

## CLINICAL CASE

# Anaphylactic reaction to the ingestion of raw onion. A case report

A. Arena, C. Cislighi\* and P. Falagiani\*

Ambulatorio di Allergologia, Azienda USL 5, Messina, Italy. \*Research Department, Lofarma SpA, Milan, Italy.

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### SUMMARY

A case of severe systemic reactions (intense itching, urticaria, confusion, blurred vision, transient loss of consciousness, sweating, tachycardia) after ingestion of raw or lightly-cooked onion is described. The patient, a 44-year-old woman, had no troubles with well-cooked onions. Differently from the cases of sensitivity to onion described in literature, this patient was monosensitized, being skin tests negative to pollens, inhalants and other foods. The patient had 3.7 kU/L of onion-specific serum IgE, as determined by REAST. The density of onion-specific IgE (calculated as percent ratio to total IgE) was 30.8%. The reactivity of patient's serum IgE towards thermolabile and thermostable components has been tested with unheated and heated (30' at 100 °C) onion extracts bound to polystyrene beads and tested in the RAST system. Unheated extract resulted positive in class 2, heated extract negative, demonstrating that this patients, differently from similar clinical cases described in literature, had IgE antibodies recognizing just thermolabile onion fraction. This is the first case described in literature of a monosensitization to the thermolabile component of onion, negative also to related foods (Liliaceae) and characterized by severe systemic reactions. The importance of specific-IgE density (%) rather their absolute amount (kU/L) as parameter predictive for the clinical severity of allergic reactions is discussed.

**Key words:** Onion allergy. Food allergy. Thermolabile. REAST. IgE density.

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### INTRODUCTION

Few publications in literature report allergic reactions to foods belonging to the Liliaceae family (garlic, onion, asparagus). Cross-reactivity among the members of this family (1) or between them and grass pollens (2) have been reported. Some cases of contact sensitization have been also reported (3, 4, 5). IgE antibodies against onion have been demonstrated, both by *in vivo* and *in vitro* tests, in four patients having concomitant pollen-induced rhinoconjunctivitis and asthma, who referred clinical symptoms induced by the handling of onions, e.g. by chopping, with positive skin prick test reactions to both heated and non-heated onion extract. In present report a case of anaphylaxis to raw onion (not cooked), confirmed by *in vitro* tests, is described.

### CASE REPORT

A 44-year-old woman reported she had never suffered from allergic symptoms until four years ago, except for a hypersensitivity reaction to peach skin at age about 20, which had then regressed. During the last four years, however, she had suffered immediate reactions (at least 5-6 episodes) within minutes after eating raw or lightly cooked onion. The reaction had become increasingly severe with intense itching in the mouth followed by a state of confusion, blurred vision, transient loss of consciousness, profuse sweating, tachycardia and subsequent transient prostration. The last episode, in June 1998, had been the most serious, lasting several hours, and the patient had also urticaria on the face and the neck. During the last few months she reported intolerance even simply to contact with

raw onion and to inhalation of the steam of onion cooking. She had never had any trouble with well-cooked onions.

## MATERIALS AND METHODS

Skin prick tests have been made with extracts of common inhalants and some foods (milk, codfish, egg, peanut, corn, soy, walnut, asparagus, garlic) of commercial source (Lofarma SpA, Milan Italy). *In vivo* tests with onion allergen have been avoided for ethical reasons, considering the severity of symptoms in the referred episodes.

Total and allergen-specific IgE have been determined in serum with REAST, which briefly consists in the following steps: capture of IgE with a specific antibody absorbed on microtiter wells, incubation with biotinylated liquid allergens, with streptavidin-peroxidase and chromogenic-substrate, reading of optical density and interpolation on a reference curve prepared with WHO 75/502 international standard for IgE (7). The test has been performed employing reagents of commercial source (Realtest® IgE-Density, Lofarma SpA, Milan, Italy).

The comparative *in vitro* test with unheated and heated onion have been made with an extract obtained by mechanical homogenization of fresh onions at 5% weight/volume ratio in phosphate buffered saline, overnight extraction under stirring; the suspension was then centrifuged and the clear supernatant collected (non-heated onion). Part of the extract was heated for 30' in boiling water, centrifuged and the slight precipitate discarded (heated onion). These extracts have been bound to polystyrene beads as solid phase and tested with commercial RAST reagents, consisting of polyclonal anti-IgE (from goat) labeled with <sup>125</sup>Iodine and a grass-pollen-positive reference curve (Sferikit® specific-IgE, Lofarma SpA, Milan, Italy).

## RESULTS

Skin prick test to common inhalant and food allergens resulted negative. The REAST revealed a content of onion-specific IgE in serum of 3.7 kU/L, and a content of total IgE of 12 kU/L. The density of specific-IgE [calculated as percent ratio to total IgE, according to (7)] resulted 30.8%. The RAST with non-heated onion resulted positive with 2.5 RAST Units corresponding to class 2, with heated onion resulted negative.

## DISCUSSION

Onion is commonly a contact sensitizer (3-5). Reports on IgE-mediated type I reactions are few, and in all the cases the patients were affected from multiple sensitization, often to grass pollen (2, 6). This is the first report on a monosensitization to onion, characterized by severe systemic reactions. It is interesting to note that the commonly observed cross-reactivity in the Liliaceae family (garlic, asparagus) was in this case absent, being skin prick tests negative. The total IgE serum level (12 kU/L) is unusually low for an adult, as well as the low level of onion-specific IgE (3.7 kU/L) is apparently not related to the severity of symptoms subsequent to allergen exposure. As a matter of fact, recent studies showed that the clinical severity of allergic sensitization is poorly related to the absolute level of circulating allergen-specific IgE, while is strictly related to their density, calculated as percent ratio to total IgE (8). The affinity of IgE for the receptor FcεRI is so high ( $K_d$  of  $10^{-10}$  mol/L) that we can consider circulating IgE antibodies to be the result of overproduction with respect to the whole receptor capacity of mast cells and basophils, which concentrate IgE on their surface (9). On the contrary the density of allergen-specific IgE is strictly related to the releasability of these cells, by rendering easier the bridging and subsequent type I events. In the patient of present report the density of onion-specific IgE was 30.8%, value that is sufficient to explain the severity of clinical picture, according to the experimental study of Crimi, et al, in which allergen sensitivity determined by nasal and bronchial challenge has been related to IgE density (8). An original finding of present report is the negativity of RAST with heated onion, while in the study of Valdivieso, et al, all the patients showed a positive skin test reaction both to heated and to non-heated extracts (6). Evidently the IgE antibodies of our patient recognize thermolabile antigenic fractions, different from those recognized by patients described in the article of Valdivieso, et al. The existence of thermolabile allergens is well known, as in the case of allergy to wheat flour in bakers, who usually have symptoms to inhaled raw wheat flour while can eat without any problem bread and other wheat-containing cooked foods (10).

## RESUMEN

*Historial:* se describe un caso de graves reacciones sistémicas (picazón intensa, urticaria, confusión, vista borrosa, pérdida transitoria de la conciencia, transpira-

ción, taquicardia) como consecuencia de la ingestión de cebollas poco cocidas o crudas. El paciente, de sexo femenino y de 44 años de edad, no había experimentado trastorno al ingerir cebollas bien cocidas. Respecto a los casos de sensibilidad hacia la cebolla descritos en la literatura, esta paciente ha sido monosensibilizada, resultando negativa la prueba cutánea a los pólenes y otros inhalantes y alimentos.

**Métodos y resultados:** en el suero de la paciente se detectó IgE específico frente a cebolla, mediante REAST, con un valor de 3,7 kU/L.

La densidad de la IgE específica de la cebolla (calculado como razón porcentual del total de la IgE) ha sido 30,8%. La reactividad del suero de IgE del paciente hacia los componentes termolábiles y termoestables ha sido comprobada con extractos de cebolla calentados y no calentados (por 30 min a 100 °C) en perlas de poliestirol y probados con el sistema RAST. El extracto no calentado ha resultado positivo de clase 2 mientras que el extracto calentado dio negativo, lo que demuestra que estos pacientes, al contrario de casos clínicos similares descritos en la literatura, presentaban anticuerpos de la IgE que reconocían solamente la fracción termolábil de la cebolla.

**Conclusiones:** este es el primer caso descrito en la literatura de monosensibilización al componente termolábil de la cebolla, negativo también en alimentos que pertenecen a la familia de las Liliáceas y caracterizado por graves reacciones sistémicas. La importancia de la densidad de la IgE específica (%) respecto a la cantidad absoluta (kU/L), como parámetro que prevé la gravedad clínica de las reacciones alérgicas, resulta controvertida.

**Palabras clave:** Alergia a la cebolla. Alergia alimentaria. REAST. Densidad de la IgE.

Correspondence:

Dr. P. Falagiani  
Scientific Direction, Lofarma SpA  
V.le Cassala 40 - 20143 Milano (Italy)

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