Anaphylaxis to European Perch (*Perca fluviatilis*) Due to α-Actin Protein

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Fish allergy is one of the most prevalent allergies in both children and adults. Cross-reaction between allergens from different fish species is common, although a minority of patients are selectively allergic to 1 fish species, with tolerance to other fish [1]. While parvalbumin proteins are the major allergens, others, such as aldolases, enolases, collagen, tropomyosins, and vitellogenin, have been identified as clinically relevant fish allergens [1].

We present the case of a 39-year-old woman with a personal history of lip and eyelid angioedema after eating walnut due to sensitization to albumin 2S storage protein and seasonal rhinoconjunctivitis due to sensitization to grass, olive, and Arizona cypress pollen. She experienced an episode of generalized urticaria, intense abdominal pain, and dizziness 20 minutes after dinner in a Peruvian restaurant. She was treated in the emergency department with intravenous fluids, antihistamines, corticosteroids, and antiemetics. Her condition improved gradually, and her blood pressure was 120/87 mmHg within the following hour. No vital signs were collected on arrival. No cofactors, such as concomitant infection, menstruation, NSAIDs, exercise, or alcohol, were recorded.

The patient had eaten cooked perch (*Perca fluviatilis*), chicken, rice, milk, egg, peas, carrot, potato, corn, onion, celery, black pepper, cumin, mayonnaise, and wheat bread. The restaurant ruled out the possibility of traces of walnut in the courses served. After this episode, the patient tolerated all the above-mentioned foods except perch, although she had tolerated this fish several times previously. She also reported eating other fish, such as salmon, hake, cod, and tuna, without problems.

Skin prick tests (SPTs) with commercial nut extracts (peanut, walnut, pistachio, almond, hazelnut, chestnut, and sunflower seed [LETI Pharma]) were performed with a positive result only for walnut (20 mm). SPTs with a battery of commercial fish extracts (hake, cod, sole, rooster, sardine, trout, tuna, salmon, monkfish [LETI Pharma]) and *Anisakis* were negative. Prick-by-prick testing with cooked perch (*P fluviatilis*) was positive (6 mm).

Specific-IgE by ImmunoCAP (Thermo Fisher Scientific) with perch, tuna, cod, salmon, swordfish, roosterfish, hake, carp parvalbumin (Cyp c 1), and *Anisakis* were all negative (<0.10 kU_A/L). The values for walnut-specific IgE and rJug r 1 were 2.26 kU_A/L and 0.67 kU_A/L, respectively. Determination of specific IgE to chicken meat, rice, milk, egg, peas, carrot, potato, corn, onion, black pepper, and wheat extracts was negative. Total IgE was 289 IU/mL. The serum baseline tryptase level was 3.6 µg/L. The patient refused to undergo an oral challenge with perch.

Protein extracts from raw and cooked perch (*P fluviatilis*) were prepared by delipidation, homogenization in phosphate-buffered saline (15% wt/vol) (50 mM phosphate buffer, 100 mM NaCl, pH 7.5), dialyzation against distilled water, and lyophilization. Raw and cooked perch extracts were analyzed using SDS-PAGE immunoblotting under reducing conditions (2-mercaptoethanol) according to the Laemmli method [2]. The assay revealed an IgE-reactive band of an approximate molecular mass of 31 kDa in the cooked perch extract. No band was detected in the raw perch extract (Figure).

The protein was identified by mass spectrometry, as previously reported [3], as well as by searching a nonredundant protein sequence database (NCBI) using the Mascot program (http://www.matrixscience.com) in the Proteomic Service of Complutense University of Madrid, which is a member of the ProteoRed Network. Research conducted with protein

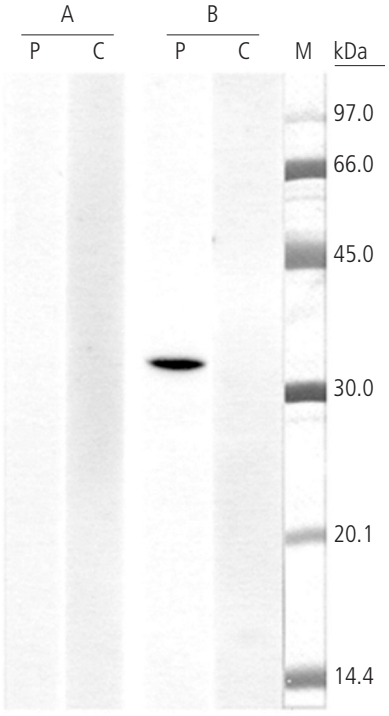

Figure. SDS PAGE immunoblotting reveals the 31-kDa IgE-reactive band. A, Raw perch (*Perca fluviatilis*) extract. B, Cooked perch (*P fluviatilis*) extract. P indicates patient's serum; C, control serum (pool of sera from nonatopic individuals); M, molecular mass pattern.

databases identified a 31-kDa IgE-binging band as skeletal α-actin type 2b.

We present a case of anaphylaxis after the intake of multiple foods, with perch being the main suspected trigger.

P fluviatilis is a bony fish species belonging to the Percidae family. It is also known as European perch, Eurasian perch, or river perch. It is found throughout Eurasia, from the Pyrenees to the Scandinavian Peninsula, although its geographical distribution has expanded as far as Italy, North Africa, and Albania [4].

Actin is an essential protein present in eukaryotic cells. It plays a key role in cell structure and contractility [5]. Six actin isoforms have been described in vertebrates, and skeletal α-actin corresponds to 1 of them [5]. α-Actin has been described as an allergen (Lat n 3) in an isolated case of allergy to Nile perch (*Lates niloticus*) [6]. It was also involved as a cross-reactive allergen between fish and poultry (fish-chicken syndrome) [7]. ß-Actin has been described as a fish allergen in a case of contact allergy with black bass fin [8].

We identified an α-actin protein with a molecular mass of 31 kDa instead of 42 kDa [7,8]. Similar findings have been reported by other authors [9] and could be explained by α-actin degradation. The nonappearance of the 31-kDa IgE-reactive band in the raw perch extract could be explained by the presence of new epitopes produced by the cooking process in the cooked α-actin molecule. Alternatively, the α-actin concentration could be higher in the cooked perch extract than in the raw perch extract.

We present a case of selective allergy to European perch due to an α-actin protein in a patient who tolerates other fish species. To our knowledge, this is the first published case of allergy to European perch (*P fluviatilis*). We emphasize the importance of identifying new fish allergens, such as actin proteins, in order to improve our diagnostic tools.

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Conflicts of Interest

The authors declare that they have no conflicts of interest.

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