags containing the sterile surgical gloves, she had severe nasal irritation, sneezing, profuse sweating and occasionally a significant degree of respiratory distress. These complaints disappeared on leaving the environment.

In vivo tests

Prick-tests were performed using a battery of the usual inhalants (pollens, mites, animal dander and fungal spores) and also the more common foods (milk, egg, nuts and fish). Histamine acid phosphate 1/1000 was used as a control.

Epicutaneous and prick-tests were carried out with an extract from the gloves and with natural latex. 20 atopic and 20 non-atopic patients were tested as controls.

Patch-tests with the 26 allergens of the Spanish Contact Dermatitis Research Group (6) and a group of substances frequently used in the manufacture of rubber were performed.

In vitro tests

Antigen extraction method

From the sterile glove: the inside of the glove was washed with 10 ml phosphate buffered saline (PBS). The solution was then centrifuged at 1000 g for 10 min. The supernatant was dialyzed against 100 volumes of PBS, sterilized by filtration and concentrated 10 × on an Amicon Immersible CX-10 (Millipore Corp. Bedford, Mass.) The antigen was used for skin tests and labelled with peroxidase as previously described (7-9).

From *Hevea brasiliensis* latex: the natural latex provided by the manufacturer was diluted 1/10 (v/v) in carbonate-bicarbonate buffer, 0.1 M, pH 9.2. After centrifuging at 1000 g for 10 min, the supernatant was serially filtered through Immersible CX-30 (nominal cut-off 30,000 d) and Immersible CX-10 (nominal cut-off 10,000 d). 3 different fractions were obtained: molecular weight higher than 30,000 d (MW 30); molecular weight between 10,000 and 30,000 d (MW 10-30), and molecular weight less than 10,000 d (MW 10).

Histamine release

This was carried out using an automated fluorometric method as performed by Siraganian (10) with the modifications previously described (11). Any result higher than 10% release was considered positive.

Indirect ELISA for specific IgE antibodies determination

This method detects the presence of specific IgE antibodies using antigen-coated microtiter plates (12). After coating, the sera (optimally diluted) are incubated in the wells. Thereafter, monospecific antisera (antihuman IgE) labelled with peroxidase are added and finally the presence of specific antibodies is revealed by

means of a chromogenic substrate (orthophenylenediamine).

Reverse enzyme immunoassay (REIA) for specific IgE antibodies

This assay measures the specific IgE antibodies. First the IgE from the sera is isolated, thereby avoiding the effect of possible blocking antibodies present in the samples; next the microtiter plates are incubated with the peroxidase-conjugated antigen; the presence of specific IgE antibodies is revealed employing the substrate used in the previous technique.

REIA inhibition assay

The specificity of the REIA was tested by an inhibition assay as follows: during the peroxidase-conjugated allergen incubation step, this allergen was coincubated with non-labelled allergen or different allergens. These allergens were:

The whole latex from *Hevea brasiliensis*

MW 30

MW 10-30

MW 10

Latex obtained from different trees (a *Pine* tree and a *Fig* tree).

Determination of total IgE

This was measured by Enzygnost (Behringwerke, Mauburg W. Germany).

Results

The skin prick tests carried out on the patient were positive for grass pollen and strongly positive for glove antigen and natural latex. In 2 grass pollen sensitive atopic controls, prick tests were positive for the latex and glove antigen. They were negative in the other controls. All the patch tests in the patient were negative.

The patient had very strong positive histamine release with glove antigen and natural latex, especially with MW 30 (Figs. 1, 2). The histamine release was also positive in the only control available with a positive skin test. His-

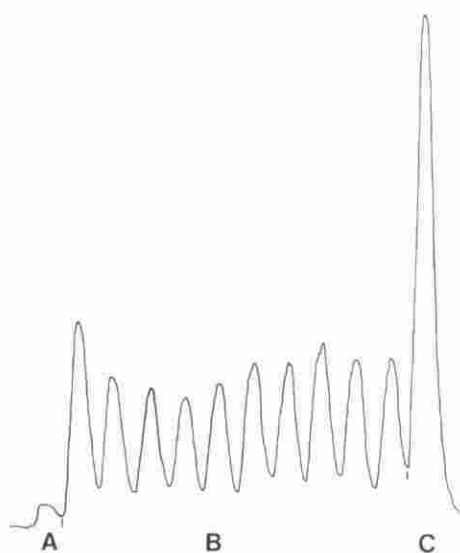


Fig. 1. Histamine release with glove antigen. (A) Basal release. (B) Release performed using serial five-fold dilutions of the glove antigen. (C) Total release.

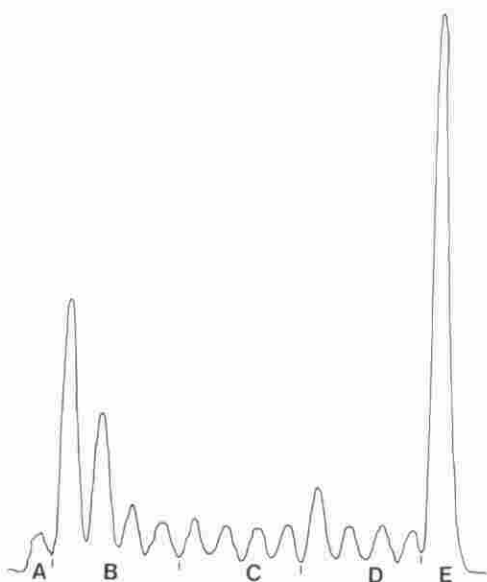


Fig. 2. Histamine release with the 3 fractions of latex antigen. (A) Basal release. (B) Release with serial 5-fold dilutions of MW 30. (C) Release with serial 5-fold dilutions of MW 10-30. (D) Release with serial 5-fold dilutions of MW 10. (E) Total release.

tamine release with these 2 antigens was not detected in the other controls.

Using the REIA method, we detected specific IgE for the glove antigen in the serum of the patient and in the serum of the control subject with a positive skin test and positive histamine release. The presence of specific IgE could also be demonstrated in the patient using the indirect ELISA with glove antigen coated microtiter plates (data not shown).

The REIA inhibition assay using the whole latex and the 3 fractions obtained from it gave the strongest results with the fraction MW 30 (Fig. 3). Inhibition was not observed with the latex of the other trees.

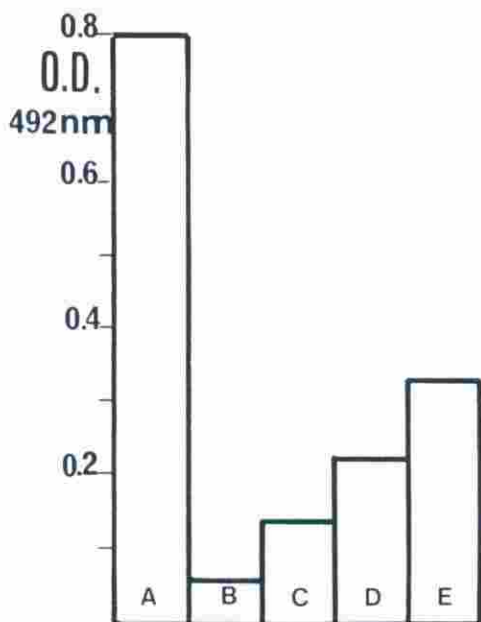


Fig. 3. Inhibition of the glove antigen REIA. (A) O.D. for glove antigen. (B) O.D. after inhibition with whole latex (25 mcg/well). (C) O.D. after the inhibition with fraction MW 30 (25 mcg/well). (D) O.D. after the inhibition with fraction MW 10-30 (25 mcg/well). (E) O.D. after the inhibition with fraction MW 10 (25 mcg/well).

Discussion

Urticaria as a result of contact with latex used in the manufacture of surgical gloves has been described (2-5). In the present study, we describe the case of a patient with contact urticaria and rhinitis caused by use of latex surgical gloves. By means of skin tests and in vitro methods, we have proved the existence of specific IgE for the latex in the serum of the patient.

Latex is extracted from the tree *Hevea brasiliensis*. We have shown that the antigen or antigens responsible for the symptoms are present in natural latex and are not generated during the manufacture of gloves. The antigen or antigens appear to have a MW greater than 30,000 d and to be proteins since, after treatment with trypsin in the indirect ELISA, they lose their allergenic potential (data not shown). No cross-reactivity exists with the latex of other trees belonging to the same botanical family or to unrelated families.

The growing number of studies published during the last 7 years which describe cases of contact urticaria to latex is worthy of attention. Skin tests and in vitro tests (histamine release and enzyme-immunoassay techniques) are very reliable in the diagnosis of latex hypersensitivity.

Surprisingly, 2 of the atopic controls had positive skin tests to latex antigen. The presence of specific IgE antibodies could be confirmed in vitro in the only patient available. The 2 atopic controls had "sports-shoe" sensitivity. This suggests that sensitization to latex is not only an occupational disorder, but that the incidence of sensitization is probably higher than suspected.

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