Biological Agent Reference Sheet (BARS)

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EMORY UNIVERSITY | Environmental Health and Safety Office
Research Administration

1762 Clifton Road, Suite 1200
Atlanta, Georgia 30322
(404) 727-5922
FAX: (404) 727-9778

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 $C_{11}H_{17}N_3O_8$. 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	Paresthaesias, dizziness, gastrointestinal symptoms, and ataxia. Toxication can progress to paralysis and death within hours of ingesting the naturally occurring toxin.
Toxicity Dose Data	Median LD_{50} 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	http://www.cdc.gov/biosafety/publications/bmbl5/
Essentials of Toxicology	Klaassen CD, Watkins JB. 2003. Casarett & Doull's Essentials of Toxicology. New York (NY): McGraw-Hill.
Guide to Hazardous Properties	Patnaik P. 2007. Guide to Hazardous Properties of Chemical Substances. 3rd Edition. Hoboken (NJ): John Wiley and Sons.
Biological Safety: Principles & Practices	Flemming DO, Hunt DL. 2006. Biological Safety: Principles and Practices. 4th Edition. ASM Press.

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.	
Medical Follow-up	7am-4pm (OIM): EUH (404-686-7941) EUHM (404-686-7106) WW (404-728-6431)	After Hours: OIM NP On Call 404-686-5500 PIC# 50464
	Needle Stick (OIM): EUH (404-686-8587) EUHM (404-686-2352)	Yerkes: Maureen Thompson Office (404-727-8012) Cell (404-275-0963)

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

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.