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# Article ID: SIMM0403 Popular Article Seafood Allergens: Mechanism and Control Measures

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# Abstract

Food-induced allergies are considered an essential problem of public health with a remarkable impact on the quality of life of sensitized/allergic individuals. As highly consumed foods. fish and shellfish represent a valuable source of proteins for the general population. Despite their economic and nutritional importance, these foods induce hypersensitivity reactions in sensitized/allergic individuals. So far, parvalbumins (fish) and tropomyosins (crustaceans and molluscs) have been considered significant allergens in seafood allergy, responsible for most of the reported cases of adverse immunological responses. More recently, other proteins such as arginine kinases, myosin light chains, troponins, and sarcoplasmic calciumbinding proteins have been regarded as relevant allergens in fish, crustaceans, and molluscs. This article will focus on seafood allergens, reporting an updated and compiled list of allergens from fish, crustaceans and mollusc species, with an overview of the most representative analytical methods for their detection.

#### **INTRODUCTION**

The diet and health of humans are significantly influenced by seafood. Globally, there has been a steady rise in fish and shellfish intake due to the documented health benefits mentioned above. For the bulk of the world's population. Allergies can result from adverse reactions to seafood, which are frequently caused by pollutants but can also be mediated by the immune system. Contaminants include parasites, bacteria, viruses. marine toxins. and biogenic amines. which noncan cause immunological reactions to seafood. Adverse reactions may also result from ingredients added during the preparation and canning of seafood. However, consuming items containing undeclared shellfish can pose serious health risks (such as systemic immunological reactions and anaphylaxis) for a tiny but considerable portion of people with food allergies due to unintentional exposure to the offending food (Madsen & Associates, 2012 Citation). Allergies to fish and shellfish have become more common in recent years and are now recognized as a developing public health concern. Allergic responses to "shellfish," which is a term used to describe the groupings of mollusks and crustaceans. **FOOD ALLERGEN** 

Food can cause an allergic response, but a few foods cause most food allergies. About 3% of people have food allergies linked to IgE, which can seriously impact a patient's



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everyday life. Symptoms can affect other organ systems in addition to the gastrointestinal tract. Studies on birth cohorts have demonstrated that early infancy is when allergy sensitivity to food allergens occurs. Pathogenesis mechanisms include cross-linking IgE attached to mast cells and basophils, which immediately release inflammatory mediators. Also, latephase and chronic allergic inflammation are caused by activating T cells, basophils, and eosinophils. Scientists are starting to identify the molecular characteristics of food allergies.

# **TYPE OF SHELLFISH ALLERGEN**

Seafood allergies can take many different forms, and they are frequently categorized according to the particular kind of seafood that causes the allergic reaction. Typical forms of seafood allergy include the following: Fish Allergy: Different fish species, including salmon, tuna, cod, and halibut, can cause this allergy. Allergy to shellfish: One of the most prevalent categories of seafood allergies is shellfish allergy. They fall into two other categories: allergy to Mollusk Shellfish, which comprises shellfish such as scallops, mussels, oysters, and clams. It's crucial to remember that while some people may only be allergic to one type of shellfish, others may be allergic to both. Seafood allergies can cause mild to severe symptoms, such as hives. swelling, breathing C, itching, difficulties, asthma, vomiting, diarrhea, and, in extreme situations, anaphylaxis.

## SHELLFISH ALLERGEN

The main allergen associated with shellfish allergies is thought to be tropomyosin. Both muscle and nonmuscle cells contain tropomyosins. They mediate the troponin– actin complex interaction in striated muscle to control contraction. Arginine kinase, like tropomyosin, is found in large amounts in the muscles of invertebrates. Other invertebrates and shellfish species have also been shown to contain it. They don't withstand heat or acid-base treatment, and their physicochemical qualities are unstable compared to tropomyosins.

## STRUCTURE

As the first coiled-coil to be sequenced and modeled, tropomyosin is the prototypical coiled coil. The intricacy and subtlety necessary for tropomyosin function have been made clear by studies of the structure and dynamics of tropomyosin and by biochemical and biophysical examinations of tropomyosin, mutations, and model peptides. Tropomyosin has to connect to the helical actin filament through bends and local unstable areas, which are made possible by disruptions in the conventional coiled coil.

DIFFERENT BETWEEN THE FINFISH AND SHELLFISH ALLERGY

The consumption of fish and shellfish has increased globally, and reports of adverse reactions to these foods are rising, with a prevalence of between 0.5 and 5%. Allergies to fish typically appear early in life, whereas allergies to shellfish usually appear later, starting in puberty. Though the natural history of both allergies is both are believed unknown, to be persistent. For example, the clinical signs of shellfish allergy can range from minor, localized reactions to potentially fatal "anaphylactic" responses in individuals and between persons. The two main allergens are parvalbumin and tropomyosin; however, numerous other allergens have been identified and cloned. Due to these allergens' high heat and biochemical stability, a complete medical history, skin prick, and in-vitro specific IgE testing, and possible oral challenges are necessary for the diagnosis. The current clinical standard



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of care for patients with allergies is strict avoidance of specific allergens; an anaphylaxis plan with an adrenaline autoinjector is provided when necessary.

## **MECHANISMS**

The mechanism behind shellfish allergies involves the body's immune system mistakenly identifying proteins found in shellfish as harmful invaders. When someone with a shellfish allergy consumes or comes into contact with shellfish proteins, their immune system produces immunoglobulin E (IgE) antibodies specific to those proteins.

## **CONTROL MEASURES**

If you or a loved one is allergic to shellfish, it's critical to take precautions against unintentional exposure and control any symptoms. These are a few preventative steps; avoiding shellfish and goods containing shellfish is the best method to prevent an allergic response. This covers hidden sources such as sauces, soups, and flavorings, as well as apparent ones like shrimp, crab, lobster, and mollusks. Always thoroughly study food labels to look for components that could suggest shellfish or shellfish byproducts are present. A word like "shellfish extract" or "crustacean" should raise your suspicions because it could mean that allergies are present. Keep your hands away from shellfish. Because there is a greater chance of crosscontamination in these settings, cooking tools, serving plates, and surfaces must be meticulously cleaned after coming into contact with the shell. Keep yourself educated about shellfish allergies and inform people around you. Over time, allergy management techniques may need modified, to be so it's critical to periodically assess and revise your plan to guarantee ongoing safety. By taking preventative steps, those allergic to

shellfish can lessen their chance of exposure and better manage their illness. CONCLUSION

shellfish allergens pose a significant health risk to individuals allergic to them, requiring vigilant avoidance and preparedness for managing allergic reactions. Proper diagnosis and education about sources of shellfish allergens are crucial for the safety and well-being of those affected.

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