

ALLERGY Net

ALLERGY 2010 DOI: 10.1111/j.1398-9995.2010.02443.x

© 2010 JOHN WILEY & SONS A/S

CONTRIBUTIONS TO THIS SECTION WILL NOT UNDERGO PEER REVIEW, BUT WILL BE REVIEWED BY THE ASSOCIATE EDITORS

Airborne allergy to tomato proteins

R. Asero*, G. Mistrello, S. Amato

Keywords: allergens; food allergy; respiratory allergy; tomato.

A 31-year-old woman working in a supermarket, with a history of both kiwi and banana allergy started having severe rhinoconjunctivitis for > 1 month that responded to antihistamines. Symptoms were markedly exacerbated during the working hours while handling the typical 'bunch tomatoes' on the vines grown in Southern Italy and sold with the branches still attached. Surprisingly, handling other sorts of tomatoes sold without branch did not cause any symptom. SPT excluded sensitization to seasonal and perennial respiratory allergens and confirmed tomato hypersensitivity (5 mm; Abelló, Madrid, Spain). SPT with profilin-enriched date palm extract (Abelló) scored negative.

Bunch tomatoes, their branches, and branches' fuzz carefully removed using a shaving blade were extracted separately for 1 h in 0.1 M PBS, pH 7.4 at 4°C while stirring. After centrifuging, supernatants were harvested and dialyzed. The protein concentration (1) was 96, 36, and 860 µg/ml for branch, fuzz, and fruit extract, respectively. IgE in patient's serum, in the serum from another tomato-allergic subject, and in a serum pool from five nonatopic individuals were measured by ELISA (2). Absorbance values, read at 450 nm

by spectrophotometer, were expressed as optical density units (OD). Values < 300 OD were considered negative. In inhibition studies, 100 µl of patient's serum were pre-absorbed with 50 µl of dilution buffer containing 50 or 5 µg of branch extract, or 10 µg of fuzz extract, or 10 µg of house dust mite extract (1.2 mg/ml) before performing the ELISA using fuzz extract as substrate.

Immunoblot analysis was performed under reducing conditions. Because inhibition experiments using patient's serum showed total cross-inhibition between fuzz and branch extract, the assay was performed only with branch extract. The extract was mixed with sample buffer and 5% B-mercaptoethanol and then denatured heating at 100°C for 10 min. Electrophoresis (25 µg per lane) was carried out in a 10% polyacrylamide precast gel at 180 mA for 1 h. The resolved proteins were transferred for 1 h onto nitrocellulose membrane (3). Bound specific IgE were detected by peroxidase-conjugated anti-human IgE antibodies from goat (1 : 4000 in saturation buffer) and using an ECL western blotting kit (Amersham, Milan, Italy) as substrate.

On ELISA, patient's serum showed a strong IgE reactivity to tomato fuzz (2948 OD) and stem extract (2701 OD) but no reactivity to tomato fruit (368 OD). In contrast, the serum from a tomato-allergic control with a history of allergy following the ingestion of tomato showed strong IgE reactivity to fuzz (2973 OD), branch (1125 OD), and tomato fruit (3236 OD). On immunoblot, patient's serum reacted against proteins at about 67 and 94 kDa (Fig. 1). Pre-absorption of patient's serum with kiwi did not produce any inhibition of IgE reactivity to tomato branch, suggesting cosensitization to these fruits.

Several tomato allergens have been described so far, including Lyc e 1 (profilin, m.w. 14 kDa), Lyc e 2 (fructofuranosidase; 50 kDa), Lyc e 3 (lipid transfer protein, 6 kDa), Lyc e chitinase (31 kDa), Lyc e glucanase (55 kDa), and Lyc e peroxidase (44 kDa). The clinical relevance of each of these allergens is ill-defined, with the exception of profilin that may cause oral allergy syndrome (4). The IgE profile of our patient does not correspond to any of these allergens. This patient, who worked in the fruit and vegetable department of a supermarket, developed

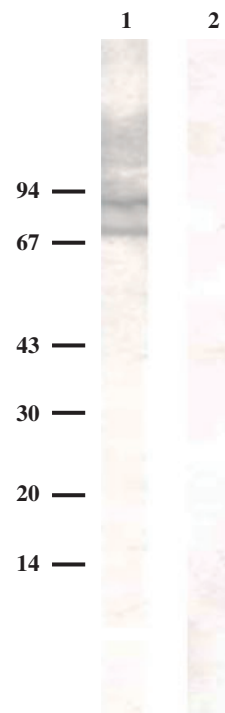


Figure 1 Immunoblot analysis of patient's IgE reactivity to tomato branch proteins, Lane 1: Patient's serum. Lane 2: Negative control serum. IgE reactivity to high molecular weight proteins is clearly visible.

an airborne allergy to tomato branch proteins in the absence of food allergy to tomato; whether food allergy to tomato will develop in the future remains to be assessed. Airborne sensitization to food allergens is increasingly reported, and in some cases, it precedes to development of food allergy (revised in 5). This case is a further example in this sense.

*Ambulatorio di Allergologia
Clinica San Carlo
Paderno Dugnano (MI)
Italy
Tel.: +39 02 99038470

Fax: +39 02 99038223
E-mail: r.asero@libero.it

Accepted for publication 11 June 2010
Allergy 2010
© 2010 John Wiley & Sons A/S
DOI: 10.1111/j.1398-9995.2010.02443.x

References

1. Bradford MM. A rapid and sensitive method for the quantification of microgram quantities of protein utilizing the principles of protein-dye binding. *Anal Biochem* 1976;**72**:248–254.
2. Asero R, Mistrello G, Amato S, Roncarolo D, Martinelli A, Zaccarini M. Peach fuzz contains large amounts of lipid transfer protein:

is this the cause of the high prevalence of sensitization to LTP in Mediterranean countries? *Eur Ann Allergy Clin Immunol* 2006;**38**:118–121.

3. Towbin H, Staehelin T, Gordon J. Electrophoretic transfer of proteins from polyacrylamide gels to nitrocellulose sheets. Procedure and some applications. *Proc Natl Acad Sci USA* 1979;**76**:4350–4354.
4. Asero R, Mistrello G, Roncarolo D, Amato S, Zanoni D, Barocci F et al. Detection of clinical markers of sensitization to profilin in patients allergic to plant-derived foods. *J Allergy Clin Immunol* 2003;**112**:427–432.
5. Asero R, Antoncelli L. Does sensitization to foods in adults occur always in the gut? *Int Arch Allergy Immunol*. (in press)