

OVERVIEW

Hazard Characteristics

- There is no treatment for tetrodotoxin poisoning
- Lab acquired poisoning is extremely rare
- Heat resistant

Background Information Summary

Tetrodotoxin is a colorless or white crystalline solid or powder. It is found in the visceral organs (liver, kidneys, ovary, intestines) and skin of a variety of fish and amphibians and is produced by fish associated microorganisms.

Exposure in humans interferes with the transmission of signals from nerves to muscles and causes an increasing paralysis of the muscles of the body. Poisoning can be fatal. Exposure usually occurs through eating improperly prepared fish, or through contamination of other food. Lab associated poisonings are rare.

EXPOSURE AND HAZARD INFORMATION

Exposure Route	Symptoms	Immediate Actions after Exposure
Inhalation	Not a typical route of exposure. See ingestion symptoms for indication of poisoning.	• If inhaled exit and receive fresh air • Seek immediate medical attention
Oral/Ingestion	Main route of exposure: First stage: Numbness and sensation of prickling and tingling (paresthesia) of the lips and tongue, followed by facial and extremity paresthesias and numbness, headache, sensations of lightness or floating, profuse sweating (diaphoresis), dizziness, salivation (ptyalism), nausea, vomiting (emesis), diarrhea, abdominal (epigastric) pain, difficulty moving (motor dysfunction), weakness (malaise), and speech difficulties. Second stage: Increasing paralysis, first in the extremities, then in the rest of the body, and finally in the respiratory muscles; difficulty breathing or shortness of breath (dyspnea); abnormal heart rhythms (cardiac dysrhythmias or arrhythmia); abnormally low blood pressure (hypotension); fixed and dilated pupils (mydriasis); coma; seizures; respiratory arrest; and death.	• Do not induce vomiting • Seek immediate medical attention

Eyes/Mucous Membranes	Not a typical route of exposure. See ingestion symptoms for indication of poisoning.	• Flush with water or saline for a minimum of 15 minutes. • Seek immediate medical attention
Injection	Not a typical route of exposure. See ingestion symptoms for indication of poisoning.	• Seek immediate medical attention
Skin	Not a typical route of exposure. See ingestion symptoms for indication of poisoning.	• Remove contaminated clothing • Gently clean exposed area for a minimum of 15 minutes using copious amounts of soap and water. • Do NOT scrub the area • For intact skin exposure, seek medical attention as soon as possible if symptoms develop. • For non-intact skin exposure seek immediate medical attention.

Health Effects

Acute	• Hypothermia, hypotension due to vasodilatation, bradycardia, dysrhythmias, and asystole can occur. Hypertension, nausea, vomiting, diarrhea, vertigo, dizziness, headache, and blurred vision.
Chronic	• Patients who survive exposure usually recover without residual deficits.

Hazards and Exposure Limits

Physical Hazards	• Physical hazards are not established or determined.
Exposure Limits	• There are no established safe levels of exposure to tetrodotoxin. • Tetrodotoxin is considered a select agent in quantities of 10mg or greater.

Controls

Containment, and Engineering and Administrative Controls	• Handling of powder and solution preparation must be done in certified chemical fume hood or a class II type B2 biosafety cabinet.
PPE	• General: Chemical resistant gloves, lab coat, eye protection. • When handling dry powder, additionally an N95 respirator and static free nitrile gloves. • Thoroughly wash hands after gloves are removed.
Emergency Equipment	Showers and eyewash station must be readily available.

MEDICAL SURVEILLANCE

No medical surveillance is required, but individuals should be aware of signs and symptoms of poisoning.

TRAINING

General training required for any chemical use:

- Review of relevant information including fact sheets, SOPs, and SDS. This review should include training on hazards, symptoms of exposure, PPE, and emergency procedures.
- UW Lab Safety Training Series - New Employee Orientation, Regulated Waster Generator, and Laboratory Safety "Chemical Hygiene & GHS/OSHA

SIGNAGE AND RESTRICTED AREA INFORMATION

Where tetrodotoxin is in use, there shall be an established regulated area where entries and exits are strictly controlled for authorized individuals only.

Cage cards should specify that animals have been treated with tetrodotoxin and must indicate whether bedding or cages are considered contaminated (for a minimum of 72 hours after last administration).

ANIMAL METABOLISM OF CHEMICAL

Tetrodotoxin is excreted in the urine and feces of infected animals for 72 hours after administration.

DISINFECTION AND INACTIVATION

- Surfaces should be decontaminated with freshly prepared 10% bleach solution.
- Liquid waste should be decontaminated with fresh bleach to a final concentration of 10%. Allow at least 30-minute contact time.
- Contaminated glassware should be soaked with 10-20% bleach for at least 30 minutes prior to washing.
- Tetrodotoxin is heat stable and is not inactivated by steam autoclaving.

CAGE/HOUSING MANAGEMENT

- The first cage change should occur no sooner than 72 hours after last administration in a biosafety cabinet where possible, and an N95 must be worn if a BSC is not available.
- Use 10% bleach solution to thoroughly wet inside of cage and soiled bedding. Allow 30 minutes contact time prior to cage wash.
- Subsequent cage changes can be treated as non-hazardous waste.

WASTE DISPOSAL

- All waste must be disinfected with 10% bleach with a contact time of at least 30 minutes and disposed of as hazardous waste.
- Steam autoclaving does not inactivate tetrodotoxin.

SPILLS/RELEASES

- Liquid spills inside BSC or fume hood: Do not turn off hood. Cover spill with absorbent paper towels, apply 20% bleach solution, allow 30-minute contact time before bagging waste for disposal.
- Powder spills inside BSL or fume hood: Do not turn off hood, and don N95 respirator if not already being worn. Gently cover powder spill with dampened absorbent paper towels, taking caution not to produce aerosols. Apply 20% bleach solution and allow 30-minute contact time before bagging waste for disposal.
- Powder spill outside BSC or fume hood – evacuate area and restrict access. Inform PI or lab supervisor for spill clean up.
- For large spills or assistance/guidance with clean up, call the Regulated Material Management Center (RMMC) 766-3698 or 766-3697.

EMERGENCIES/MEDICAL GUIDANCE FOR EXPOSURES

- For accidental ingestion, contact Poison Control
- In case of medical emergency call 911, or seek attention immediately:
 - During business hours: Iverson Urgent Care is the occupational health provider, and it is available to assist in the arrangement of medical evaluation and treatment
 - After business hours: Emergency Room or Urgent Care
- Report all accidents, injuries, illnesses or exposures as soon as possible:
https://www.uwyo.edu/safety/procedures/incident-injury_reporting.html

CONTACT INFORMATION

Poison Control:	1-800-222-1222
Chemical Specialist:	Kevin Macartney: 307-766-6116
Occupational Health:	Bailey Wallace: 307-766-3203

Acknowledgment

This document was developed using adapted material from Colorado State University, with modifications to reflect institutional policies and procedures at University of Wyoming.