

FACT SHEET

Work with Biological Toxins

The University of Utah Institutional Biosafety Committee (IBC) reviews registrations for work with, possession of, use of, and transfer of acute biological toxins (mammalian LD50 <100 µg/kg body weight) or toxins that fall under the Federal Select Agent Guidelines, as well as the organisms, both natural and recombinant, which produce these toxins

Toxins Requiring IBC Registration

The following toxins require registration with the IBC. The list is not comprehensive. Any toxin with an LD50 greater than 100 µg/kg body weight, or on the select agent list requires registration. Principal investigators should confirm whether or not the toxins they propose to work with require IBC registration by contacting the EHS Biosafety Officer at biosafety@ehs.utah.edu or 801-581-6590.

- Abrin
- Aflatoxin
- Bacillus anthracis* edema factor
- Bacillus anthracis* lethal toxin
- Botulinum neurotoxins
- Brevetoxin
- Cholera toxin
- Clostridium difficile* toxin
- Clostridium perfringens* toxins
- Conotoxins
- Dendrotoxin (DTX)
- Diacetoxyscirpenol (DAS)
- Diphtheria toxin
- Domoic acid
- Pertussis toxin
- Pfeisteria* spp. toxin(s)
- Ricin
- Saxitoxin
- Shiga-like ribosome inactivating proteins
- Shigatoxin
- Staphylococcal* enterotoxins
- T-2 toxin
- Tetanus toxin
- Tetrodotoxin (TTX)

PIs or their delegates working with acute toxins must complete the General Laboratory Setup and Biological Registration Wizards in [BioRAFT](#). The information must be supplemented by completion of the Biological Toxin registration form, which can be found [here](#), and a hygiene Plan.

Laboratory Practices

Guidelines for working with biological toxins can be found in Appendix I of the Biosafety in Microbiological and Biomedical Laboratories (<http://www.cdc.gov/biosafety/publications/bmbL5/index.htm>). These are summarized below.

Routine operations with dilute toxin solutions are conducted using **Biosafety Level 2 (BSL2)** practices and these must be detailed in the IBC protocol and will be verified during the inspection by EHS staff prior to IBC approval.

All personnel working with biological toxins or accessing a toxin laboratory must be trained in the theory and practice of the toxins to be used, with special emphasis on the nature of the hazards associated with laboratory operations and should be familiar with the signs and symptoms of toxin exposure. This includes how to handle transfers of liquids containing toxin, where to place waste solutions and contaminated materials or equipment, and how to decontaminate work areas after routine operations, as well as after accidental spills. The worker must be reliable and sufficiently adept at all required manipulations before being provided with toxin. Laboratory work with toxins should be done only in designated rooms with controlled access and at pre-determined bench areas. When toxins are in use, the room should be clearly posted: "**Toxins in Use—Authorized Personnel Only.**"

Researchers working with a toxin should be vaccinated if a vaccine is available (e.g. diphtheria toxin, tetanus toxin). Routine operations with dilute toxin solutions are conducted using **BSL2** practices and facilities shall be used for activities involving biological toxins. These include:

- Biohazard signs and labels must be displayed in areas and on equipment where biological toxins are used and stored. This includes, but is not limited to, laboratory entrance doors, biological safety cabinets, chemical fume hoods, refrigerators, and freezers.
- Use a biological safety cabinet (BSC) or a chemical fume hood for resuspension of biological toxins or manipulations of stock solutions of toxins that can generate aerosols, such as pipetting, harvesting, infecting cells, filling tubes/containers, and opening sealed centrifuge canisters. When using an open-fronted fume hood or BSC, workers should wear suitable laboratory PPE to protect the hands and arms, such as laboratory coats, smocks, or coveralls and disposable gloves.
- Whenever possible, use needle-free techniques to resuspend biological toxins.
- If a quantity of powder-form toxin must be weighed, then the scale must be located in a certified chemical fume hood.
- When conducting liquid transfers and other operations that pose a potential splash or droplet hazard in an open-fronted hood or BSC, workers should wear safety glasses and disposable facemask, or a face shield.
- Toxin should be removed from the hood or BSC only after the exterior of the closed primary container has been decontaminated and placed in a clean secondary container. Toxin solutions, especially concentrated stock solutions, should be transported in leak/spill-proof secondary containers.

Centrifugation of cultures or materials potentially containing toxins should only be performed using sealed, thick-walled tubes in safety centrifuge cups or sealed rotors. The outside surfaces of containers and rotors should be routinely cleaned before each use to prevent contamination that generate an aerosol. After centrifugation, the entire rotor assembly is taken from the centrifuge to a BSC to open it and remove its tubes.

Personal Protective Equipment (PPE)

Work with biological toxins shall be conducted using BSL2 PPE:

- Disposable gloves – consider the use of double gloves for enhanced protection. Ensure your gloves are compatible with any solvent your toxin may be dissolved in.

- Lab coat or back-closing disposable gown
- Eye protection (safety glasses or goggles)

Decontamination and Spills

Toxin stability varies considerably outside of physiological conditions depending upon the temperature, pH, ionic strength, availability of co-factors and other characteristics of the surrounding matrix. Inactivation procedures should not be assumed to be 100% effective without validation using specific toxin bioassays.

Exposures

Antitoxins are available for some biological toxins and immediate medical “first-aid” interventions may help prevent or lessen the severity of the reaction. If you know or suspect a biological toxin exposure.

- Irrigate the site of exposure
 - If exposure was by needle stick or other route which breaks the skin, wash with soap and water for 5-15 minutes and cover with a bandage.
 - If exposure was by splash to eyes or mucus membranes, irrigate thoroughly for 15 minutes at an appropriate eye wash station.
- Report to your Laboratory Supervisor and the Biosafety Officer IMMEDIATELY. Seek medical attention as outlined in your laboratory specific safety manual.

For More Information See:

[The University of Utah Biosafety Manual.](#)

Visit the IBC website: IBC.Utah.edu
or contact EHS at 801581-6590

