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LETTER TO THE EDITOR

Case of anaphylaxis due to fish and shellfish

Dear Editor,

Fish and shellfish are important causes of food hypersensitivity. Tropomyosin and *Anisakis* are the major allergens in fish and shellfish. Tropomyosin is an important allergen in shellfish, such as shrimp, crab, oyster and scallop, as well as other arthropods, such as house dust mite and cockroach. *Anisakis* is an enteroparasite in fish, such as mackerel, salmon and tuna, cephalopods and crustaceans.

A 40-year-old Japanese man first developed urticaria at 36 years of age after eating deep-fried scallops. Since then, he experienced urticaria and anaphylaxis after eating scallop sauce, deep-fried oyster, boiled shrimp, boiled lobster, raw salmon and raw tuna. No sign of infection or history of medication was present before the onset of these symptoms. The patient had a 10-year history of pollenosis.

Laboratory investigation showed an elevated concentration of serum immunoglobulin (Ig)E (3358 IU/mL). Radioallergosorbent testing for specific IgE revealed class 6 reactivity for cedar, class 3 for house dust mite, moth and *Anisakis*, class 2 for shrimp, cockroach, oyster, clam and scallop, and class 0 for salmon and tuna. Immunoblotting revealed that the serum IgE of the patient reacted with the 38-kDa bands for both extracts and tropomyosins of scallop, lobster and oyster (Fig. 1). Three IgE binding bands were observed for *Anisakis* with a molecular weight of approximately 150 kDa, but not 38 kDa (Fig. 1). No anaphylaxis occurred when the patient avoided eating shellfish and raw fish.

Fish and shellfish are major sources of dietary protein, especially in coastal areas. As Western societies have recently incorporated more fish and shellfish into their diets to promote healthier living, cases of seafood allergy have increased. The major shellfish allergen is tropomyosin, an essential protein with multiple isoforms found in muscle and non-muscle cells of invertebrates and vertebrates.[1] Tropomyosin is an important allergen in shellfish, such as shrimp, crab, oyster and scallop, as well as other arthropods, such as house dust mite and cockroach. Furthermore, tropomyosin has been suggested as the cause of clinical cross-sensitivity between invertebrates. In contrast, vertebrate tropomyosins are considered non-allergenic. Tropomyosins in invertebrates have a molecular weight of 38–41 kDa and exhibit great homology in their amino acid sequences.[2] In our case, immunoblot analysis detected a major 38-kDa band in the extract and tropomyosin from scallop, lobster and oyster, indicating that tropomyosin is the major antigen and is responsible for cross-reactivity between these invertebrates.

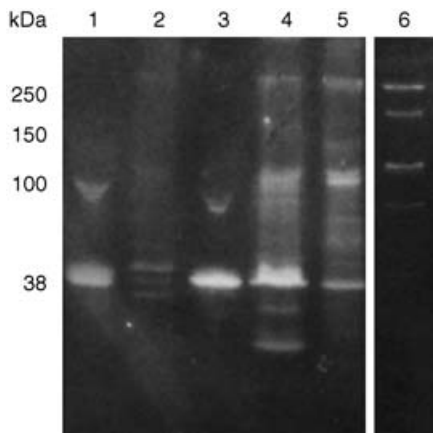

Figure 1. Immunoblot analysis with the patient's serum. Lane 1, scallop tropomyosin; lane 2, boiled scallop extract; lane 3, lobster tropomyosin; lane 4, boiled lobster extract; lane 5, boiled oyster extract; lane 6, raw *Anisakis* extract.

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The nematode *Anisakis simplex*, in the third larval stage, parasitizes fish (such as mackerel salmon and tuna), cephalopods and crustaceans, and induces IgE-mediated allergic reactions. Thus, in our case, the allergic reactions to raw salmon and tuna were likely induced by *Anisakis*. Several proteins have been identified as allergens of *A. simplex.* Tropomyosin is considered to be one of the important allergens responsible for such reactions.[3] However, Asturias *et al.* recently reported that none of 10 sera samples from *Anisakis*-sensitive patients reacted with natural or recombinant *Anisakis* tropomyosin by immunoblotting and suggested that tropomyosin is not an important allergen in *Anisakis* allergic reactions.[4] Lorenzo *et al.* demonstrated that *O*-glycans, glycoproteins of 139 and 154 kDa, are important allergens.[5] In the present case, three IgE binding bands were observed at approximately 150 kDa, but not 38 kDa, suggesting that tropomyosin is not the *Anisakis* allergen in this patient. Further examination is necessary to identify the IgE-binding epitopes in *Anisakis*.

In summary, we present a case of a patient who exhibited hypersensitivity reactions to several fish and shellfish. Tropomyosin may have been responsible for his responses to scallop, lobster and oyster. However, some proteins of *Anisakis* apart from tropomyosin may be responsible for the allergenicity of raw salmon and tuna.

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