

AMNESIC SHELLFISH POISONING



“The Mussel Gatherers”, oil on canvas, c. 1908, William Page Atkinson Wells

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Introduction

Amnesic (or encephalopathic) shellfish poisoning differs from most other neurotoxic marine poisoning because the main clinical effects are seen in the **CNS**, rather than in the peripheral nervous system.

Poisoning is caused by the neuroexcitatory amino acid, **domoic acid**.

Treatment is supportive.

Epidemiology

Although mass deaths of marine mammals and sea birds have been attributed to fish containing domoic acid there has been only one well documented human outbreak of amnesic shellfish poisoning. This occurred in Canada in 1987.

Domoic acid has been found in other places including the Pacific coast of Mexico, where it has caused massive poisoning of sea birds and mammals, and the coasts of Washington and Oregon in razor clams and Dungeness crabs.

Pathophysiology

Ingestion of mussels contaminated with **domoic acid** is the cause of amnesic shellfish poisoning.

Toxin

Domoic acid is heat stable, so is not destroyed by cooking.

It is an amino acid that has neuroexcitatory effects similar to the neurotransmitter glutamic acid.

This neuroexcitatory toxin appears to overstimulate cells without destroying them.

Organisms:

Algae of the genus *Nitzschia* is a diatom that produces domoic acid.

In an outbreak in Canada, the source of domoic acid was found to be *N pungens*, which was in extensive blooms in the region at the time.

Clinical features

Features observed in the Canadian outbreak that involved 107 cases in 1987, included the following:

1. Initial GIT upset:
 - Median onset time was 5.5 hours.
 - Vomiting, abdominal cramps, and diarrhoea.
2. At around 48 hours, central neurological features began to develop:
 - Headache

- Confusion
 - Loss of short term memory was prominent:
 - ♥ This feature was more prominent in older patients.
 - ♥ Severely affected patients had ongoing neurological abnormalities, including an anterograde amnesic syndrome with relative preservation of other cognitive functions.
 - Ophthalmoplegia
 - Mutism
 - Myoclonus/ seizures
 - Coma
3. CVS:
- Hypotension
 - Cardiac arrhythmias
4. Respiratory:
- Some had developed profuse respiratory secretions.

Some were lethal.

Investigations

Diagnosis in the first instance must be clinical.

Diagnosis is problematic, as there has only been limited experience with this type of shellfish poisoning.

However, amnesic shellfish poisoning is a possibility if there is a combination of gastrointestinal and encephalopathic features, particularly memory loss and confusion, after the ingestion of shellfish.

Toxin testing

A mouse bioassay and high performance liquid chromatography can be used to test for the presence of domoic acid in mussels.

CT Scan

This may be normal, but may need to be done to help exclude other possible causes of confusion.

EEG:

Electroencephalogram (if available) may show generalised, slow-wave activity.

Management

There is no specific treatment available, and so the patient is managed supportively.

Although animals have been protected from the effects of domoic acid when they are given kynurenic acid before domoic acid, further studies are needed before any human benefit can be ascertained.

References

1. Isbister GK, Kiernan MC. Neurotoxic marine poisoning. *Lancet Neurol.* 2005 April 4 (4): 219-28.
2. Perl TM, Bedard L, Kosatsky T, Hockin JC, Todd EC, Remis RS. An outbreak of toxic encephalopathy caused by eating mussels contaminated with domoic acid. *N Engl J Med* 1990; **322**: 1775–80.

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