

EMPLOYEE INFORMATION*
INJURIES INVOLVING NONHUMAN PRIMATES
(B-VIRUS)

I. Background

- A. B-Virus (cercopithecine herpesvirus I, BV) is a common pathogen in monkeys of the genus *Macaca* (including rhesus, cynomolgus, bonnet, and stump-tailed macaques). B-Virus infection in macaques is analogous to that of herpes simplex virus in humans.
1. Primary infection is generally asymptomatic, although oral and genital ulcers may occur.
 2. The virus establishes latency in sensory nerve ganglia and periodically reactivates. Reactivation occurs more frequently when the animal is stressed, ill, immunocompromised, or in mating season (i.e. September through December).
 3. One to three percent of infected macaques shed B-Virus at any given time. Frequently, shedding animals do not have clinical evidence of disease.
- B. B-Virus causes a rare but rapidly progressive ascending encephalomyelitis in humans with a fatality rate of approximately 70%. Symptoms in humans are variable and inconsistent, but usually occur within one month following exposure. The site of the injury directly affects the onset of symptoms due to the length of the nerve pathways to the brain (i.e. symptoms related to a splash injury to the eye would manifest quicker than those from a lower extremity injury).
1. Early manifestations (within 10 days)
 - a. vesicular eruption near the exposure site
 - b. pain, itching or numbness at the exposure site
 - c. regional lymphadenopathy
 2. Intermediate manifestations (within 21 days)
 - a. fever and chills
 - b. proximally progressive paresthesia from the exposure site
 - c. fatigue
 - d. conjunctivitis
 - e. myalgia
 - f. muscle weakness in the exposed extremity
 - g. dizziness
 3. Late manifestations
 - a. neck stiffness
 - b. severe headache lasting more than 24 hours
 - c. diplopia, dysphagia, ataxia, confusion, agitation, hemiparesis, hemiplegia, and respiratory arrest

- C. Potentially infective macaque fluids and tissues include oral, ocular, and genital secretions, CSF, brain tissue, sensory ganglia, primary monkey tissue cultures, and possible excreta. B-Virus has not been recovered from macaque blood.
- D. Human infections have followed bite, scratch (including cage scratch), and splash injuries. Prompt, appropriate first aid may reduce the risk of infection.
 - 1. High risk injuries include:
 - a. percutaneous exposure to the macaque's mucous membrane secretions. Examples include bite injuries, needlestick injuries with a needle used in proximity to the macaque's mucous membrane (i.e. tuberculosis skin testing in a macaque's eyelid).
 - b. percutaneous exposure to the macaque's neurologic tissue. An example is a laceration while working with a macaque brain during necropsy.
 - c. mucous membrane exposure to the macaque's mucous membrane secretions.
- E. Post exposure prophylaxis (PEP)
 - 1. PEP in experimentally infected rabbits successfully suppressed the development of B-Virus associated disease. PEP in the same experiments also suppressed the development of specific antibodies to B-Virus (i.e. seroconversion). As a result, PEP may complicate the interpretation of negative or indeterminate serologic tests for B-Virus infection.
 - 2. It is not known whether PEP can prevent B-Virus infection in humans.
 - 3. The recommended medication for PEP, valacyclovir (Valtrex®), interferes with the virus' DNA polymerase. Valacyclovir may not block infection of host cells that are directly exposed to the B-Virus because it does not interrupt the early stages of the infection (i.e. it does not interrupt the absorption, penetration, uncoating, and intranuclear circularization of the viral DNA).

II. First Aid

- A. First aid should be initiated at the worksite within five minutes of the injury.
 - 1. Skin exposed to nonhuman primate body fluids is scrubbed vigorously with a 75% povidone iodine solution for fifteen minutes. If the individual is allergic to iodine, a chlorhexidine solution is used.
 - 2. Mucous membranes and eyes contaminated with nonhuman primate body fluids are irrigated for fifteen minutes with normal saline or water.

- B. Once first aid is completed, the injured worker proceeds directly to OHS for further medical assessment and treatment.
- C. When OHS is closed, the injured worker reports to the Emergency Department at BMC on the East Newton Campus.

III. Evaluating and Testing the Macaque

- A. As soon as possible following the injury, the veterinarian responsible for the care and management of the nonhuman primate reviews the monkey's medical record. The veterinarian also examines the animal for mucosal (oral or genital) vesicles, ulcerations or crusts, and for conjunctivitis.
 - 1. Dacron™ or Cotton tipped sterile swabs and vials containing Viral Transport Medium are used to obtain the cultures.
 - 2. The containers are labeled with the identity of the macaque, the body location, and the date the specimen is obtained.
 - 3. The specimens are kept refrigerated (i.e. wet ice, "cool packs") and in an upright position so that the swabs remain submerged in the viral medium during transport.
- B. The veterinarian also obtains a blood sample from the macaque for B-Virus serology using a serum separator tube. The blood specimen is labeled with the identity of the macaque and the date the sample is obtained.
- C. The veterinarian submits the clinical information, the swabs, and the blood sample to B virus Laboratory as soon as they are available. The veterinarian also provides OHS with information on the health status of the monkey.
- D. The information provided by the veterinarian is entered on the injury report form and OHS log on injuries involving nonhuman primates and the patient's chart.

IV. Initial OHS Visit

- A. Anyone with an injury involving nonhuman primates at a BU facility is eligible for evaluation, treatment, and follow-up evaluation in OHS. If the individual elects to be treated by his/her personal health care provider, an OHS physician offers to consult with the provider.
- B. OHS handles injuries involving nonhuman primates as emergencies. If the employee reports within eight hours of the injury, the wound is cleaned regardless of First Aid on-site performed.
- C. If the injury is a bite or scratch and the nonhuman primate is a macaque, a swab sample from the worker's wound is obtained **only after** the administration of first aid and is cultured for B-Virus.
 - 1. To obtain the viral culture, the OHS nurse gently twirls a Dacron™/or Cotton tipped sterile swab in the wound and

- then inserts it in a vial containing Bartel's or Viral Transport Medium. Holding the vial at arm's length, the swab is bent towards the nurse until it breaks.
2. The vial is labeled with the patient's name, the location cultured, the date the specimen is obtained, and that the culture was obtained **after** first aid was administered.
 3. If the culture will be sent to the BMC Microbiology laboratory that day, it is refrigerated. If it will not be sent that day, it is placed in the -20°C freezer.
- D. Using the Report of Injury Involving a Nonhuman Primate form, the OHS healthcare provider ascertains the following:
1. the time the injury occurred and the time it was reported to OHS,
 2. all relevant safety measures employed at the time of the injury,
 3. type of fluid or tissue contacted; individuals exposed to nonhuman primate (NHP) blood may be at risk for exposure to NHP retrovirus (i.e. SIV, SRV).
 4. type of injury (i.e. percutaneous injury, mucous membrane or skin exposure),
 5. circumstances of the event,
 6. the identity of the nonhuman primate involved in the injury, and
 7. details regarding first aid provided at the work site and at OHS.
- E. OHS recommends PEP for high-risk injuries and offers PEP to workers with moderate risk of injuries.
1. Recommendations for treatment are based upon:
 - a. the type of nonhuman primate fluid or tissue involved in the injury,
 - b. the type of injury, and
 - c. the quality and timeliness of the first aid administered.
 - d. the health status of the nonhuman primate
 2. OHS strives to provide PEP within two hours of the time of injury. PEP is not offered if the injury is reported more than five days following the injury. However, all other monitoring is provided as described below.
 3. Valacyclovir is used for PEP. The worker is instructed to take 1 Gram three times a day for two weeks. If valacyclovir is unavailable, acyclovir is used. The dose for acyclovir is 800 mg five times a day. Treatment is switched to valacyclovir as soon as it is available.
- F. Regardless of whether or not PEP is provided, the injured worker is provided informational handouts on B-Virus and individualized counseling on the significance of the injury.

1. The worker is informed of the early and intermediate manifestations of infection with B-Virus. The injured worker is given a wallet-sized card listing the signs and symptoms suggestive of a B-Virus infection and telephone numbers to call for emergency consultation.
 2. The worker provides a serum sample for storage at the initial visit and again at the follow up visits two and four weeks after the injury.
Serologic testing is performed on paired specimens initial and specimens taken 2 and 4 weeks later to look for any evidence suggestive of a B-Virus infection. Microbiology sends specimens to B virus lab with the appropriate forms completed by OHS.
 3. EH&S is notified [(8-8830) BUMC or (3-4094) Charles Rivers Campus] of the injury and reviews the incident, circumstances of the injury and safety precautions employed at the time of the injury with the employee and the supervisor.
 4. The appropriate Incident form is completed and Workers' Compensation claim form.
 5. The employee is provided appointments to return to OHS (OEM or BUOHC) one, two, and four weeks from the date of the injury.
- G. If the injury is reported when the OHS clinic is closed, the employee reports to the East Newton Campus Emergency Department for evaluation and treatment (phone number). The Emergency Department healthcare provider obtains a medical history and advises the worker of appropriate first aid measures.
1. After performing First Aid if available, the worker is directed to proceed to the closest emergency medical facility.
 2. If PEP is indicated, the healthcare provider repeats first aid and initiates PEP (see above) with consultation with B virus laboratory or ID.
 3. The Emergency Department physician also instructs the worker to report to BMC OEM (617) 638-8400 or BUOHC (617) 353-6630 when the clinic next opens to complete the report of injury and transmits the injury report to OEM.

V. Follow up OHS Visit

- A. The injured worker is re-evaluated one, two, and four weeks from the date of the injury.
 1. The worker is questioned and examined for symptoms and signs of B-Virus infection.

2. If PEP was initiated, the worker's compliance with treatment is assessed and noted in the clinical record. Anyone who gets PEP must get a serum titer 4 weeks after the completion of the PEP.
 3. A second blood sample is obtained for a serum titer 2-3 weeks and a third serum at 6 weeks following the injury if there are any concerns and at anytime the patient is symptomatic.
- B. NIH herpes virus experts are consulted as needed during the follow up process.
Dr. Julia Hilliard, Director of the NIH B Virus Lab:
404.651.0808; for emergencies (nights, weekends) 404.358-8168 or Centers for Disease Control at 404.639.0066.

Employee Information-NHP Injuries updated: 3-1-07

***Reporting Requirements**

Employee/Personnel: Within 1 Business Day

Illness

- All personnel and laboratory workers are encouraged to report any illness to their supervisor and occupational health directly if they are ill and working with or near agents covered by this BPHC regulation.
- Supervisors should refer any ill worker to the Occupational Health Officer (OHO) or designee for evaluation at Boston Medical Center Occupational & Environmental Medicine located at 732 Harrison Avenue, (F5) or the Emergency Department located at the Menino Pavilion at 771 Albany Street for after hours, weekends and on hospital holidays.
- Supervisors are **required** to report **all** illnesses, significant exposures, and absenteeism to the OHO at (617) 353-6630, (617) 738-4402, or (617) 780-5519 or designee at (617) 414-8262 or (617) 638-8400. The above conditions are reportable to Boston Public Health Commission (BPHC) by OHO or designee.

Significant Exposures

- All laboratory workers must report any exposures to their supervisor and occupational health directly.
- Workers in laboratories working with agents covered by the BPHC regulations **must** be evaluated by the OHO or designee prior to return to work if exposure to agents covered by these guidelines occurs.

Absenteeism

- Worker notifies supervisor of reason for absence from work.
- Supervisor contacts the OHO or designee. If employee is febrile or symptomatic he/she will need to be evaluated by the OHO or designee. The employee must contact the OHO on day 1 of illness and be evaluated, depending on the symptoms, reporting **and also prior to returning to work.**

Occupational Health Officer (OHO) or Designee: Within 1 Business Day

Illness

- OHO or designee will perform an occupational health assessment for any employee who: (1) has been **diagnosed**, (2) is exhibiting **symptoms**, or (3) **may** have been **exposed** to a registered agent as defined in this regulation.
- OHO or designee shall immediately notify the BPHC of the assessment, but not later than **one business day** of the assessment.
- OHO or designee should evaluate the individual based upon clinical findings and epidemiological risk factors, including specific lab work being conducted, and make appropriate recommendations.
- OHO or designee shall report findings of the assessment immediately, but not later than **one business day**.

Significant Exposures

- OHO or designee shall report to the BPHC any diagnosis of any disease caused by a high-risk registered agent pursuant to Section V. Part A of the guidelines, and any violation or breach of any laboratory procedures or any other incident which the IBC, Project Director or OHO should reasonably believe was released beyond the work area must be reported within once business day.
- OHO or designee must evaluate workers in laboratories working with agents covered by the BPHC regulations if an exposure to agents covered in these guidelines occurs.
- OHO or designee must report significant exposures to BPHC within 1 business day.
- Follow-up information must be provided to BPHC as requested.
- OHO or designee must report to BPHC, if a significantly exposed worker develops illness that could be related to an agent used in the laboratory and covered by these guidelines.
- OHO or designee should evaluate the individual based upon clinical findings and epidemiological risk factors, including specific lab work, and make appropriate recommendation.

Absenteeism

- OHO or designee must evaluate any worker in a laboratory using agents covered by these guidelines who is absent from the workplace due to illness for a period of two or more consecutive workdays.
- OHO or designee must contact the ill worker to determine whether illness could be related to an agent covered by these guidelines and used in the laboratory.
- OHO or designee must be reported within 1 business day to the BPHC, if illness may be related to an agent covered by these guidelines.

Occupational Health Officer (OHO) or Designee: Within 3 Business Days

Illness

- If the OHO or designee determines that the illness is caused by an agent that is covered by these guidelines and may be work-related, BPHC must be consulted within 3 business days **before** the worker is allowed to return to work.

Significant Exposures

- OHO or designee must send BPHC documentation that an exposed employee was cleared to return to work within 3 business days of clearance.