Mycotoxins

Mycotoxins are secondary metabolites produced by fungi that can cause illness in humans. Mycotoxins include some extremely potent carcinogens such as aflatoxin. Effects from exposure to mycotoxins could include serious acute effects as well as chronic effects such as malignancies.

General Safety considerations:

- There are a huge variety of known mycotoxins, with an equally large range of potentially lethal and sublethal effects.
- Because so many mycotoxins are potent carcinogens, it is extremely important to avoid exposures to any amounts of mycotoxins.
- Note that microbiology labs that handle cultures of fungal species, even if they are not purifying mycotoxins intentionally, must take precautions to avoid exposures to mycotoxins that might be present in the cultures.
- Exposure routes: These vary according to toxin type, but may include inhalation, ingestion, absorption and parenteral (through the skin).
- As with most other biological toxins, mycotoxins are generally acquired in powdered form. Dry forms of mycotoxins are **always** handled in a chemical fume hood or ducted certified biological safety cabinet. **Be extremely careful** when handling any amount of mycotoxins in dry form. Only order as much as you need to use in the immediate future, and resuspend the entire vial at once rather than weighing out aliquots.

Biosafety Protocol

At UW-Madison, research laboratories that utilize purified mycotoxins in their research programs must list information about use of those specific toxins in their Bio-ARROW protocol. Following is information about adding mycotoxins to specific sections of the Bio-ARROW protocol:

Microbes

- Microbes treated with mycotoxins are handled at BSL2 or (if applicable) BSL3.

Biological Toxins: Biological Toxins Details [the specific purified mycotoxin(s) must be identified]

- Select Agent: No
- Botulinum Toxin: No
- Biological Toxin Select Agent Inventory: Not applicable (or N/A)
- Amount: Estimated maximum amount you will have in your laboratory.
- Form: Enter all forms handled (dry/lyophilized, aqueous, etc.) and note if the dry/lyophilized form is only handled for reconstituting.
- LD_{50}: Enter estimated value
- Biosafety Level: BSL2
- Storage only: Select “yes” only if all of the mycotoxin in the laboratory is currently in storage and is not in active use in your research program.

Cells, Organs, Tissues, or Biological Specimens

- Cells and tissues are administered mycotoxins in containment in a biological safety cabinet at BSL2. Requests to handle mycotoxin outside of containment must be reviewed by the Office of Biological Safety and approved by the IBC.
- Treated cells or tissues are subsequently handled at BSL2.

Vertebrate Animals

- ASL2 housing is adequate for most animal studies involving mycotoxins. OBS staff will work with labs to determine the required biosafety level for these animals, and whether administration of mycotoxins to animals must occur in a BSC.

Containment

- Aerosol Generating Activities: Because of the potential acute and chronic effects from mycotoxins, they should be handled in containment (BSC or fume hood). Justification must be provided if the toxin will be handled outside of containment.
- Aerosol Generating Activities: Cage changes of rodents treated with mycotoxins should be performed in a biosafety cabinet.

PPE

- Lab coat, eye protection, and disposable gloves should be worn when handling mycotoxins.

Disinfection and Inactivation - Animal

- Because mycotoxins could potentially be present in bedding of mycotoxin-treated animals bedding should be autoclaved or otherwise treated to inactivate mycotoxins prior to disposal.
- Carcasses of animals injected with mycotoxins should not need to be autoclaved prior to pick-up for incineration unless they need to be autoclaved for a different reason (also infected with a Risk Group 3 pathogen, for instance).

Disinfection and Inactivation - General: Biotoxins

- Identifying efficacious inactivation methods for mycotoxins may not be a simple process. Safety Data Sheets and/or literature searches will likely be necessary.
- Because of the potential aerosol risk, spills of mycotoxins outside of containment should include evacuation of the lab for at least 30 minutes to allow dissipation of aerosols. Spills of mycotoxins can then be treated with effective chemical agents for at least 20 minutes after first covering the spill with absorbent material.

Spill and Release Procedures:

- Please note that the Biosafety in Microbiological and Biomedical Laboratories (BMBL), current edition, recommends the following PPE are worn during a cleanup for a liquid toxin spill: mask, gloves, safety glasses or goggles and laboratory coat.

Signage

- A "Toxins in Use" sign should be posted on the laboratory door when mycotoxins are being handled. The sign can be removed when no toxin is in use.
- Cage cards should specify that animals have been treated with mycotoxins

Emergency Response

- UW-Madison Occupational Medicine provides Medical Response plans for biological toxins and infectious agents through a link at https://ehs.wisc.edu/workplace-safety/occupational-medicine-2/.
- Emergency Response - General: In the event of exposure to mycotoxin, wash or flush the affected area with soap and water for 15 minutes. Use an eyewash for 15 minutes after a splash to the eye. After a needlestick, immediately remove gloves and "bleed out" the wound under running water for 15 minutes Consult University Health Services after an exposure to LPS. Report exposures as soon as possible to the PI and/or laboratory supervisor. Submit a First Report of Exposure/Release form as soon as possible, and within 24 hours.

Laboratory Training

- Individuals handling mycotoxins or working in a laboratory here mycotoxin is being handled need to receive training about potential risks from exposure to mycotoxins as well as safe handling of the toxins as outlined in the biosafety protocol.
- It is very important that training include the potential for both acute and chronic (particularly carcinogenic) effects from exposure to mycotoxins.
- A separate spill protocol specifically for SEB may be required.

Research Description

- Briefly describe what you will be doing with specific mycotoxins, including the estimated amounts utilized.
- Specify the location(s) and biosafety level(s) for research involving mycotoxin.
- Staff from the Office of Biological Safety (OBS) will review the potential exposure risks for research activities proposed with mycotoxin and may require additional PPE or modified handling practices prior to the start of the research.

Contacts and Additional Information

The sources listed may provide additional information about safe use of mycotoxins in research laboratories at UW-Madison:

- Office of Biological Safety (OBS); biosafety@fpm.wisc.edu, 608-263-2037
- Chemical Safety Department; chemsafety@fpm.wisc.edu, 608-265-5700
- Occupational Medicine; occmed@uhs.wisc.edu, 608-265-5610

- First Report of Exposure or Release Form; https://ehs.wisc.edu/first-report-of-biological-exposure-or-release-event/
- Bio-ARROW KnowledgeBase; https://kb.wisc.edu/arrow/ibc/page.php?id=43188