Potential Cross-Reactivity Between Shellfish and Anchovy: A Case of Late Phase Anaphylaxis

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Abstract

Prevalence of seafood allergy is rising in the U.S. population, including children[1-3] Data on the cross reactivity among species of shellfish is robust, but there is limited data in terms of the potential cross-reactivity between shellfish and fish[2,4] Shellfish allergy tends to present with anaphylaxis and episodes can be life-threatening[2]. Data from the National Electronic Injury Surveillance System showed that 24% of ED visits for anaphylaxis were seen in children ≥6 years[3], with shellfish being the most common culprit. Tropomyosin and parvalbumin are known proteins that are the main culprits causing allergic reactions and cross-reactivity between different types of shellfish and fish respectively[4].

Objective:

- Discuss potential cross-reactivity of bony fish and shellfish
- To highlight the importance of proper handling of specific foods and avoidance in patients with seafood allergy
- To increase awareness on fish and shellfish allergy in the pediatric population

Shellfish Allergy Case Report

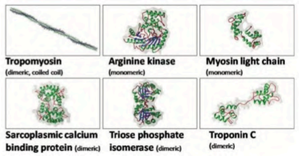
- A 16-year-old female with allergic rhinitis with history of dust mite and cat allergy who developed severe late phase anaphylactic reactions after consuming shellfish.
- The episodes required ICU admissions for late-phase anaphylaxis requiring several doses of epinephrine hours to days after consumption of shellfish or shellfish and fish containing products.

Case Report:

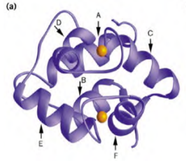
- The first episode occurred after consuming rice with shrimp. (hives, lip and eye angioedema). She did not seek medical care, therefore no testing results are available.
- The second episode occurred after eating pre-packaged BBQ chicken wings, noted to contain shellfish, fish, artichoke and anchovies. Symptoms were hives, swelling, shortness of breath and wheezing.
- The third episode occurred after eating a cheese and sausage kolache at school where they were also cooking fish and shellfish. Symptoms were hives, swelling, shortness of breath and wheezing.

Protein Structure:

Shellfish



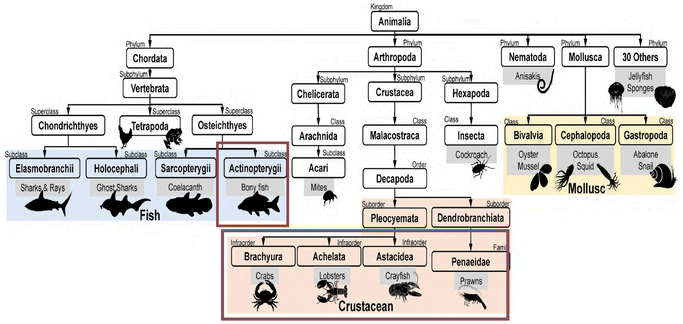
Parvalbumin



Specific and total IgE levels (sIgE in kU/L and total IgE in IU/L)

Second Episode	sIgE	Third Episode	sIgE
Anchovy	0.47	Anchovy	0.49
Crab	0.56	Artichoke	0.44
Crayfish	15.6	Beef	<0.35
Lobster	7.93	Chicken	<0.35
Shrimp	13.8	Codfish	<0.35
Spiny Lobster	1.44	Salmon	<0.35
Other Fish and Mollusks	<0.35	Wheat	<0.35
Total IgE	1060		647

Taxonomic tree of edible seafood species and related allergen sources



- 20% of crustacean allergic patients have fish allergies.
- 50% of shellfish allergic patients have mollusk allergies.

Additional laboratory testing:

Ancillary Tests	Results
Histamine	476 nmol/L
Tryptase	3.11ug/L
C1 esterase non-function	38 mg/dL
C1 esterase function inhibitor	80% (normal >60%)
C3	182 mg/dL
C4	47mg/dL
CH50	131mg/dL

Discussion:

- Although cross-reactivity is common in shellfish allergic patients (75%), studies are lacking on the clinical and immunologic cross-reactivity among shellfish and fish.[1,3]
- This case highlights the importance of creating awareness of potential cross-contamination and how small doses of aerosolized allergen can be enough to cause symptoms of an allergic reaction and even anaphylaxis[3]
- We hypothesize that the positive sIgE level for anchovy might be due in part to cross-reactivity or represent actual fish allergy.
- Since 1/5 of shellfish allergic patients have food allergy, oral food challenge to shrimp, crab and anchovy are necessary in the clinical setting to confirm this potential cross reactivity.
- More research is needed to improve testing for seafood allergens in order to make evidence based decisions in treatment, diagnosis and patient education.[3-6]

References:

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