

hours after the end of challenge exposure, histamine PC₂₀ value was decreased significantly to 1.35 mg/ml while sputum eosinophils were increased substantially (19% of 4.76×10^6 cells/ml) as compared with the control day values.

To the best of our knowledge, this is the first case of linseed-induced occupational asthma confirmed by inhalation challenges since the original description by Prof. Charpin et al. (4). More importantly, this report should draw renewed attention to the sensitizing potential of linseed and other oleaginous seeds that are expected to be increasingly used as environmentally friendly alternatives to petroleum-derived materials. Airborne exposure to these vegetable allergens should be minimized through appropriate work hygiene measures.

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IgE-mediated anaphylaxis to proton pump inhibitors – cross-reacting study

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Key words: anaphylaxis; drug allergy; omeprazole; pantoprazole; proton pump inhibitors.

A 37-year-old woman attended our department, who reported that 3 months ago, she had taken an omeprazole capsule for peptic ulcer and after 15 min, itching of the palms, facial angioedema, generalized urticaria, bronchospasm, dizziness and collapse occurred. No other drugs had been administered during the previous 12 h. She was immediately transferred to the emergency services and received adrenaline, dexamethasone, hydrocortisone and nebulized β_2 -agonists. In the past, she had taken omeprazole many times. She had no history of atopy.

We conducted skin prick test (SPT) with commercial common inhalant, food allergens and other imidazole derivatives (ketokonazole, metronidazole), which was negative. SPT with lansoprazole, pantoprazole, rabeprazole and esomeprazole was negative too. The skin prick and intradermal tests to omeprazole were positive.

Serum sample, tested in Phadia Laboratories (CAP – FEIA), was negative for specific IgE to omeprazole. Challenges with lansoprazole, pantoprazole and capsule shell showed no reactions.

Two months before attending our department, a 58-year-old male had suffered generalized urticaria vomiting and diarrhea 1 h after taking an omeprazole capsule.

Fifteen days later, he received an i.v. injection of pantoprazole before an operation. Because of previous reaction to omeprazole, doctors preferred pantoprazole as a safer choice. Five minutes after injection, he had generalized itching, shock and loss of consciousness.

PPIs are a rare cause of anaphylaxis.

Cross-reactivity at the whole group should not be assumed.

Our study showed that SPT and ID tests were positive to omeprazole and pantoprazole. Skin prick test to esomeprazole, lansoprazole and rabeprazole was negative. A challenge test with esomeprazole was negative. The patient refused challenges to other PPIs.

Skin prick test to omeprazole, pantoprazole, esomeprazole, lansoprazole, rabeprazole and ID tests to omeprazole and pantoprazole were negative in five normal controls (Table 1).

Our patients had experienced anaphylactic reactions, the first one to omeprazole and the second one to omeprazole and pantoprazole, as suggested by the history and positive skin tests. Other causes of anaphylaxis, such as food, drugs, insect sting or capsule shell were excluded.

In our study, skin tests with proton pump inhibitors (PPIs) proved to be the only accurate and simple method of identification of the incriminated agent and quite specific to solve cross-reactivity problems among drugs of this group. This conclusion is in accordance to the vast majority of the studies (1, 2).

Serum specific IgE to omeprazole could not be measured by CAP method in our patients and this result is in line with most studies (3–5). There is only a case report with positive basophil activation test (F.A.S.T) to omeprazole in literature (6).

The causative factor for anaphylactic reactions to PPI in our patients was the original molecule (omeprazole and pantoprazole) and not any metabolite as revealed by positive skin test and oral challenge.

Oral provocation tests with PPIs in patients with negative skin tests proved to be a safe and effective procedure for identifying an alternative safe drug of this group (1).

A very impressive finding was that the second patient sensitive to omeprazole tolerated esomeprazole, an *S*-enantiomer of omeprazole.

The most reports of anaphylactic reactions demonstrate the presence of cross-reactivity among PPIs to extend to the whole group (2, 5) but in our patients, the sensitization was proved to be restricted to one and two compounds respectively according to skin and oral challenge tests (1).

Table 1. Skin tests and challenges performed

	Drug	Reaction	SPT (1 : 1)	ID (1 : 100, 1 : 1000)	Oral graded challenge (1 : 100, 1 : 30, 1 : 10, 1 : 3, 1 : 1)*
A patient	Omeprazole	Anaphylaxis	Omeprazole (+) Pantoprazole (-) Lansoprazole (-) Esomeprazole (-) Rabeprazole (-)	Omeprazole (+) Pantoprazole (-)	Pantoprazole (-) Lansoprazole (-) Capsule (-)
B patient	Omeprazole Pantoprazole	Anaphylaxis Anaphylaxis	Omeprazole (+) Pantoprazole (+) Lansoprazole (-) Esomeprazole (-) Rabeprazole (-)	Omeprazole (+) Pantoprazole (+)	Esomeprazole (-)

+, positive result; -, negative result.

*Every 30 min.

Successful desensitization to omeprazole has been referred (3) and it may be an option only for patients with positive SPT to all commercially available PPI forms but not the treatment of choice because alternative safe compounds of the PPI group could easily be identified (1, 5).

Proton pump inhibitors are a rare cause of anaphylaxis, but healthcare professionals need to be aware of this possibility. The cross-reactivity at the whole group should not be assumed and a complete study should be carried out, whenever a drug of this group is indicated.

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'Allergy to red pitaya'

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Key words: food allergy; immunoblotting; *red pitaya*; urticaria–angioedema.

Pitaya (also known as 'fruit of the dragon') is the result of a particular species of cactus, then belonging to the family of Cactaceae (*Hilocereus undatus*) to which belongs the 'fig of India' fruit commonly consumed in southern Italy.

There are two varieties, the red pitaya, of Colombian origin, and the yellow pitaya, of Vietnamese origin. In wild conditions, the plant is of climbing type and has large white flowers that blossom only at night whose duration is for 1 day; for 1 month after flowering, fruit is ready for harvest. Before ripening, pitaya is green and covered with small, sharp thorns. The red pitaya is round and the skin has elongated green languages that wrap the fruit. The flesh inside is soft and can be white or red, with many tiny black edible seeds. It is available in the market throughout the year and kept at room temperature. The pulp is usually consumed raw and used for the preparation of juices (1).

Here, we present a patient, who developed allergy related symptoms after ingestion of fresh red pitaya fruit. The patient, a 19-year-old woman, with no history of allergic disease, reported one episode of urticaria and angioedema after eating fruit salad (pitaya, kiwi, orange, watermelon, and grape) and treatment with i.m. injections of antihistamines and corticosteroids in an emergency unit relieved the symptoms.

Red pitaya fruit proteins were extracted from pulp and peel by stirring for 2 h at 4°C in 0.15 mol/l phosphate buffer saline (pH 7.2). Insoluble particles were removed by centrifugation at

Positive immuno-blotting and skin prick tests in patient with urticaria–angioedema after eating *red pitaya* fruit.