

Acute Biological Toxins

Description

Acute Toxins of Biological Origin

Biological toxins are hazardous substances produced by microorganisms, animals, insects, and plants that can be harmful when inhaled, ingested, injected, or absorbed. Depending on the toxin and amount and route of exposure, health effects can range from minor (skin or eye irritation, headache, nausea) to severe (respiratory distress, muscle weakness, seizures, death).

Toxins with a mammalian lethal dose (LD_{50}) ≤ 100 $\mu\text{g}/\text{kg}$ body weight are considered acute toxins and pose the greatest risk. These toxins have no established safe exposure limits. Most acute toxins are stable proteins (or carbohydrates) requiring rigorous inactivation of contaminated surfaces, objects, and waste.

[su_spoiler style="fancy" icon="chevron" title=" High Risk Procedures when Handling Acute Toxins "]

- Aerosol or splatter generating procedures (e.g., vortexing, grinding, centrifuging, intra-nasal inoculation of animals).
- Utilization of concentrated stocks or large quantities of toxins: *beware that a vial could contain more than a LD_{50} for an average-sized person!* **Calculate in advance.**
- Work with powdered or dried toxins: potential for inhalation and a tendency for electrostatic attachment to gloves, weighing spatulas, etc.
- Use of needles or sharps.
- Reconstitution of lyophilized toxin.

[/su_spoiler] [su_spoiler style="fancy" icon="chevron" title=" Registration of Research Involving Acute Toxins "]
Reducing the risks associated with acute toxin work starts with the registration process.
Work cannot begin until project registration and SOPs have been approved by the Biosafety Office.

- All possession and use of acute toxin(s) must be registered with the Biosafety Office using the [Gator TRACS Biological Agent Registration](#). Toxins that require registration can be found on the [Acute Toxin Table](#).
- Projects involving the deliberate formation of recombinant or synthetic nucleic acid molecules containing genes encoding toxin molecules with an $LD_{50} < 100$ ng/kg body weight. This work must also be approved by the NIH Office of Science Policy and the UF Institutional Biosafety Committee (IBC) prior to initiation.
- Lab-specific acute toxin [Standard Operating Procedures](#) (SOP) must be submitted along with the acute toxin registration document.

If you have any additional questions, please contact the Biosafety Office at 352-392-1591 or bsso@ehs.ufl.edu.

[/su_spoiler] [su_spoiler style="fancy" icon="chevron" title=" Export Controlled Toxins "]
Several biological toxins are restricted for export by the U.S. Department of Commerce and require an export

license prior to any shipment out of the U.S.

- The list of toxins subject to export controls can be found on the [Bioagent Export Control List](#).
- All export-controlled toxins must be registered even if the LD₅₀ of the toxin is >100 µg/kg body weight.
- This allows the Biosafety Office to track what laboratories are in possession of export-controlled material in compliance with federal regulations.

[/su_spoiler] [su_spoiler style="fancy" icon="chevron" title=" Toxins Classified as Select Agents "] Some biological toxins are classified by the Federal Government as "[Select Toxins](#)" due to their potential to pose a severe threat to public health and safety.

- Possession, use, and transfer of these toxins is highly regulated.
- All select toxins must be registered by the Biosafety Office. Please see the [Select Agent page](#) for more information on registering this work.

Select toxins are not regulated if the amount possessed does not exceed, at any time, the exempt amounts indicated in the [Acute Toxin Table](#).

Even in permissible amounts, select agent toxins are subject to federal regulations for "[Due Diligence](#)" when transferring any amount of select agent toxin to another investigator or individual.

Due to concerns that someone might stockpile select toxins, the law requires that any transferor must ensure and document that the recipient:

- Is eligible to receive the select toxin.
- Has a legitimate need to handle or use such select toxins.
 - Because each PI must register the possession and use of acute toxins, including select toxins, the **transfer of select toxins to another UF PI must be approved in advance by the Biosafety Office**, who will verify as part of the registration process, that the recipient PI has a legitimate need to possess the material.
 - Transfer of select toxins **outside of UF must also be approved in advance** by the Biosafety Office. In addition to documenting the recipient's legitimate need, the Biosafety Office will assist with shipping the toxin (also strictly regulated).
- Provide the Biosafety Office with:
 - The recipient's identity information, including the recipient's name, institution name, address, telephone number, and email address.
 - The name of the toxin and total amount transferred.
 - The legitimate need claimed by the recipient.
- Transferors must report known or suspected violations of Federal law or suspicious activity related to select toxins to the Biosafety Office (bsa@ehs.ufl.edu; 352-392-1591), or federal authorities by contacting the Federal Select Agent Program (FSAP) at the CDC (LRSAT@cdc.gov ; 404-718-2000) or APHIS (DASAT@usda.gov; 301-851-2070).

[/su_spoiler] [su_spoiler style="fancy" icon="chevron" title=" References "]

- "Safety and Health Considerations for Conducting Work with Biological Toxins", Johnson,

Mastnjak, and Resnick; Applied Biosafety, 6(3) pp. 117-135, 2001

<http://webfiles.ehs.ufl.edu/ToxinArt.pdf>.

- Biosafety in Microbiological and Biomedical Laboratories (BMBL) 6th Edition, <https://www.cdc.gov/labs/BMBL.html>.

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Resources

- [Acute Toxins of Biological Origin Table](#)
- [Acute Toxins in Animals Fact Sheet](#)
- [Acute Toxin Standard Operating Procedure](#)
- [Select Toxins](#)