Dear Editor,

People in Japan consume a vast amount of fish, and the importance of allergies to fish has attracted much attention because fish account for approximately half of cases of food allergies in Japanese adults. The major allergens in fish are parvalbumin and collagen, and each allergen is cross-reactive within various fish species. The IgE reactivity of patients’ sera to fish collagen has been shown to be retained even when the fish meat was treated with a high heat load. There have been very few reports of anaphylaxis in response to eel. In this report, we describe our experience with an allergy to baked eel due to fish collagen, and we also discuss fish allergens.

Case report

A 17-year-old woman presented with atopic dermatitis and a food allergy to egg, which had been presented since her childhood. She has avoided eating eggs due to the food allergy. She did not have a history of allergy to any other foods, including to eel or other fish. After ingestion of eel for dinner, she became aware of respiratory discomfort and experienced an urticaria in her body during bathing about 4 min. She was administered first aid due to suspected anaphylaxis. On admission, she presented with laryngeal edema, and she was administered hydrocortisone sodium phosphate for these symptoms, as well as a diphenhydramine maleate drip medical treatment. In order to determine the cause of the allergic reaction, the patient was referred to our hospital for medical treatment. Her serum nonspecific IgE concentration was 4660 IU/mL, and her serum specific IgE levels by ImmunoCAP were positive (7.87 U/mL) (class 3) (negative is <0.35 U/mL). The Anisakis-specific IgE result was negative. Results of specific IgE test for various seafood (cod (2.68 U/mL, class 2), crab (4.20 U/mL, class 3), shrimp (2.48 U/mL, class 2), salmon (32.2 U/mL, class 4), sardine (0.81 U/mL, class 2), and gelatin (1.68 U/mL, class 2]) were positive, as were results specific to egg white (11.1 U/mL, class 3) and egg yolk (7.22 U/mL, class 3). We then checked for IgE reactivities of the purified Pacific mackerel collagen and various fish extracts, which contain abundant collagens (Pacific mackerel, Japanese jack mackerel, red sea bream, chicken grunt and yellowfin); the results were positive, but results for parvalbumin were negative (Fig. 1). Based on the serum reactivity of the present case from the test results allergen was identified as collagen of eel.

We then performed the skin-prick test, and results were positive for baked eel (papule ≥3 mm larger than the negative control). Results of the skin-prick test were also positive for Pacific mackerel and Japanese jack mackerel extracts (Torii Pharmaceutical, Tokyo, Japan) (papule ≥3 mm larger than the negative control). A food (baked eel) challenge test was performed. Immediately after the food challenge, throat discomfort and intraoral itching appeared that lasted for 15 min. The patient’s plasma histamine concentration peaked at 20.8 ng/mL 15 min after the food challenge (Table 1). Thus, the patient was diagnosed with an eel allergy, rather than a food-dependent, exercise-induced allergy.

Discussion

Fish is a valuable source of proteins, physiologically active substances (such as eicopentaenoic acid and docosahexaenoic acid), and minerals (such as calcium). Most patients with a fish allergy display allergic symptoms following the intake of various fish species. Allergens causing allergies due to intake of fish are fish parvalbumin, fish collagen, and various allergens from Anisakis simplex. Although the patient in this case did not have a fish allergy other than to eel, Figure 1 shows that cross-reactivities of fish collagen to parvalbumin and Anisakis IgE-RAST were negative and that it resulted in positive to gelatin, eel, salmon, crab, shrimp, cod, and sardines IgE-RAST. Results of her skin-prick test were positive not only for baked eel but also for Pacific mackerel and Japanese jack mackerel, indicating that her serum IgE had cross-reactivities of eel to Pacific mackerel and Japanese jack mackerel. Her results specific to gelatin-derived from livestock meat (cow) by the immune-CAP was positive (class 2). There is the possibility that the weak positive reaction of specific IgE for livestock meat gelatin is non-specific and/or false-positive reaction. Because she could take livestock meat containing gelatin without any symptoms.

Cross-reactivity between livestock meat collagen and fish collagen could not exist. Table 1 shows the food (baked eel) challenge test process. Vital signs were not changed, but throat discomfort and intraoral itching appeared, and plasma histamine concentrations peaked at 15 min after the food challenge and immediately decreased. These results suggested that the eel collagen was the cause of the food allergy. In fact, she has avoided eating baked eel after the first anaphylactic experience, and she has not experienced any other anaphylaxis due to fish eating. Because eel contains a high collagen content, the lack of allergy to other fish is considered to be due to the fact that people are less likely to eat the sites of other fish that contain a large amount of collagen such as the skin containing of eel. However, the collagen of the eel is

1323-8930 © 2017, Japanese Society of Allergology. Production and hosting by Elsevier B.V. This is an open access article under the CC BY-NC-ND license (http://creativecommons.org/licenses/by-nc-nd/4.0/).
when ingesting the fish other than the eel for it is often exhibit other fish and antigenic cross-reactivity is a need to pay attention to the appearance of allergic symptoms.5

After 1996, the vaccines no longer contained a gelatin reagent. She received vaccinations against measles in 1998, and against mumps and rubella in 1999, but not against varicella. Thus she was not sensitized to gelatin by vaccination.

The blood testing of this patient showed specific IgE by immune-CAP reactivity of class 1 or more to almost all dietary antigens evaluated; it is a common phenomenon in patients with atopic dermatitis. However, she has not experienced any food allergy symptoms other than to eel. We compared her case to the existing literature of allergic reactions to eel, but we did not recognize any obvious common point except that many of the individuals were young.

In conclusion, this report described a case of a fish allergy to eel collagen co-occurring with atopic dermatitis.

Conflict of interest
The authors have no conflict of interest to declare.

Masao Tamura a, Kiyoshi Matsui a, Yukihiro Kobayashi b,c, Chie Ogita a, Kazuyuki Tsuboi a, Minori Kusakabe a,d, Kota Azuma a, Takeo Abe a, Takahiro Yoshikawa a, Masahiro Sekiguchi a, Naoto Azuma a, Masayasu Kitano a, Hajime Sano a

a Division of Rheumatology, Department of Internal Medicine, Hyogo College of Medicine, Hyogo, Japan

b Department of Marine Bioscience, Tokyo University of Marine Science and Technology, Tokyo, Japan

c Course of Safety Management in Food Supply Chain, Tokyo University of Marine Science and Technology, Tokyo, Japan

* Corresponding author. Division of Rheumatology, Department of Internal Medicine, Hyogo College of Medicine, Mukogawa-cho, Nishinomiya-shi, Hyogo 663-8501, Japan.
E-mail address: k-matsui@hyo-med.ac.jp (K. Matsui).

References


