McMaster University
Medical Monitoring Program Information Sheet

The purpose of this document is to provide information on an agent/virus in order for all McMaster University staff and students to make an informed decision about entering our medical monitoring program.

Please review this document, print your name, sign and date the Memorandum of Understanding and Agreement and then provide it to your supervisor.

**Cryptococcus Neoformans**


**TRANSMISSION:** Spores are inhaled

**DISINFECTANTS:** C. neoformans is effectively killed by 70% ethyl alcohol and is susceptible to phenolic compounds, formaldehyde, glutaraldehyde, iodosphors, and sodium hypochloride (1%)

**INACTIVATION:** Photodynamic therapy (PDT), which combines methylene blue (MB) with a low-power red laser can inactivate C. neoformans. PDT can be performed using 150 μM MB and 100mW red laser with a florescence at 180J/cm² for 9 min. C. neoformans can be inactivated by UV, microwave, gamma radiation, moist heat (121°C for at least 20 min), and dry heat (165-170°C for 2 h

**LABORATORY ACQUIRED INFECTIONS:** There is 1 reported case of laboratory exposure to C. neoformans from a laceration by a contaminated scalpel blade. There are 2 reported cases of eye infections related to surgical procedure from C. neoformans: Cryptococcosis from a needle puncture to the thumb during blood collection from an AIDS patient with cryptococcal fungemia and two percutaneous cryptococcal inoculations from needlestick have been reported.

**HAZARDS:** Inhalation of basidiospores and desiccated yeast cells could be infectious for the lab workers and should be regarded as potentially serious airborne hazards. Accidental parenteral inoculation of infectious materials may also occur. Bites from infected lab mice and manipulation of infectious environmental materials (e.g. pigeon dropping) may be a potential hazard

environmental materials (e.g. pigeon dropping) may be a potential hazard

**RISK GROUP** Risk Group 2

**CONTAINMENT** Containment Level 2 facilities, equipment, and operational practices for work involving infectious or potentially infectious materials, animals, or cultures. Lab coat. Gloves. Eye protection must be used where there is a known or potential risk of exposure to splashes.
procedures that may produce aerosols, or involve high concentrations or large volumes should be conducted in a biological safety cabinet (BSC). The use of needles, syringes, and other sharp objects should be strictly limited.

DISPOSAL: Decontaminate all wastes that contain or have come in contact with the infectious organism by autoclave, chemical disinfection, gamma irradiation, or incineration before disposing.

STORAGE: The infectious agent should be stored in leak-proof containers that are appropriately labelled.

The following summary is provided by Employee Health Services.

For a complete copy of the excerpted text below please refer to:

**Facts**

*C. neoformans* causes various diseases in immunocompromised and immunocompetent hosts. Diseases include meningoencephalitis (77.2%), pulmonary cryptococcosis (mostly in immunocompromised hosts, 8.2%), and several other diseases. Disseminated cryptococcosis is a complication and may occur in 91.8% of cases. Cryptococcosis may be fatal if untreated. Spores or desiccated yeast cells of *C. neoformans* enter the host respiratory tract by inhalation. Serotypes A and D are opportunistic pathogens while serotypes B and C may infect immunocompetent individuals. Pulmonary infection disseminates most commonly to the brain and the skin. *C. neoformans* can cause systemic infection, including fatal meningitis (meningoencephalitis) in normal, diabetic, and immunocompromised hosts. The infection from *C. neoformans* in the brain can be fatal if untreated. *C. neoformans* may be found in soil, bird guano, blood, urine, and specimens from bone marrow, brain, CSF, eye, respiratory sites, skin, and mucous membranes.

**Symptoms**

CNS infection: Cryptococcosis of the CNS presents mostly in the form of acute, subacute, and chronic meningitis, with symptoms of persistent headache, nausea, dizziness, ataxia, impaired memory and judgment, irritability, somnolence, clumsiness, and confusion. Patients may or may not have fever, and most have minimal or no nuchal rigidity. As the disease progresses, seizures may occur. CNS infection may also present as a brain abscess (cryptococcomas), subdural effusion, dementia, isolated cranial nerve lesion, spinal cord lesion, and ischaemic stroke. If cryptococcal meningitis occurs, mortality rate is between 10-30%.

Respiratory infection: Pulmonary cryptococcosis may present as cough, dyspnea, blood-streaked sputum, and a dull ache in the chest. Other respiratory system infections include pneumonia,
cavitation, endobronchial masses, empyema, nodules, sinusitis, mediastinitis, bronchiolitis obliterans, and pneumothorax.

Cutaneous infection: Skin lesions may be single or multiple and commonly begin as painless lesions of the face or scalp. Skin lesions may take the form of erythematous or umbilicated papules, pustules, acneiform lesions, indurated plaques, palpable purpura, soft subcutaneous masses, sinus tracts, cellulitis, vesicles, or large ulcers with undetermined edges.

Rarer presentations include lymphadenitis, pancreatitis, hepatitis, peritonitis, oesophagitis, osteomyelitis, septic arthritis, myositis, endophthalmitis, papilloedema, optic nerve atrophy, pyelonephritis, prostatitis, endocarditis, fungaemia, myocarditis, pericarditis, Cushing’s syndrome, adrenal insufficiency, adrenal mass lesions, and thyroiditis.

**Diagnosis**
Monitor for symptoms and confirm by culture and histopathology and serologically.

**Treatment**
Give appropriate antifungal therapy. No immunization is currently available; however, some vaccines are currently in clinical trials, including GXM conjugated to tetanus toxoid vaccine, which has been shown to be effective in immunocompetent individuals in clinical trials. HIV patients may receive antifungal therapy such as fluconazole when no symptoms of infections are present.

**Prevention**
Lab coat. Gloves when direct skin contact with infected materials or animals is unavoidable. Eye protection must be used where there is a known or potential risk of exposure to splashes. All procedures that may produce aerosols, or involve high concentrations or large volumes should be conducted in a biological safety cabinet (BSC). The use of needles, syringes, and other sharp objects should be strictly limited. Additional precautions should be considered with work involving animals or large scale activities. To prevent C. neoformans infections, people who have weakened immune systems should avoid areas contaminated by bird droppings, and should avoid contact with birds.

---

**Memorandum of Understanding and Agreement ("MUA") for BSL2 Medical Monitoring Program**

**Note:** This MUA is to be signed by the employee/student and supervisor, filed and kept by the supervisor. It will be reviewed during the annual biosafety audit by the McMaster Biosafety office.

The employee/student named below acknowledges and agrees as follows:

- I have read and understand all of the information in this Medical Monitoring Information Sheet provided jointly by the McMaster Biosafety Office and Employee Health Services
and reviewed the biologically hazardous agent to which I have potential exposure.

Initial here____

• I will report a pregnancy or a compromised immune system (due to medication {steroid or other immunosuppressive therapy}, organ transplant, chemotherapy or radiation therapy, HIV infection etc.) to my supervisor and X (graduate students) or Employee Health Services Occupational Health Nurse at ext. 20310 (faculty and staff) Initial here____

• I will report an exposure to a biological agent to my supervisor immediately and complete a McMaster incident/accident report. Initial here____

• I will report any illness that resembles the symptoms listed in this Medical Monitoring Information Sheet to my supervisor. Initial here____

• I recognize my responsibility to observe all safety practices and precautions while present in the BSL2 laboratory. Initial here____

• I am aware of, and wish to participate in, the medical monitoring program (RMM #605) for this biological level 2 agent. Please circle: [yes] [no] Initial here____

Employee/Student print name: ________________________________

Supervisor print name: ________________________________

Signature: ____________________________________________

Signature: ____________________________________________

Date: ____________________________________________

Date: ____________________________________________