Exposure Response Plan for the Laboratory Handling of *Francisella tularensis*

**Background Information**

*Francisella tularensis* is a Risk Group 3 gram-negative, non-motile coccobaccillus, non-sporulating, aerobic bacteria. It is classified as a Select Agent and has the potential to pose a severe threat to public health and safety. The Centers for Disease Control and Prevention (CDC) Division of Select Agents and Toxins (DSAT) under the provisions of the Public Health Security and Bioterrorism Preparedness and Response Act of 2002 regulate the possession, use, and transfer of *F. tularensis*.

The infectious dose for humans is 5–10 organisms by the respiratory route or \(10^6 - 10^8\) organisms by ingestion. Inhalation of *F. tularensis* can lead to pulmonary tularemia. The type B strains have a fatality rate of 5–15% while the type A strains have approximately 35% mortality from pulmonary tularemia. *F. tularensis* can survive in animal carcasses and organs up to 133 days and in water up to 90 days.

*F. tularensis* is transmitted through direct contact of skin (bacteria are able to pass through unbroken skin) or mucous membranes with infectious materials, accidental parenteral inoculation, ingestion, and exposure to aerosols and infectious droplets. It can be transmitted through arthropod and animal bites. It is not directly transmitted from person-to-person.

Between 1975 and 2001, Massachusetts has reported two or fewer cases of tularemia annually, with the exception of outbreaks 1978 and 2000. In 1978 cluster of primary pneumonic tularemia in the United States occurred on Martha's Vineyard, with seven cases among the residents of a single cottage. No definitive cause for those cases was determined, but it was suspected an infected wet dog aerosolized Tularemia by shaking itself dry inside the cottage. In 2000, nine cases of primary pneumonic tularemia were reported on Martha's Vineyard. Lawn mowing and brush cutting were the key risk factors for those nine cases.

**Exposure Incident:** Laboratory acquired infections (LAIs) can be acquired through percutaneous exposure, mucus membrane exposure, animal bite, needle stick, broken glass, or inhalation of aerosols. The incidence of tularemia in laboratory personnel is the third most commonly reported LAI and almost all cases involved tularemia research. There are fewer LAI related to work with infected animals and their ectoparasites. There have been 225 cases reported up to 1976 with 2 known deaths. *F. tularensis* cultures have been more commonly associated with infection than clinical materials and infected animals.
In November 2004, Boston University had three cases of tularemia that occurred in a laboratory believed to be working with the Live Vaccine Strain (LVS) of *F. tularensis*. Laboratory testing by the CDC showed that the LVS stock used by the researchers was contaminated with Type A tularemia, a wild-type, virulent form of the organism.

**Reporting Exposure Incidents:** Report all exposures to the Principal Investigator/lab supervisor and seek immediate medical guidance from Occupational Medicine Clinic or the Exposure Response Call Center (866-360-8100). Medical evaluations and help with clean up can be obtained by calling x6-6911 (from outside lines 508-839-5303). Whenever there is an accident or incident involving *F. tularensis*, the Biosafety Officer must be immediately notified.

**Pre-exposure Health Screening:**

All persons will be educated of the risks of working with *F. tularensis* and symptoms of exposure by the TCSVM Occupational Medicine Clinic.

**Before an Exposure Incident Occurs:**

Live attenuated vaccines available from CDC for occupational risk groups.

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

- **Needle stick, Animal Bite or Laceration:** Wash the area with soap and running water for at least 15 min. 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 faces contaminating the eyes, nose or mouth: flush the eyes for 15 minutes, rinse mouth out with clean water and be sure not to swallow, wash down face being sure that the nasal cavities have been rinsed as much as possible, and shower out of the laboratory. PPE and clothing should be considered contaminated and disposed or treated appropriately.

- **Inhalation:** There is no action to reduce lung and upper respiratory system exposure. Shower out of the laboratory and report the exposure to the Supervisor/Principal Investigator and the Biosafety Officer. Centrifuge accidents or incidents will be considered an inhalation exposure until investigated by BSO and ruled otherwise.

- **Contact with intact skin and clothing:** Remove contaminated clothing using gloves and place objects in plastic bags and dispose of as biological or medical waste. Wash contaminated skin with soap and water for 15 minutes and shower out of the laboratory.

**After an exposure incident occurs: medical evaluation and follow-up:**
Following immediate post-exposure actions, the exposure incident must be reported to the Supervisor/Principal Investigator and the Biosafety Officer. The exposed person must contact the TCSVM Occupational Medical Clinic which will arrange for medical evaluation, diagnosis, and treatment if indicated.

Individuals must contact the BSO and TCSVM Occupational Medical Clinic prior to receiving emergency medical care for Tularemia symptoms. Tularemia is slow acting and not directly transmitted from person-to-person. They will arrange and coordinate for treatment at a nearby Emergency Room for emergency medical care to ensure that treating physicians are fully informed of the individual’s occupational health condition.

Signs and Symptoms of Disease:

The incubation period for Tularemia is 1–14 days, but usually occurs in 3–5 days. *F. tularensis* may be found in blood during first two weeks of disease and in lesions for a month. All infected individuals often have sudden onset of pain and fever, which can be as high as 104°F. The fever can last up to 3–6 weeks without treatment.

The following list identifies the signs symptoms of Tularemia based upon the route of infection.

- **Ulcero glandular** This is the most common form of tularemia and usually occurs following a tick or deer fly bite or after handling of an infected animal. A skin ulcer appears at the site where the organism entered the body. The ulcer is accompanied by swelling of regional lymph glands, usually in the armpit or groin.

- **Glandular** Similar to ulceroglandular tularemia but without an ulcer. Also generally acquired through the bite of an infected tick or deer fly or from handling sick or dead animals.

- **Oculoglandular** This form occurs when the bacteria enter through the eye. This can occur when a person is butchering an infected animal or touches their eyes. Symptoms include irritation and inflammation of eye and swelling of lymph glands in front of the ear.

- **Oropharyngical** This form results from eating or drinking contaminated food or water. Patients with orophyangeal tularemia may have sore throat, mouth ulcers, tonsillitis, and swelling of lymph glands in the neck.

- **Pneumonic** This is the most serious form of tularemia. Symptoms include cough, chest pain, and difficulty breathing. This form results from breathing dusts or aerosols containing the organism. It can also occur when other forms of tularemia (e.g. ulceroglandular) are left untreated and the bacteria spread through the bloodstream to the lungs.

Post-exposure prophylaxis:

After exposure or if symptoms develop, the exposed person will be monitored by a physician trained in infectious diseases.
If an employee develops signs and symptoms compatible with tularemia in the absence of an exposure incident and appropriate travel history, the PI and Biosafety Officer shall be notified immediately. The infection will be considered laboratory-acquired until proven otherwise.

Massachusetts regulation classifies *F. tularensis* as a reportable disease and infections will be reported to the Local Board of Health and to the Massachusetts Department of Public Health by the attending physician or the clinical laboratory diagnosing or identifying the infection. The Responsible Official must report exposure to CDC DSAT.