

Asthma After Chicken Consumption due to Cross-reactivity Between Fish and Chicken Parvalbumin

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Fish is a staple of human nutrition and is consumed worldwide. Fish allergy is the third cause of pediatric food allergy in our environment and the sixth in adults [1]. Parvalbumins have been reported to be the main panallergen in fish allergy [2]. Although cross-reactivity between fish and amphibian parvalbumins has been documented [3], there are no reports of adverse reactions to other widely consumed foods (eg, chicken) caused by cross-reactivity with fish parvalbumins.

A 23-year-old woman presented with chest tightness and wheezing within minutes of eating chicken. She did not have symptoms with other meats or with egg and she did not report contact with birds. Her atopic history included chest tightness, wheezing, and facial angioedema after ingestion of fish at the age of 9. She has avoided fish or its derivatives since then.

Skin prick tests (SPTs) to commercial extracts from meats (chicken, pork, lamb, and veal), egg white, egg yolk, ovalbumin, ovomucoid, and feather mixture were positive to chicken (wheal of 4 × 5 mm) and negative to the other allergens. The patient refused to undergo SPT against commercial fish extracts (and *Anisakis simplex*), since she had presented an anaphylactic episode after an SPT as a child. Serum specific immunoglobulin (Ig) E levels were measured using the enzyme allergosorbent technique (Specific IgE EIA kit HYTEC HYCOR Biomedical Ltd). Determination of specific IgE revealed the following values: chicken, 7.6 kU_A/mL; pork, 0.6 kU_A/mL; salmon, 10.6 kU_A/mL; hake, 95.6 kU_A/mL; and sardine, 58.3 kU_A/mL. Total IgE was 105 IU/mL. Specific IgE against *A simplex* was <0.35 kU_A/L. Protein extracts from raw and cooked chicken extract (CE) and from hake extract (HE) were prepared by homogenization in phosphate-buffered saline, followed by dialyzation and lyophilization. Sodium dodecyl sulfate polyacrylamide gel electrophoresis (SDS-PAGE) IgE immunoblotting

assays revealed IgE reactivity with proteins of 13, 16, and 55 kDa in the CE and 13, 37, 50, and 55 kDa in the HE (Figure 1A). SDS-PAGE immunoblotting inhibition using CE in the solid phase showed complete inhibition of IgE binding when the patient's serum was preincubated with HE (Figure, B, lane 2). The inhibition was not complete when CE was used as an inhibitor (Figure, B, lane 1), thus reinforcing fish parvalbumin as the primary sensitizing allergen. The 16-kDa IgE binding band from CE and the 13-kDa binding band from HE were manually excised from both gels, digested with trypsin, and analyzed using matrix-assisted laser desorption/ionization time of flight (MALDI-TOF) spectrometry and liquid chromatography electrospray ionization. Based on comparison with a database, the resulting peptides were analyzed using mass spectrometry or tandem mass spectrometry, which revealed α parvalbumin in the CE and β parvalbumin in the HE.

Parvalbumins are calcium-binding albumin proteins that are usually localized in fast-contracting muscles, and, to a lesser extent, in brain and endocrine tissue. Parvalbumins can be subdivided into 2 different evolutionary lineages, namely, α and β . α -Parvalbumins are abundant in the muscle of fish and amphibians, but much less so in the muscle of birds and mammals. They are not generally allergenic. β -Parvalbumins are common allergens in fish, although they are not found in human muscle and show reduced identity to human α parvalbumin [3,4]. α - and β -Parvalbumins have been reported to share a high homology (51% identity and 66% positive), which is increased in the calcium-binding domain, where IgE-reactive sites have been described [5]. Cases of cross-reactivity between different species of parvalbumins are rare; IgE-antibodies of fish-allergic patients have been reported to cross-react with frog parvalbumin [3]. Kuenh et al [6] reported

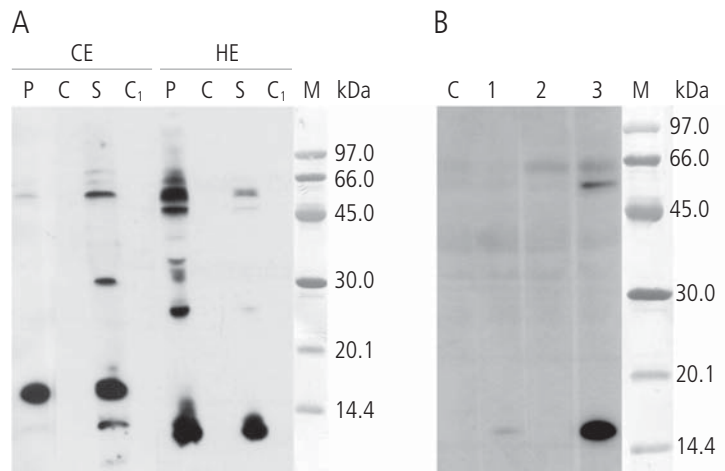


Figure. A, SDS-PAGE. CE, chicken extract. HE, hake extract. Lane P, patient's serum; Lane C, control serum (pool of sera from nonatopic subjects); Lane S, antiparvalbumin rabbit serum; Lane C1, rabbit serum before parvalbumin immunization. B, SDS-PAGE immunoblotting inhibition study. Lane C, control serum; Lane 1, patient's serum preincubated with CE (0.8 mg/mL) (homologous inhibition with positive control of inhibition); Lane 2, patient's serum preincubated with HE (0.8 mg/mL); Lane 3, patient's serum preincubated with sunflower pollen extract (0.8 mg/mL); M: molecular weight marker. SDS-PAGE indicates sodium dodecyl sulfate polyacrylamide gel electrophoresis.

reaction to chicken meat caused by IgE reactivity to muscle α parvalbumin with mild oral reactions after ingestion of tuna and salmon, although no cross-reactivity between fish and chicken parvalbumins was demonstrated, suggesting that chicken was the primary sensitizing allergen. Allergic reactions to chicken have also been reported in patients who are highly sensitized to *A simplex* [7]; however, our patient did not show detectable IgE levels against this nematode.

We present the first case of chicken allergy involving parvalbumin as the relevant allergen in a fish-allergic patient, with demonstrated cross-reactivity between α and β parvalbumin. Physicians should be aware of clinical cross-reactions involving panallergens such as parvalbumins, which might be present in widely consumed foods.

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Nine Cases of Allergy to Omeprazole

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Key words: Omeprazole allergy. Proton pump inhibitors. Benzimidazole derivatives. Dot-blot. Cross-reactivity.

Palabras clave: Alergia a omeprazol. Inhibidores de la bomba de protones. Derivados benzimidazólicos. Dot-blot. Reactividad cruzada.

The benzimidazole derivative omeprazole was the first proton pump inhibitor to be marketed (1988). The 5 proton pump inhibitors currently used in Spain are omeprazole, lansoprazole, pantoprazole, rabeprazole, and esomeprazole, all of which belong to a group of benzimidazole derivatives comprising agents such as mebendazole, domperidone, and mizolastine. These drugs share a sulfanyl group in the bond between the benzimidazole ring and pyrimidine ring that gives them a similar structure in which only the free radicals are different. Omeprazole is widely used, yet few cases of allergy to this agent have been reported. The incidence of allergic reactions to omeprazole has increased in recent years.

We studied 9 patients (3 men and 6 women; mean age, 43 years [range, 23-63 years]) who had experienced allergic reactions to omeprazole. The reaction was immediate in 8 cases (urticaria/angioedema in 4 and anaphylaxis in 4) and delayed in the remaining case (exudative erythema multiforme).

All patients underwent skin testing. The 8 patients who had had an immediate reaction underwent prick testing with omeprazole (4 mg/mL) and intradermal testing with omeprazole (0.4 mg/ml) and pantoprazole (0.4 mg/mL). When the result of skin testing was negative, a challenge test was performed with omeprazole (3/8). In 4 cases, challenge testing was performed with other benzimidazole derivatives (domperidone, mebendazole, and mizolastine). Challenge tests were performed in 4 cases where other drugs were believed to be involved.

The results of prick testing were negative in all patients (8/8). The intradermal test with omeprazole was positive in 5 patients and the challenge test with omeprazole was positive in 3 cases (3/8). When challenge testing was performed with other benzimidazole derivatives (4/8) and with other medicines (4/8), the result was negative.

Dot-blot testing was performed in 1 patient (patient 6), and the result was positive.

As the reaction was delayed in patient number 9, patch testing was performed with readings at 48 hours and 96 hours. The result was negative with omeprazole (1% pet). Challenge testing with omeprazole was positive. Challenge testing with the other benzimidazole derivatives and the other drugs involved was negative.

The results of the allergy work-up are shown in the Table.

Although omeprazole is widely used, few allergic reactions have been reported. However, due to increased use of this