

# Anaphylaxis after accidental ingestion of kiwi fruit

Ewa Gawrońska-Ukleja, Anna Różalska, Natalia Ukleja-Sokołowska, Magdalena Żbikowska-Gotz, Zbigniew Bartuzi

Department and Clinic of Allergy, Clinical Immunology and Internal Diseases, Nicolaus Copernicus University, *Collegium Medicum*, Bydgoszcz, Poland  
Head: Prof. Zbigniew Bartuzi MD, PhD

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## Abstract

Numerous cases of anaphylaxis after ingestion of kiwi fruit, after the skin tests and during oral immunotherapy were described. The article describes the case of severe anaphylactic reaction that occurred in a 55-year-old patient after accidental ingestion of kiwi. Allergy to kiwi fruit was confirmed by a native test with fresh kiwi fruit. After the test, the patient experienced generalized organ response in the form of headache, general weakness and rashes on the neck and breast, and dyspnea. The patient had significantly elevated levels of total IgE and IgE specific to kiwi fruit.

**Key words:** allergy, anaphylaxis, kiwi fruit.

## Introduction

The first description of allergy to kiwi fruit comes from 1981 and it relates to a 53-year-old woman who has experienced acute urticaria, wheezing and swelling of the larynx [1]. Nowadays kiwi allergy is becoming increasingly important and is particularly prevalent in young children. At the moment, according to reports from 2011, there are no accurate epidemiological data on allergic reactions to this tasty fruit [2]. Kiwi allergen is a protein. Its molecular weight is approximately 30 kDa, and the concentration of the major allergen of this fruit depends on the variety [3].

Clinical symptoms after eating kiwi are mostly IgE-dependent reactions, mainly occurring around the mouth (oral allergy syndrome – OAS) [4, 5]. There may also appear changes in the skin such as acute urticaria, contact urticaria, atopic dermatitis and contact dermatitis [6-9]. Symptoms of asthma were found in 3-4% of patients allergic to kiwi protein, the frequency is the same for gastrointestinal symptoms [10]. The most dangerous, life-threatening allergic reaction to food is an anaphylactic shock.

In the medical literature, there are numerous descriptions of cases of anaphylaxis after eating kiwi fruit, but also after skin tests and during oral immunotherapy [11-13]. In 1992, an interesting case was described of a 29-year-old woman with several episodes of severe anaphylaxis after eating kiwi fruit, including three full-blown anaphylactic shocks. The first two shocks occurred immediately after eating fresh fruits and the third episode occurred as a total loss of consciousness caused by a small amount of kiwi

left on the knife, which was used to prepare a strawberry dessert served to the patient in a restaurant [11]. Since the clinical symptoms reported after ingestion of kiwi are serious and may lead to the loss of consciousness, in some cases (idiopathic anaphylaxis) it is possible to consider kiwi as a hidden allergen.

Numerous reports indicate cross-reactions with kiwi allergens and plant and food allergens. Kiwi gives cross-reactions with Japanese cedar [14], meadow fescue [15], olive [16], wheat [17], latex [18, 19], melon, sesame seeds, poppy seeds, hazelnuts, potatoes, peach papaya, pineapple and apple [20-24], pepper [25] and tomato [26].

In the diagnosis of allergy to kiwi, native skin prick-by-prick tests with skin and pulp of the fruit have the advantage over skin prick tests with standardized allergens [18]. Still the gold standard in the diagnosis of food allergy is a double-blind, placebo-controlled food challenge – DBPCFC [27]. The patient can also perform the labial food challenge – LFC [28] and assess the concentration of specific IgE against kiwi allergen.

## Case report

Patient, 55 years old, male, was admitted to the Department and Clinic of Allergy, Clinical Immunology and Internal Diseases to perform an allergy diagnostic procedure.

In May 2010, after an accidental ingestion of kiwi hidden in vanilla ice cream (it is most likely that a small amount

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**Address for correspondence:** Ewa Gawrońska-Ukleja MD, PhD, Department and Clinic of Allergy, Clinical Immunology and Internal Diseases, *Collegium Medicum*, University Hospital No. 2, 75 Ujejskiego St, 85-168 Bydgoszcz, Poland, phone: +48 52 365 5416, e-mail: kikalerg@cm.umk.pl

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of kiwi fruit was on a spoon used for scooping ice cream) the patient developed shortness of breath, swelling and numbness of tongue, hot flashes, dizziness and temporary loss of consciousness, involuntary urination and defecation. Symptoms subsided after taking 2 tablets of the antihistamine drug – cetirizine and a tablet of calcium. During the interview, it was revealed that several years before, after eating kiwi the patient developed numbness of lips and tongue, and generalized skin rash. The patient eliminated kiwi from his diet. Up to the hospitalization he was not diagnosed in the direction of kiwi hypersensitivity. Three weeks before being admitted to the hospital the patient experienced malaise, a feeling of scratching in the throat and flushing of cheeks after eating raw garlic. Previously, garlic was well tolerated.

The patient also noticed that during contact with construction dust he experienced hot and itchy skin, especially on the face. The other reported symptoms were dyspnea and a tiring, dry cough with increasing intensity for the last 3 weeks. Physical examination on admission does not deviate from normal.

We performed skin prick tests (SPT) with food allergens using a set from Allergopharma (allergens included hen's egg, cow's milk, cocoa, tomatoes, carp, apples, bananas, strawberries, rye flour, wheat flour, peanuts, nuts, celery, pork, poultry, citrus), which were negative. The skin prick test using a standardized kiwi allergen was not performed since the allergen extract was not available. Eventually, we performed a prick-by-prick test with fresh kiwi fruit.

The result of the prick-by-prick test was strongly positive (histamine 4 mm/4 mm, negative control – negative, kiwi 9 mm/12 mm). Ten minutes after the test, the patient experienced severe headache, weakness, rash on the neck and décolleté, and shortness of breath. Symptoms disappeared after administration of 4 mg of dexamethasone *i.v.* and 1 tablet of the antihistamine drug (cetirizine). The patient also had several immunological tests using enzymatic Hycor Biomedical Technic EIA (WHO standard results are shown in kU/l). The patient's level of specific IgE against kiwi was 2.75 IU/ml (class II). Specific IgE concentration was not elevated to birch, grass pollen, trees, mugwort, house dust mites, molds, mix. spices, banana and latex. It should be noted that during the test we used a mix of spices, which included garlic, i.e. the spice causing symptoms according to the patient's interview. Total IgE concentration was 176.42 IU/ml (total IgE level is considered elevated when above 100 kU/l).

The patient had eosinophilia in 1 mm<sup>3</sup> of normal peripheral blood (340 cells). The patient had a detailed diagnosis using the immunoblotting method. In this method, no positive signal was obtained. In addition, because the patient reported dyspnea of paroxysmal character, spirometry was performed with the histamine provocation test. The patient demonstrated typical asthmatic bronchial hyperreactivity (FEV<sub>1</sub> decreased 24.76%).

The patient's diagnosis was established as allergy to kiwi and controlled asthma. The patient was discharged

home with instructions to continue treatment under the supervision of the Allergy Clinic, total elimination of kiwi fruit from his diet (both in the fresh and processed form) and avoidance of cross-reaction to kiwi allergens (birch, wheat, latex, melon, sesame seeds, poppy seeds, nuts, potatoes, peach, papaya, pineapple, apple, red pepper and tomato). We recommended the need for a so-called "rescue set" (adrenaline in auto syringes, oral steroids, antihistamines) and inhaled steroids to control asthma.

## Discussion

The described case shows the great allergenic strength of kiwi. A small amount of the allergen left on an ice cream scooping spoon can result in a full-blown life-threatening anaphylactic shock. As in the case described in the literature, when a 29-year-old woman had an anaphylactic shock caused by a small amount of kiwi left on the knife, which was used for the preparation of a strawberry dessert in a restaurant [11].

The severity of allergy in our patient is described by the fact that he suffered anaphylaxis 10 min after the prick-by-prick test with fresh kiwi fruit. The present case shows that native tests should be performed by an experienced medical doctor, because the available literature also describes the reaction of the system in a 50-year-old man after a skin test [18].

Strongly positive prick-by-prick skin tests with fresh kiwi fruit and symptoms that occurred after the test have confirmed the source of anaphylactic reaction in our patient. According to the data in the literature, tests using fresh food have high specificity [29]. The gold standard in the diagnosis of food allergy is DBPCFC. In the case of kiwi allergy, diagnostic efficacy has been demonstrated in 66-68% of patients [27]. In the described patient, we decided against DBPCFC due to organ reaction observed after the prick-by-prick test, which clearly confirmed the allergy. Kiwi allergy in our patient was confirmed by evaluating the level of specific IgE to kiwi (class II). Although there was no signal in immunoblotting, we presume that it did not exclude the presence of specific antibodies against kiwi protein extract and the results may be a consequence of their low concentrations in the blood serum tested and partial change in allergen particles due to protein denaturation.

In patient's diagnosis we failed to demonstrate hyperreactivity to allergens that cross-react with kiwi. It was recommended, however, to avoid allergens that may provide potential cross-reaction with fresh kiwi fruit.

Food allergy, including allergy to kiwi, significantly affects the quality of life. Patients with food allergies are afraid of accidental exposure to an allergen. Patients with allergy to kiwi should strictly eliminate this fruit from their diet and also all the fruits potentially providing cross-reactions. Patients need to carefully read labels of consumed articles. Every patient should have a rescue medication (epinephrine in auto-syringe, antihistamine, steroids). Our patient

was equipped with this medication. High hopes are associated with specific immunotherapy [30], but the efficacy of immunotherapy is currently difficult to be determined due to the standardization of food used for desensitization therapy. This treatment is still used in small groups of patients [31].

Future in the diagnosis of allergy to kiwi is related with skin testing of recombinant allergens obtained by genetic engineering. The use of recombinant allergens will enable the identification of specific allergen proteins recognized by specific anti-kiwi IgE (recognized by SPT or allergen provocation tests) [32]. Unfortunately, this method is currently unavailable [33].

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