

BIOHAZARDOUS AGENT REFERENCE DOCUMENT

Diphtheria toxin (DT)

The Biohazardous Agent Reference Document (BARD) is a general guidance resource that reviews and summarizes the nature of a pathogen or biotoxin, and offers safety requirements for work with the agent in the laboratory. The BARD may replace the formal SOPs used in conjunction with some IBC registrations.

The BARD is provided as an additional guidance tool, and is not a substitute for a risk assessment, biosafety training, lab-specific training, or a formal [IBC master protocol registration](#). This document should be readily available in the laboratory, and it is the responsibility of the Laboratory Supervisor or Principal Investigator to ensure that all personnel have read, understood, and signed the document. The BARD is for informational purposes only, and is not intended to be a substitute for professional medical advice, diagnosis, or treatment. Please consult a health care provider for any medical questions or concerns.

INSTRUCTIONS

- 1. Review the information contained in this document.**
- 2. Add any necessary information that is specific to your work in the laboratory (such as strain-specific information). Please be sure that the track changes function is turned on to indicate any changes that you make.**
- 3. Instruct all personnel to review the BARD and sign the last page, indicating that they have read and understood the information.**
- 4. Submit the BARD along with your IBC master protocol registration, amendment, or continuing review.**

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CHARACTERISTICS

Morphology	Bacterial exotoxin that inhibits protein synthesis in eukaryotic cells
Characteristics	Natural source is <i>Corynebacterium diphtheria</i>

HEALTH HAZARDS

Host Range	Humans. Rarely: cows, cats, horses
Modes of Transmission	Inhalation, ingestion, mucous membrane contact, percutaneous
Signs and Symptoms	Cranial, motor, and sensory nerve palsies, fever, localized irritation, seizures, myocarditis, endocarditis, organ necrosis, death.
Lethal Dose (LD50)	In mice: 0.01 micrograms/kg (intravenous) or 1.0 micrograms/kg (subcutaneous, intraperitoneal)
Incubation Period	2 – 4 days for clinical disease

MEDICAL PRECAUTIONS / TREATMENT

Prophylaxis	Booster dose of diphtheria toxoid
Vaccines	Vaccination with booster recommended every 10 years (typically combined with tetanus & pertussis vaccines as Tdap and administered to young children)
Treatment	Administer antitoxin, treat symptomatically
Surveillance	Monitor for clinical disease symptoms
UVM IBC Requirements	Report any exposures or signs and symptoms to your supervisor
Additional Medical Precautions	

LABORATORY HAZARDS

Laboratory Exposures	33 cases of lab-acquired diphtheria infections reported as of 1976
Sources	Lyophilized toxin, exudates or secretions of the respiratory system, wounds, blood, or skin of infected animals

CONTAINMENT REQUIREMENTS

BSL - 2	Preparation/dilution of the agent, work with clinical specimens and cultures known or suspected to contain the agent
BSL - 3	
ABSL - 2	Administration of the agent to an animal model. Use mechanical or anesthetic restraint for injections.
ABSL - 3	
Aerosol generating activities	Centrifugation, homogenizing, vortexing or stirring, pipetting, pouring liquids, filling or expelling syringes
Primary containment device (BSC)	Use a biosafety cabinet for preparing stocks, and for all manipulations of DT

EXPOSURE PROCEDURES

Mucous membranes	Immediately flush eyes, mouth or nose for 15 minutes at eyewash station, seek medical attention.
Other exposures	Wash area with soap and water, seek medical attention.
Medical Follow-Up	Contact UVMHC Infectious Disease Dept. directly at (802) 847-2700 for immediate assistance
Reporting	Report all exposures or near misses to: <ol style="list-style-type: none"> 1. Your immediate Supervisor 2. The UVM Biosafety Officer at (802) 777-9471 and Risk Management at 6-3242 3. Risk Management and Safety; https://www.uvm.edu/riskmanagement/incident-claim-reporting-procedures

PERSONAL PROTECTIVE EQUIPMENT (PPE)

Minimum PPE Requirements	Nitrile gloves, lab coat, appropriate eye/face protection
Additional Precautions (Risk assessment dependent)	Sharps use strictly limited. Store DT locked up. Due to risk of inhalation, respirators may be required when working with DT. Medical clearance, fit testing and training is required annually per UVM's Respiratory Protection Program: https://www.uvm.edu/riskmanagement/personal-protective-equipment

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VIABILITY	
Disinfection	Freshly prepared 10% bleach with a 30 minutes contact time
Inactivation	Autoclaving at 121°C for 1 hour liquid cycle
Stability in Environment	Stable at room temperature and normal pressures

SPILL CLEAN UP PROCEDURES	
Small Spill	Notify others working in the lab. Allow aerosols to settle. Don appropriate PPE. Cover area of the spill with paper towels and apply approved disinfectant, working from the perimeter towards the center. Allow 30 minutes of contact time before clean up and disposal. Dispose in double biowaste bags and biobox.
Large Spill	<p>Inside of a lab: Call UVM Service Operations at 656-2560 and press option 1 to speak to a dispatcher. Ask them to page Risk Management and Safety.</p> <p>Outside of a lab: Pull the nearest fire alarm and evacuate the building. Wait out front of the building for emergency responders to arrive.</p>

REFERENCES	
Canadian PSDS	https://www.canada.ca/en/public-health/services/laboratory-biosafety-biosecurity/pathogen-safety-data-sheets-risk-assessment/corynebacterium-diphtheriae.html
BMBL	https://www.cdc.gov/biosafety/publications/bmbl5/
CDC Guidelines	https://www.cdc.gov/diphtheria/
Applied Biosafety	Johnson B, Mastnjak R, Resnick IG. 2001. Safety and Health Considerations for Working with Biological Toxins. Applied Biosafety. 6 (3): 117-135

STUDENT / EMPLOYEE NAME	SIGNATURE	DATE

Biosafety Review:

Jeff LaBossiere, Biological Safety Officer

Date

Principal Investigator: _____

IBC Registration #: _____