

## MODULE 7 - TOXINS

### Objectives

This module is for INFORMATION ONLY. No BETC test questions are from this module.

At the completion of this section, participants will be able to:

- Discuss some of the more common naturally occurring toxins associated with marine organisms.
  - Discuss some of the more common naturally occurring toxins found in agricultural products
- 

### Introduction

Up to this point, microbiological hazards associated with food products has been discussed. But not all food hazards are directly caused by microorganisms, some are chemical hazards that are caused by byproducts from microorganisms or that occur naturally in the food source.

### NATURAL TOXINS

The natural toxins discussed in this section include:

- **Ciguatera poisoning** <http://vm.cfsan.fda.gov/~mow/chap36.html>
- **Shellfish toxins** (PSP, DSP, NSP, ASP)  
<http://vm.cfsan.fda.gov/~mow/chap37.html>
- **Scombroid poisoning**  
<http://vm.cfsan.fda.gov/~mow/chap38.html>
- **Tetrodotoxin** (Pufferfish)  
<http://vm.cfsan.fda.gov/~mow/chap39.html>
- **Mushroom toxins** <http://vm.cfsan.fda.gov/~mow/chap40.html>
- **Aflatoxins** <http://vm.cfsan.fda.gov/~mow/chap41.html>
- **Pyrrolizidine alkaloids** <http://vm.cfsan.fda.gov/~mow/chap42.html>
- **Phytohaemagglutinin** (Red kidney bean poisoning)  
<http://vm.cfsan.fda.gov/~mow/chap43.html>
- **Grayanotoxin** (Honey intoxication)  
<http://vm.cfsan.fda.gov/~mow/chap44.html>

### MARINE TOXINS

In fish, naturally occurring marine toxins present some unique food hazards. We need to be concerned with these toxins. The toxins found in

fish are some of the most poisonous substances found on earth. Some are toxic at extremely low levels. In addition, many are heat stable and not normally destroyed by cooking. These toxins can be detected, but not easily. The presence of these toxins is usually detectable only through involved analytical methods. The affected fish look, smell, and often taste normal.

Special attention needs to be paid to a group of seafood products called molluscan shellfish. Those include oysters, mussels, and clams. There are specific toxins that are associated with this group of filter feeders. The toxins that have been involved in human illnesses caused by shellfish poisonings include: Paralytic Shellfish Poisoning or PSP; Diarrhetic Shellfish Poisoning or DSP, Neurotoxic Shellfish Poisoning or NSP, and Amnesiac Shellfish Poisoning or ASP.

## **AGRICULTURAL TOXINS**

In addition to the toxins found in marine species there are naturally occurring toxins that are found in agricultural commodities. In general, these toxins are grouped under the heading of mycotoxins. Mycotoxins are produced by fungi, which wide spread in nature and therefore has the potential for appearing in most types of agricultural commodities.

Not all fungi are toxic, and those that are only produce toxin if environmental conditions like water activity, temperature, availability of oxygen and other conditions are right. If all the conditions are correct, they can enter the foods directly, for example as a result of growth on a cereal grain like corn or wheat. Mycotoxins can also enter the food chain indirectly as a result of using a contaminated food ingredient for animal food. In that instance, the mycotoxins may be passed on into animal products like milk and cheese.