Background Information

Botulism is a rare but serious paralytic illness caused by a nerve toxin (Botulinum neurotoxin-BoNT) that is produced by the bacterium Clostridium botulinum and sometimes by strains of Clostridium butyricum and Clostridium baratti. Clostridia spp. are spore-forming, anaerobic, gram-positive bacilli that are commonly found in soil and water-body sediments. Under certain conditions spores may germinate into bacilli that can produce toxin. These conditions most often occur with improperly canned foods; foodstuffs that are stored for prolonged periods and ingested without prior cooking; and contaminated wounds, especially those associated with heroin use. Clostridium botulinum produces eight serologically distinct botulinum toxin types (A–H). Of these, naturally occurring botulism in humans is caused primarily by toxin types A, B, or E, and rarely by F. The principal site of action of this toxin is the neuromuscular junction, where blockade of nerve transmission produces muscle weakness or paralysis.

Botulinum toxin is defined as a Tier 1 Select Agent by the CDC and USDA. BoNT is not regulated if the aggregate amount under the control of a principal investigator does not exceed, at any time, 0.5 mg.

Risk of laboratory exposure is due to the presence of the toxin and not due to a potential of infection from the organisms that produce the toxin.

Exposure Incident: Exposure to botulinum neurotoxin may occur via needle stick, ingestion (mouth), contact with mucous membranes (mouth, nose, eyes), absorption through non-intact skin (i.e. skin wound) and inhalation (lungs).

Reporting Exposure Incidents: All exposure incidents must be reported immediately to the Principal Investigator, Supervisor, and the Biosafety Officer.

Pre-exposure Health Screening

All employees will be educated on the risks of working with Botulinum toxin and symptoms of exposure by the Principal Investigator, Biosafety Officer, or Occupational Health Professional prior to any individual beginning work with or around this agent.

Before an Exposure Incident Occurs

Currently there is no vaccine available for immunization of laboratory personnel working with botulinum toxin or cultures of botulinum neurotoxin producing species of Clostridium. CDC discontinued distribution of the Pentavalent (ABCDE) Botulinum
Toxoid vaccine in 2011 due to decline in potency and observed increase in moderate local reactions.

**After an Exposure Incident Occurs: Immediate Action by Route of Exposure**

*Needle stick:* Wash the area with soap and running water. Do not apply bleach, alcohol or other disinfectant to the skin.

*Mucous membranes (eye, nose, mouth):* If contaminated material is splashed or sprayed into the face contaminating the eyes, nose or mouth: flush the eyes for 10-15 minutes, rinse mouth out with clean water and be sure not to swallow, and wash down face being sure that the nasal cavities have been rinsed as much as possible.

*Inhalation:* If contaminated materials are aerosolized outside of primary containment and potentially inhaled, rinse mouth twice expelling the rinsate, do not swallow.

*Contact with intact skin and clothing:* Remove contaminated clothing using gloves either discard as biological or medical waste or autoclave prior to laundering and re-use. Wash contaminated skin with soap and water.

**After an Exposure Incident Occurs: Medical Evaluation and Follow-up:**

*Post-Exposure Treatment:* An equine antitoxin product is available for treatment of patients with symptoms consistent with botulism.

If any individual working with or around Botulinum toxin develops signs or symptoms suggestive of exposure to Botulinum toxin, they must inform their Principal Investigator and Biosafety Officer immediately. The individual must notify the TCSVM Occupational Medical Clinic or Emergency Response Call Center-ERCC 866-360-8100 (Grafton), Tufts MC Employee Health (Boston), or Mt. Auburn Hospital Occupational Health Group (Medford).

If the exposed individual requires immediate medical attention (especially after inhalation and injection of toxin) call Tufts Police 6-6911.

**Signs and Symptoms**

The classic symptoms of botulism include double vision, blurred vision, drooping eyelids, slurred speech, difficulty swallowing, dry mouth, and muscle weakness. These are all symptoms of the muscle paralysis caused by the bacterial toxin. If untreated, these symptoms may progress to cause paralysis of the respiratory muscles, arms, legs, and trunk. The respiratory failure and paralysis that occur with severe botulism may require a patient to be on a breathing machine (ventilator) for weeks or months, plus intensive medical and nursing care. Botulism can result in death due to respiratory failure; the proportion of patients with botulism who die is 3-5%. 
Exposure to concentrated preparations of botulinum toxin might warrant hospitalization and administration of botulinum antitoxin, which is available from CDC; decisions about antitoxin use are made on a case-by-case basis in consultation with CDC.

Massachusetts Department of Public Health (MDPH) regulations (105 CMR 300.000) stipulate that botulism is reportable to the Local Board of Health (LBOH).