

Anaphylaxis to European perch (*Perca fluviatilis*) due to alpha-actin protein

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Each named author states their contribution in all four requirements approved by the International Committee of Medical Journal Editors (ICMJE).

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This article has been accepted for publication and undergone full peer review but has not been through the copyediting, typesetting, pagination and proofreading process, which may lead to differences between this version and the Version of Record. Please cite this article as doi:

10.18176/jiaci.0825

Keywords: European perch. Anaphylaxis. Mono-allergic. Actin. Alpha-actin

Palabras clave: Perca europea. Anafilaxia. Monoalérgico. Actina. Alfa-actina

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

We present 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 a 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 assisted at an Emergency Department where she was immediately treated with intravenous fluids, antihistamines, corticosteroids, and antiemetics, with a progressive improvement and a subsequent blood pressure of 120/87 mmHg within the next hour. No vital signs were collected on arrival. No cofactors were involved: concomitant infection, menstruation, NSAIDs, exercise, or alcohol.

She ate 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 contained in the courses. After this episode, she tolerated all those foods except the perch, although she had tolerated this fish several times before. She also admitted to eating other fish such as salmon, hake, cod, and tuna without problems.

Skin prick tests (SPT) to commercial nut extracts from LETI Pharma® (peanut, walnut, pistachio, almond, hazelnut, chestnut, sunflower seed) were performed with a positive result only for walnut (20mm). SPT to a battery of commercial fish extracts from LETI Pharma® (hake, cod, sole, rooster, sardine, trout, tuna, salmon, monkfish) and Anisakis

were negative. Prick by prick testing with cooked perch (*Perca fluviatilis*) was positive (6 mm).

Specific-IgE by ImmunoCAP® (ThermoFisher Scientific) to perch, tuna, cod, salmon, swordfish, rooster, hake, carp parvalbumin (Cyp c 1) and Anisakis were all negative (<0.10 kU_A/L). Walnut-specific IgE and rJug r 1 were 2.26 kU_A/L and 0.67 kU_A/L, respectively. Specific-IgE to chicken meat, rice, milk, egg, peas, carrot, potato, corn, onion, black pepper, and wheat extracts resulted negative. Total IgE was 289 IU/ml. 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 (*Perca fluviatilis*) were prepared by delipidation, homogenization in phosphate-buffered saline (15% W/V) (50 mM phosphate buffer, 100 mM NaCl, pH 7.5), dialyzation against distilled water, and lyophilization. Raw and cooked perch extracts were analyzed by 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 raw perch extract (figure 1).

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 databases identified 31kDa IgE-binding band as Skeletal alpha-actin type-2b.

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

Perca fluviatilis is a bony fish species belonging to the *Percidae* family. It is also known as European perch, Eurasian perch, or river perch. Eurasian zone, from the Pyrenees to the Scandinavian Peninsula, is its natural geographical distribution, although it has been expanded in places such as Italy, North Africa, or Albania [4].

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

We identified an alpha-actin protein with 31 kDa instead of 42 kDa of molecular mass [7,8]. This situation was published by other authors [9] and could be explained by alpha-actin degradation. The non-appearance of the 31-kDa IgE reactive band in the raw perch extract could be explained by the existence in the cooked alpha-actin molecule of new epitopes produce by the cooking process, alternatively, the alpha-actin concentration could be higher in the cooked than in the raw perch extract.

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

Funding:

The authors declare that no funding was received for the present study.

Conflicts of interest:

Any author has any conflict of interest.

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