

Urticaria and Rhinitis to Shrubs of *Ficus benjamina* and Breadfruit in a Banana-Allergic Road Worker: Evidence for a Cross-Sensitization between Moracea, Banana and Latex

J.M. De Greef^a F. Lieutier-Colas^b J.C. Bessot^b A. Vérot^b A.M. Gallerand^c
G. Pauli^b F. de Blay^b

^aService de Pneumologie, Centre Hospitalier, Boulogne-sur-Mer, ^bService de Pneumologie, Hôpitaux Universitaires, Unité INSERM U425, Strasbourg, et ^cService de Biologie, Centre Hospitalier du Carbet, Le Carbet, Martinique, France

Key Words

Breadfruit tree · Latex, *Hevea brasiliensis* · Banana · *Ficus benjamina*

Abstract

Background: We report the case of a road worker with a food allergy to banana, who developed urticaria and rhinitis when cutting shrubs of *Ficus benjamina* and breadfruit. He did not develop an allergy to latex of *Hevea brasiliensis*. **Results:** Sensitization to latex of *F. benjamina*, *H. brasiliensis*, breadfruit and banana was demonstrated using skin tests and specific IgE measurements. RAST inhibitions procedures showed that specific IgE to breadfruit latex cross-reacted more strongly with latex of *H. brasiliensis* and banana than with latex of *F. benjamina* with the same extract. **Conclusion:** Given the wide distribution of Moracea trees in tropical regions, sensitization to latex of *H. brasiliensis* and banana could be a consequence of sensitization to Moracea members; *F. benjamina* does not seem to be the only Moracea responsible for cross-allergy with latex and fruit. Consequently, it seems interesting to test other members of the Moracea family in patients sensitized to

latex of *H. brasiliensis* and banana. Sensitization to breadfruit could be a risk factor for sensitization to latex of *H. brasiliensis*.

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Introduction

We report the case of a 37-year-old man living in Martinique (French West Indies), who presented with generalized urticaria and severe Quincke's edema after ingestion of ripe banana; however, cooked breadfruit could be eaten without a reaction. On the other hand, the patient frequently had rhinitis and severe urticaria of the arms when cutting shrubs of ficus and breadfruit growing along the roads. He had no history of an allergy to latex of *Hevea brasiliensis*.

Material and Methods

Botanical Description

The taxonomical name for breadfruit is *Artocarpus altilis*. The breadfruit tree is a tree with white latex belonging to the Moracea family, like *Ficus benjamina*, which is commonly found in tropical

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Correspondence to: Dr. F. de Blay
Service de Pneumologie, Hôpital Lyautey, Unité INSERM U425
Hôpitaux Universitaires de Strasbourg, BP 426
F–67091 Strasbourg Cedex (France)
Tel. +33 3 88 11 66 19, Fax +33 3 88 84 61 01, E-Mail frederic.deblay@chru-strasbourg.fr

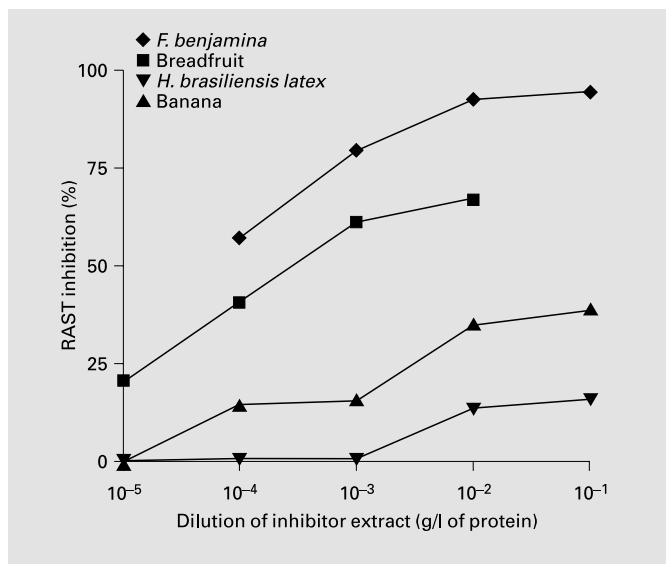


Fig. 1. Inhibition of binding of specific IgE to *F. benjamina* by *F. benjamina*, breadfruit, *H. brasiliensis* latex and banana.

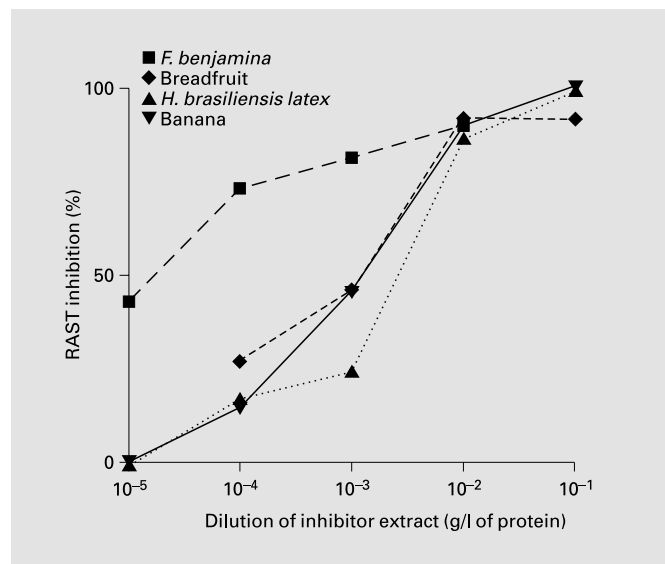


Fig. 2. Inhibition of binding of specific IgE to latex of breadfruit by *F. benjamina*, *H. brasiliensis* latex, banana and breadfruit.

areas, especially on the Caribbean islands. Its fruit is edible when cooked and contains a latex.

Allergen Extracts

Latex of *H. brasiliensis* was obtained from the Stallergènes Lab. (Fresnes, France). Banana extracts were obtained by crushing and stirring banana in NH_4HCO_3 125 mmol/l pH 8, EDTA 1 mmol/l at 4°C. The mixture was centrifuged for 30 min at 10,000 g at 4°C. The supernatant was filtered on a Whatman filter, and ammonium sulfate was then added in the proportion of 29.5 g/100 ml of liquid. After centrifugation (10,000 g) the precipitate was resuspended, dialyzed and then lyophilized. Latex extract of breadfruit was obtained after stirring latex of uncooked breadfruit in 30 ml of distilled water. The mixture was centrifuged at 1,000 g during 20 min and the supernatant was filtered using a 0.2- μm Millipore filter and then lyophilized. Latex of *F. benjamina* extract was obtained as previously described [1, 2]. Protein content, determined using the Bradford method, was 3.9 mg/ml for latex of *F. benjamina*, 0.2 mg/ml for latex of *H. brasiliensis*, 0.53 mg/ml for banana and 2.53 mg/ml for breadfruit.

Prick Test

Prick tests were performed using green and ripe banana, uncooked breadfruit, latex of *H. brasiliensis* and *F. benjamina*. A prick test was considered as positive when the mean diameter of the wheal (i.e., $D + d/2$) obtained with the allergen was $\geq 75\%$ of the wheal obtained with codeine 9%.

RAST Measurements

RAST measurements were performed with banana, breadfruit, *F. benjamina* and *H. brasiliensis* extracts, by coating the same extract used in skin tests on to an activated bromide cellulose disk (i.e., 20 μg of protein/disk). A RAST was considered positive when the mean

value of radioactive counts bound to the solid-phase antigen was greater than the mean +2 standard deviation of radioactive counts obtained with the negative control, the atopic control and the non-atopic control.

RAST Inhibition Procedure

The antigen inhibitor extracts were the same as those coated onto the activated bromide disks. Depending on the protein concentration of the different extracts, the dilution of the inhibitor antigens varied from 10^{-5} to 10^{-1} g/l, in order to avoid a difference in protein content of the inhibitor extract. Positive controls were performed by self-inhibitions (e.g. *F. benjamina* vs. *F. benjamina* and breadfruit vs. breadfruit) (fig. 1, 2). Two other self-inhibitions were realized (e.g. *H. brasiliensis* latex vs. *H. brasiliensis* latex and banana vs. banana) and inhibition rates were 74 and 88% at the dilution of 10^{-1} g/l, respectively. A negative control was performed using cat allergen extract (Allerbio, Varennes, France) as an inhibitor with *F. benjamina*, breadfruit, *H. brasiliensis* latex and banana; a 0% inhibition rate was obtained in all cases for dilution from 10^{-4} to 10^{-1} g/l.

Results

Prick tests were positive with green and ripe bananas, uncooked breadfruit, latex of *H. brasiliensis* and *F. benjamina*. Specific IgE levels to latex of *F. benjamina* were very high (50 times the control value, i.e. 5,895.4 cpm, control: 81.9 cpm) as well as breadfruit latex (20 times the control value: 3,539.7 cpm, control: 118.8 cpm) and banana (17 times the control value: 3,412.8 cpm, control: 570.0 cpm) but specific IgE levels were lower for latex of

H. brasiliensis (8 times the control: 3,333 cpm, control: 739 cpm).

RAST inhibition: A 90.5% inhibition of IgE binding to latex of breadfruit was obtained by *F. benjamina* extract (W/V = 10⁻²). In contrast, there was a lower inhibition of IgE binding to *F. benjamina* by breadfruit (W/V = 10⁻²; 67.5%) (fig. 1). A weak inhibition of IgE binding to *F. benjamina* was obtained with latex and with banana (fig. 1). In contrast, a strong inhibition of IgE binding to breadfruit was obtained with *H. brasiliensis* latex and with banana (fig. 2).

Discussion

Several years ago, M'Raihi et al. [3] demonstrated that banana and latex shared cross-reacting antigens. More recently, various authors have shown cross-allergenicity between latex of *F. benjamina* and latex of *H. brasiliensis* [4, 5]. *F. benjamina* is not the only member of the Mora-

cea family which could be responsible for allergic sensitization. As has been described for *F. benjamina* [6], our patient was exposed to Moracea during his occupational activity. RAST results demonstrated that sensitization to latex of *F. benjamina* and of breadfruit was more important than to latex of *H. brasiliensis* and banana. RAST inhibition results suggest that sensitization to banana and latex of *H. brasiliensis* was rather a consequence of allergy to breadfruit than to *F. benjamina*. The antigen responsible for cross-reactivity between these two members of the Moracea family appears to be slightly involved in the cross-allergy with banana and latex of *H. brasiliensis*.

In conclusion, given the wide distribution of Moracea trees in tropical regions, sensitization to latex of *H. brasiliensis* and banana could be a consequence of sensitization to Moracea members; *F. benjamina* does not seem to be the only Moracea responsible for cross-allergy with latex and fruit. Consequently, it seems interesting to test other members of the Moracea family in patients sensitized to latex of *H. brasiliensis* and banana.

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