Salmon Roe as an Emerging Allergen in Western Countries

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Salmon roe, which is also known as salmon caviar, red caviar, or ikura and is frequently consumed in countries such as Japan or Russia, is a delicacy commonly served in sushi-based meals [1,2]. Allergic reactions to salmon roe have been reported in Japan [3,4], and a few cases were recently described in western countries (3 cases in France [5], 2 cases in the USA [2,6]). Nevertheless, studies on the allergenicity of salmon roe are rare [7].

We report the first case of salmon roe anaphylaxis in a young adult in Portugal. A 26-year-old man with a history of mild controlled persistent asthma and persistent, moderate-severe allergic rhinitis who was sensitized to house dust mites was admitted to our emergency department complaining of dyspnea, rhinorrhea, ocular pruritus, epigastric pain, and nausea. The symptoms began a few minutes after the ingestion of a sushi meal comprising rice, salmon, salmon roe, wasabi, soy, and ginger and were treated with intramuscular epinephrine, intravenous corticosteroids, and antihistamines. Uvular edema persisted in the emergency department. The patient denied having eaten other foods, taken any drugs (including nonsteroidal anti-inflammatory drugs), being infected, or having recently exercised. Skin prick tests with commercial food extracts were negative for salmon and other fish, shellfish, soy, rice, total egg, egg white, egg yolk, ovalbumin, and ovomucoid. Skin prick-prick tests were positive for chum salmon (*Oncorhynchus keta*) roe (17×10 mm) and negative for egg (white and yolk), ginger, salmon, flying fish roe (tobiko), sturgeon roe (caviar), and black scabbard fish roe. Specific IgE (sIgE) was 0.28 kU_A/L

for salmon roe extract (ImmunoCAP, Phadia) and negative for extracts of salmon and other fish (<0.10 kU_A/L). SDS-PAGE immunoblotting (Roxall) with chum salmon roe extract and the patient's serum revealed a 20-kDa IgE-binding band (Figure). This band was manually excised from the gel, digested with trypsin, and assessed using mass spectrometry following the methods of Pastor et al [8]. Proteins were identified by searching a nonredundant protein sequence database (National Center for Biotechnology Information) using the Mascot program (http://www.matrixscience.com). The resulting peptides identified by mass spectrometry corresponded to the region of vitellogenin that forms lipovitellin. After the allergic reaction, the patient tolerated salmon and other fish roes (tobiko, caviar, and black scabbard fish). The patient eats fish and shellfish regularly with no complaints. We report a case of salmon roe allergy confirmed by positive in vivo and in vitro tests. In this case, no oral food challenge was performed. Yanagida et al [1] reported that a value of 34.6 kU_A/L of the sIgE to salmon roe has a 95% positive predictive value for a positive oral challenge result. Despite the low level of sIgE to salmon roe detected in the present case, we decided not to perform an oral food challenge test because of the severity of the reaction and the fact that we were able to rule out all other possible triggers. Furthermore, SDS-PAGE immunoblotting had additional value in our etiological investigation, confirming the presence of sIgE to salmon roe in the patient's serum. Roe from fish or other aquatic species is enclosed in the ovarian membrane, and salmon roe contains 3 major components that are equivalent to hen's egg yolk proteins, namely, lipovitellin, phosvitin, and β'-component [3]. Nevertheless, there does not seem to be cross-reactivity between salmon roe proteins and hen's egg [1,3]. These proteins are degradation fragments of vitellogenin, a protein synthesized in fish liver that is carried to the oocytes through the bloodstream [9]. β'-component is a dimer composed of 2 proteins (16 kDa and 18 kDa, respectively) derived from the same polypeptide chain and is associated with cross-reactivity between fish roes. The 20-kDa IgE-reactive protein detected in our study was identified as the lipovitellin from salmon roe, a protein that has been reported to be an allergen both in salmon roe [3,9] and in beluga caviar [10].

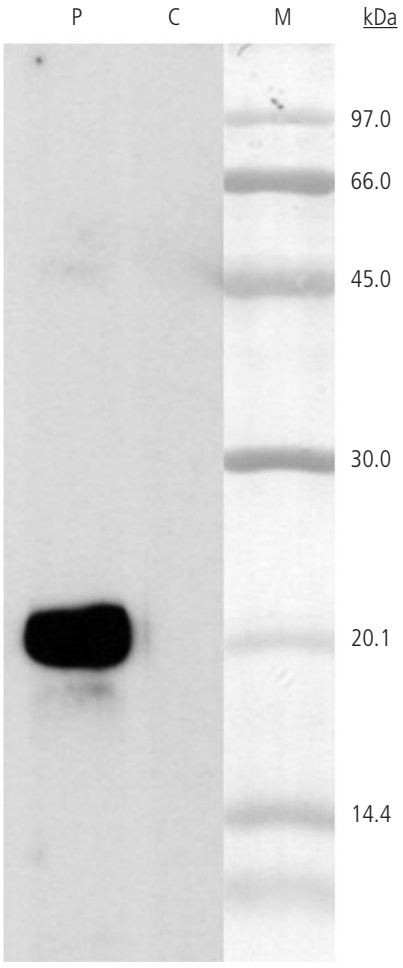

Figure. SDS-PAGE with salmon roe extract. Samples with 2-mercaptoethanol. Lane P, Patient's serum; Lane C, control serum (pool of sera from nonatopic individuals); Lane M, molecular mass marker.

To our knowledge, this is the first reported case of salmon roe allergy without concomitant salmon allergy in a Portuguese patient. Allergic reaction to fish roe is rare in western countries; however, given the increase in consumption of fish roe in these countries, salmon roe allergy should be considered when evaluating patients with anaphylaxis after ingestion of sushi.

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Conflicts of Interest

The authors declare that they have no conflicts of interest.

Previous Presentations

With the exception of protein identification, data from this case report were presented as a poster at the EAACI 2018 annual congress.

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