Tufts University / Tufts Medical Center

Exposure Response Plan for the Laboratory Handling of *Toxoplasma gondii*

**Background Information**

*Toxoplasma gondii* is an obligate intracellular parasite that causes the disease toxoplasmosis. The sexual part of the lifecycle takes place in domestic and wild cats. Asexual reproduction can occur in any mammal. The infectious dose is not known. Infection occurs when oocysts from feline feces or contaminated water or, more commonly, tissue cysts from undercooked meat are ingested. When oocysts or tissue cysts are ingested, the parasite replicates rapidly and is disseminated throughout the body via macrophages (this stage of the parasite is referred to as the tachyzoite stage). The immune response controls this stage of the infection, and the parasite forms the latent bradyzoite stage in the tissues including the brain. The host will remain latently infected for life, but immune to repeat infection. Bradyzoite cysts can be reactivated in severely immunocompromised individuals. Complications from infection during pregnancy occur only when *Toxoplasma* is contracted for the first time during the pregnancy.

Approximately 15-20% of the population in the US harbor latent infection, in France, 90% of the population is seropositive. Because this infection is easily acquired from the environment, and is commonly asymptomatic, the only way to confirm laboratory infection is to demonstrate seroconversion.

**Exposure Incident:** Oocysts or tissue cysts: any exposure of the agent to the eyes, nose or mouth, inhalation of aerosols. Tachyzoites or tissue cysts: Parenteral exposure.

**Reporting Exposure Incidents:** All exposure incidents must be reported immediately to the supervisor. *Toxoplasma strains that are avirulent for mice are still infectious for humans.*

**Pre-exposure Health Screening:**

All employees will be educated by the PI or Occupational Health Professional of the risks of working with *Toxoplasma* and symptoms of exposure prior to any individual beginning work with or around this agent.

All immunocompromised employees who might potentially be exposed to *Toxoplasma* during routine work should be advised to self-identify to Employee Health Clinic (Boston) or Occupational Medical Clinics (Grafton/Medford) for further evaluation and discussion of the specific risks associated with immunodeficiency and exposure to *Toxoplasma.*

Women who first become infected during or just before pregnancy can pass infection to the unborn child. This transmission may result in abortion, stillbirth, and severe central nervous
system and eye problems. Women wishing to conceive or those pregnant should avoid working with this agent.

**Before an Exposure Incident Occurs:**

Immunization for *Toxoplasma* is currently not available.

**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. Do not apply bleach, alcohol or other disinfectant to the skin. *For infection to occur due to this type of exposure, oocysts must be ingested or inhaled. However infection could occur by this route if the investigator is working with tachyzoites or tissue cysts.*

**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. Be sure not to swallow. Wash down the 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 and place objects in plastic bags and dispose of as biological or medical waste. Wash contaminated skin with soap and water. *Again, for infection to occur due to this type of exposure, oocysts or tissue cysts must be ingested or inhaled, and tachyzoites would need to be injected. Use caution if clothing is removed over the head.*

**After an exposure incident occurs: medical evaluation and follow-up:**

Following immediate post exposure actions contact the Tufts Medical Center Employee Health Clinic (Boston), TCSVM Occupational Medical Clinic (Grafton) or the Mt. Auburn Occupational Health Services (Medford) and arrange for medical evaluation, diagnosis and treatment if needed.

During this medical evaluation, the exposed individual may be educated on the signs or symptoms of toxoplasmosis, and instructed to watch for the development of these signs and symptoms.

**Signs and Symptoms of Toxoplasmosis include:**
In the immunocompetent individual: Most people have an asymptomatic infection. Some will have mild flu-like symptoms with swollen lymph nodes or muscle aches. People with ocular infections can have reduced or blurred vision, pain, redness or tearing.

In the immunocompromised individual: Neurological complications may occur due to reactivation of bradyzoite cysts in the brain, headache, fever, myocarditis (abnormal heart beat), chest pain, and shortness of breath are possible.

Diagnosis of infection is typically made by serologic testing for anti-toxoplasma antibodies. In immunocompromised individuals with neurologic signs, a CAT scan can demonstrate brain lesions from the re-activated cysts.

Post-exposure prophylaxis:

There is currently no routine post exposure pre-symptom prophylaxis for toxoplasmosis. In otherwise healthy people, treatment may not be needed. A health care provider may decide to initiate presumptive therapy.

If any individual working with or around *Toxoplasma* develops signs or symptoms suggestive of exposure to toxoplasmosis, they must inform their PI and Biosafety Officer immediately. Signs and symptoms usually develop within 5-25 days of exposure. The individual must be evaluated at Tufts Medical Center Employee Health (Boston), must notify the TCSVM Occupational Health Nurse who will refer the individual to an Infectious Disease specialist (Grafton), or a physician at Mt. Auburn Hospital Occupational Health Group (Medford).

Massachusetts Department of Public Health classifies toxoplasmosis as a reportable disease and must be reported to the Local Board of Health immediately by the attending physician. In accordance with Massachusetts regulation, any clinical laboratory identifying an infection caused by *Toxoplasma* may be reported to the Massachusetts Department of Public Health in accordance with disease-reporting regulations.

If an employee develops signs and symptoms associated with *Toxoplasma* exposure in the absence of an exposure incident, the PI and Biosafety Officer should be notified immediately. However, laboratory acquired infection can only be confirmed by documenting seroconversion.