Exposure Response Plan for the Laboratory Handling of Eastern Equine Encephalitis Virus

Background Information

Eastern Equine Encephalitis (EEE) Virus is a CDC Select Agent that causes what is commonly called sleeping sickness (not to be confused with the disease African trypanosomiasis). EEE is a small enveloped virus consisting of a single strand of RNA, typical of an alphavirus belonging to the family Togaviridae. It is an infectious virus. One mosquito bite can cause disease. Person-to-person transmission has not been reported.

EEE Virus, like all other alphaviruses has a positive sense single stranded RNA genome. Thus its viral RNA, being similar to mRNA, can be immediately translated by the host cell.

There are two forms of the disease; systemic and encephalitic. Persons with the encephalitic form, or central nervous system involvement, have a 35% fatality rate and 50% have permanent neurological damage. The incubation period ranges from 2 to 10 days post exposure. The natural route of transmission is via mosquito bite; however, the virus is highly infectious by the aerosol route and laboratory acquired infections have been documented.

The natural EEE reservoirs are birds and mosquitos; humans and horses are accidental hosts. In 1831 EEE was first recognized in horses in Massachusetts. In 1938, the first confirmed human cases were identified in the northeastern United States.

Exposure Incident: Laboratory acquired infections (LAIs) can be acquired through parenteral inoculation, contact of the virus with broken skin or mucus membranes, bites of infected animals or arthropods, or aerosol inhalation. Laboratory acquired infections, including asymptomatic cases, have been documented.

Reporting Exposure Incidents: Report all exposures to the Principal Investigator/lab supervisor and seek immediate medical evaluation. After an exposure, if help is needed with injuries or clean up contact Tufts University Police Department at x6-6911 (from outside lines 508-839-5303). Whenever there is an accident or incident involving EEE, the Biosafety Officer must be notified.

Pre-exposure Health Screening:

Prior to beginning work with or around EEE, 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. All persons working with this agent must be screened by Occupational Health. People over the age of 50 have a greater risk of developing severe disease.

**Before an Exposure Incident Occurs:**

A FDA licensed vaccine is not available for use in humans. A formalin-inactivated vaccine may be available on an IND basis at USAMRIID. The Institute has used the IND vaccine for over 30 years. Humans develop neutralizing antibody following vaccination or infection. Recovery from infection is thought to confer life-long immunity against re-infection. A vaccine is available for equines.

**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. These routes of exposure are the primary hazards in working with EEE.

- **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 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. These routes of exposure are the primary hazards in working with EEE.

- **Inhalation:** If contaminated materials are aerosolized outside of primary containment and potentially inhaled, rinse mouth twice expelling the rinsate. Do not swallow. Evacuate area. Exposure to aerosols is a potential hazard.

**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.

During this appointment, the exposed individual will be informed of the signs and symptoms of EEE, and will be instructed to watch for development. Blood may be collected. The Hinton State Laboratory Institute is able to perform serologic testing. Depending upon the signs and symptoms, hospitalization is a possibility.

**Signs and Symptoms for Systemic disease: abrupt onset**

- Chills
- Fever
- Malaise
- Illness lasts 1-2 weeks

**Signs & Symptoms for Encephalitis**
- Fever
- Headache
- Irritability
- Convulsions
- Adults display systemic signs prior to encephalitic signs

Complications upon recovery:
- Minimal brain dysfunction to severe intellectual impairment
- Personality disorders
- Seizures
- Paralysis

Post-exposure prophylaxis:

Immediate hospitalization may be needed for suspected encephalitis. No specific antiviral treatment is available.

Massachusetts Department of Public Health classifies EEE 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 EEE 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 EEE in the absence of an exposure incident, the PI and Biosafety Officer shall be notified immediately. In the absence of relevant information, the infection will be considered laboratory-acquired.