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**BIOLOGICAL AGENT REFERENCE SHEET**  
**Tetrodotoxin (TTX)**

### CHARACTERISTICS

| Natural Source | TTX naturally occurs in the skin, intestine and liver of some fish in the order *Tetraodontidae*. Examples include puffer fish, porcupine fish, ocean sunfish, and some species of newts and salamanders. |
| Laboratory Source | Isolated toxin |
| Characteristics | The toxin is a chemical with a molecular formula of C₁₁₁H₂₁₇N₂O₈. The formula weight is 319.27. TTX is a neurotoxin that blocks the flow of sodium ions in sodium channels. This blocks the conduction of nerve impulses. |

### HEALTH HAZARDS

**Route of Entry**  
Inhalation, ingestion, absorption, and injection

**Signs and Symptoms**  
Paresthesias, dizziness, gastrointestinal symptoms, and ataxia. Toxication can progress to paralysis and death within hours of ingesting the naturally occurring toxin.

**Toxicity Dose Data**  
Median LD₅₀ for humans is 334 μg/kg

### MEDICAL PRECAUTIONS / TREATMENT

**Diagnosis**  
No rapid diagnostic assays are currently available.

**Prophylaxis**  
None available

**Vaccines**  
None available

**Treatment**  
No antidote available. Administer supportive care (artificial respiration to support breathing).

**Emory Requirements**  
Report all exposures

### CONTAINMENT REQUIREMENTS

| BSL-2 | Most manipulations of TTX |
| BSL-3 | Large scale production of TTX or activities with a high potential for aerosol or droplet generation |

### SUPPLEMENTAL REFERENCES

- **BMBl: 5th Edition**  
- **Essentials of Toxicology**  
- **Guide to Hazardous Properties**  
- **Biological Safety: Principles & Practices**  

### SPILL PROCEDURES

**Small**  
Notify others working in the lab. Rinse gloves with decontamination solution and don new gloves. Cover area of the spill with paper towels and apply decontamination solution, working from the perimeter towards the center. Exit and keep others from entering the laboratory. Allow 1 hour of contact time before entering the laboratory without respiratory protection. Cleanup and dispose of spill materials.

**Large**  
Contact Emory's Biosafety Officer (404-727-8863), the EHSO Office (404-727-5922), or The Spill Response Team (404-727-2888).

### EXPOSURE PROCEDURES

**Mucous membrane**  
Flush eyes, mouth or nose for 15 minutes at eyewash station.

**Other Exposure**  
Wash area with soap and water for 15 minutes.

**Reporting**  
Immediately report incident to supervisor, complete an employee incident report in PeopleSoft.

### VIABILITY

**Decontamination**  
1.0 to 2.5% sodium hypochlorite

**Inactivation**  
Autoclaving is not an effective method of physical inactivation of TTX.

### PERSONAL PROTECTIVE EQUIPMENT (PPE)

**Minimum PPE Requirements**  
At minimum, personnel are required to don gloves, closed-toed shoes, lab coat, and appropriate face and eye protection prior to working with TTX. Additional PPE may be required depending on lab specific SOPs.

**Additional Precautions**  
Depending on the risk assessment, respirators may be required when working with TTX. Fit testing and training is required annually per Emory’s Respiratory Program: [http://www.ehso.emory.edu/content-manuals/RespiratoryProtectionProgram.pdf](http://www.ehso.emory.edu/content-manuals/RespiratoryProtectionProgram.pdf)

### ADDITIONAL REQUIREMENTS

**Regulatory Requirements**  
TTX is select agent and is regulated under the federal regulation 42 CFR Part 73. TTX is not regulated if the amount under the control of a principal investigator, treating physician or veterinarian, or commercial manufacturer or distributor does not exceed 100 mg, at any time. Possession of select agent toxins above the maximum amount without CDC registration is a criminal offense and punishable by up to five years in prison and/or $500,000 in fines. Please contact the Biosafety Officer if you do not have biosafety approval for working with TTX.