Exposure Response Plan for the Laboratories Handling Cryptococcus neoformans

Background Information

*C. neoformans* is a dimorphic fungus. Infection is caused by the yeast form and its associated polysaccharide capsule. The capsule can be visualized with India ink and plays an important role in agent pathogenicity. Serotypes are based on capsular reaction; A, B, C, D and hybrid A/D. Serotypes A and D are generally responsible for opportunistic infections while B and C may infect immunocompetent individuals. Serotype A is responsible for about 95% of cryptococcosis cases worldwide and is implicated in a majority of the AIDS co-infections. Yeast cells may remain dormant in the body, particularly if one is immunocompetent. This is termed a latent infection. Mortality of symptomatic disease in developed nations is around 12%. Untreated brain infections can be fatal.

In nature, spores or desiccated yeast cells are inhaled. Pulmonary infection disseminates most commonly to the brain and skin. The infectious dose is unknown. Host range includes humans as well as domestic and wild animals (eg. cats and birds). Direct transmission from animals to humans is unproven. Transplant transmission has occurred. In nature, soil and bird excrement are hazards.

*Exposure Incident:* Laboratory acquired infections may result from inhalation, accidental parenteral inoculation or bites from infected lab mice. Accidental percutaneous exposure is the most commonly cited LAI route while eye infections related to surgical procedures have been documented. If you work with or around this agent, make your healthcare provider aware of this.

*Reporting Exposure Incidents:* Report all exposures to the Principal Investigator/lab supervisor and seek immediate medical evaluation. If help is needed with injuries or clean up, members of the University will contact the Police at 6-6911 and members of the Medical Center will contact Security at 6-5100. Whenever there is an accident involving *Cryptococcus*, the Biosafety Officer must be notified.

*Pre-exposure Health Screening:*

Prior to beginning work with or around *Cryptococcus*, the PI or an Employee Health Professional will inform each person of the risks s/he takes and of the symptoms s/he may experience following exposure. Serotype(s) planned for laboratory use will be identified.

*Before an Exposure Incident Occurs:*
A FDA approved vaccine for *Cryptococcus* is not available. Some carbohydrate based vaccines are in human clinical trials. The most promising conjugates a portion of the capsule to the tetanus toxoid vaccine.

All immunocompromised employees who might potentially be exposed to *Cryptococcus* 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 *Cryptococcus*. The following diseases and medications are risk factors for *Cryptococcus* infection and are associated with at least some degree of immunosuppression:

- HIV/AIDS
- Corticosteroids
- Solid organ transplantation
- Diabetes mellitus
- Heart, lung or liver disease
- Pregnancy

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

*Needlestick, Animal Bite or Laceration:* Wash the area with soap and running water.

*Mucous membranes (eye, nose, mouth):* If contaminated material is splashed or sprayed contaminating the eyes, nose or mouth: Flush the eyes for 10-15 minutes. Rinse mouth out with clean water and do not swallow.

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

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

Following immediate post exposure actions, contact the TMC 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 appointment, the exposed individual will be informed of the signs and symptoms of cryptococcosis, and will be instructed to watch for the development of these signs and symptoms. Diagnosis of an infection can be made by microscopic examination and/or tissues or bodily fluids. The incubation period is unknown. The agent can colonize the respiratory tract for months to years without causing clinical symptoms.

**Signs and Symptoms of Cryptococcosis include:**

- Pneumonia like illness (shortness of breath, cough and fever)
- Meningitis (persistent headache, nausea, dizziness, impaired memory and judgment)
• Skin lesions which commonly begin painlessly and have a variety of presentations.

**Post-exposure prophylaxis:**

Pre-symptom prophylaxis for cryptococcosis is not routinely given to immunocompetent persons.

Immunocompromised persons may receive antifungal prophylaxis as determined by a HCP.

Massachusetts Department of Public Health classifies cryptococcosis as a reportable disease. Any clinical laboratory identifying an infection caused by *C. neoformans* 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 *C. neoformans* exposure in the absence of an exposure incident, the PI and Biosafety Officer shall be notified immediately. Infection will not be considered laboratory-acquired until proven otherwise.