



College of Veterinary Medicine Policies and Procedures

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Human Rabies Prevention
Program***

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MSU-CVM Rabies Protocol Human Rabies Prevention Program

Introduction

Rabies is a fatal neurological illness transmitted to people by direct contact with the saliva of a rabid animal, normally through a bite; however, transmission through saliva contact with mucous membranes or a fresh wound is possible. The virus cannot penetrate intact skin. Rabies virus is inactivated rapidly by ultraviolet light and desiccation and does not persist in the environment; therefore, contact with the environment around a rabid animal does not present a risk. In Mississippi, rabies is found primarily in bats. Livestock and pets generally develop the disease following a bite from an infected bat. People, in turn, are generally exposed to rabies by bats, livestock, and unvaccinated pets. In developed countries, rabies has been well controlled by mandatory vaccination of pet dogs and cats. Since vaccination of pet animals became routine, human rabies cases have fallen dramatically and are now considered rare in the U. S.

Background

Rabies is caused by a negative-strand RNA virus in the *Rhabdoviridae* family, genus *Lyssavirus*. There are seven genetically distinct types of *Lyssavirus* worldwide (Genotype 1 – Genotype 7). Six of the seven viruses can cause fatal encephalitis disease in humans. However, only rabies virus itself (Genotype 1) is present in North America. It is believed that the current rabies vaccine provides at least some level of protection against other genotypes.

The virus invades the peripheral nervous system and travels via axonal movement from the site of infection to the central nervous system. Once the brain becomes infected, the virus also moves to the salivary glands where it is shed in saliva. Most exposures result from bites or other contact with saliva from rabid animals, and occasionally from exposure to brain or other infectious nervous tissue. Other types of non-bite exposures to rabies that can occur include scratches, abrasions, open wounds, or mucous membranes

contaminated with saliva or other potentially infectious material (such as brain tissue) from a rabid animal. Inhalation of aerosolized rabies virus is also a potential non-bite route of exposure, but other than laboratory workers, most people are unlikely to encounter an aerosol of rabies virus. A total of four cases of rabies have been known to result from aerosol transmission. Two of the four documented aerosol cases were in lab technicians conducting research on rabies, and the others were in individuals who had spent time in caves inhabited with large numbers of bats.

In cases where exposures result in infection, the result is serious, almost universally lethal disease in humans for which preventive and therapeutic interventions are available. The clinical disease can develop weeks, months, or even years after exposure. In recent years, human rabies in the U.S. has largely been controlled by vaccination of pet animals. Nevertheless, human cases continue to occur in the U. S. at a rate of 1-5 per year. In the majority of these instances, the causative rabies viruses have turned out to be of bat origin. Thus, direct exposure to bats and activities that place persons in close contact with areas where bats dwell warrant special consideration. In each of five fatal human cases that occurred in the U.S. in the year 2000, between 20 and 71 persons with exposure were treated with postexposure prophylaxis.

General Precautions to Avoid Rabies Exposures

Once the clinical signs of rabies infection manifest themselves, the disease cannot be cured or treated, and is nearly always fatal. Avoiding exposures is critical and can be done by following these guidelines:

- 1) Consider mammals larger than a rodent or lagomorphs that are not laboratory animals, especially wild animals, as potentially infected with rabies. Exposures can occasionally occur as a result from contact with livestock animals.
- 2) All personnel whose work places them at risk for rabies infection (all personnel working with certain animals as described in this document) should receive pre-exposure vaccination with the human diploid cell vaccine (HDCV).
- 3) Immediately report any bites or scratches from animals to a supervisor and to the Attending Veterinarian so that arrangements can be made for diagnostic evaluation of the suspect animal. Bites or other exposures must be evaluated as soon as possible by a physician to ensure proper post-exposure treatment is administered promptly.
- 4) Exercise extreme care in the handling of these animals: dogs, cats (especially feral dogs and cats), skunks, ferrets, raccoons, foxes, coyotes and bats. Nocturnal wild animals seen during the day or acting in an unusual manner should be avoided and reported to animal control authorities.
- 5) Wear appropriate protective clothing, gloves, and eye protection when working with any of the above animals.

Key Elements of the Prevention Program

Personal Protective Equipment (PPE)

Exposure to rabies can be minimized by the appropriate and effective use of personal protective equipment (PPE). What constitutes appropriate PPE is determined by the procedure being conducted and the type, duration and extent of exposure, but at a minimum the use of fluid-proof barrier gloves and safety glasses should be used at all times when handling animals that have the potential to be infected.

Training

Training is a key element to any hazardous activity. The ability to avoid exposures and to appropriately respond to exposures when they happen requires that personnel understand the risks and have been trained on effective methods for minimizing those risks. Exposures to rabies can be effectively managed with prompt first aid and medical interventions, but at-risk personnel must know how to respond appropriately and when to seek medical attention.

Medical Care and Monitoring

The exposure control plan is primarily intended to prevent accidental infections, but it also contains specific requirements for pre-exposure vaccination and post-exposure medical care and occupational surveillance where warranted.

The use of preventive strategies will not completely eliminate the possibility of exposure to infectious materials or rabid animals. For certain researchers, clinicians, students, technicians, or diagnostic laboratory workers who handle suspect animals, samples, or other potentially infectious materials, the plan requires pre-exposure vaccination; for all workers and students, follow-up and documentation of any possible exposure incident is required. Therapeutic interventions are highly effective if administered appropriately and promptly.

MSU-CVM Human Rabies Prevention Program

I. Applicability

This plan applies to all field research, clinical, or teaching activities where there is a likelihood that CVM employees or students could come into contact with rabies through contact with reservoir animals or specimens collected from such animals. The term “reservoir animals” means dogs, cats (especially feral dogs and cats), skunks, ferrets, raccoons, foxes, coyotes and all types of bats. This plan also applies to research or diagnostic work in which contact is possible with suspected or potentially infected reservoir animal saliva, unfixed neural tissues (e.g., brain), cerebrospinal fluid, or cell culture of rabies virus or related *Lyssaviruses*.

II. Precautions for CVM Personnel

II-1) Precautions for collection, treatment, or other handling of bats and other reservoir animals:

All CVM personnel or students involved in collecting, trapping, providing veterinary care, or other handling of wild or feral reservoir animals shall adhere to the following precautions:

- Bare-handed contact is prohibited when handling reservoir animals and tissue specimens from reservoir animals. Precautions must be taken to avoid direct contact with saliva or cerebrospinal fluid, in particular. Rubber / nitrile / latex / vinyl / PVC gloves shall be used for all animal contact.
- Cut-resistant gloves should be considered – these may be worn under rubber / nitrile / latex / vinyl / PVC gloves to avoid cuts or puncture wounds from bites, claws, or instruments during handling and field work involving reservoir animals.
- Hands must be washed after handling animals and removal of gloves; if hand-washing in the field is not possible, the use of an antimicrobial gel must be substituted.
- Eye protection must be worn when handling animals or specimens collected from animals to prevent splashes of saliva into the eyes.
- If a reservoir animal bites a worker during field work or clinical treatment, that animal must not be released so that it can be observed or tested for signs or pathology associated with rabies. If the animal dies for any reason, the animal or its brain must be submitted as suspect to the Veterinary Diagnostic Laboratory for rabies testing. All animal bites must be reported and appropriately treated.
- If a reservoir animal bites a worker during field work or clinical treatment and subsequently escapes capture, then that animal shall be assumed to be rabid and post-exposure procedures will be followed as described in Section V.
- All field personnel must have available at all times a first aid kit containing tincture of iodine, povidone iodine, or other effective virucidal antiseptic.

II-2) Precautions for the handling of suspect specimens in animal necropsy suites:

- Where practical, all small animal carcasses should be manipulated in a certified biological safety cabinet (BSC).
- Larger carcasses should be manipulated using equivalent protective measures (e.g. splash protection on eyes, protective solid-front gowns with tight fitting wrists, rubber / latex / vinyl / PVC gloves).
- For procedures involving sawing into the skull / brain of a potentially rabid animal, respiratory protection is recommended. Appropriate respiratory protection would be an N95 respirator.

II-3) Precautions for the handling of clinical specimens from suspect animals (including CSF, saliva, and tissues):

The precautions in this section apply to persons who collect, transport, prepare for evaluation, or conduct diagnostic testing on specimens from suspect animals.

- Potentially infected clinical specimens for diagnostic purposes may be handled in an approved biosafety level 2 (BSL-2) facility using the practices described in the most current version of the CDC/NIH publication "*Biosafety for Microbiological and Biomedical Laboratories.*"
- Collection, sectioning, and preparation of brain or other tissues for testing must be carried out using standard universal precautions. This includes the use of gloves and eye protection for all manipulations of potentially infectious tissues, hand washing upon removal of gloves, and using care to avoid accidental cuts with sharp instruments used for these tasks.
- If tissue or other diagnostic specimens are to be transported, the specimens must be placed in leak-resistant plastic bags within leak-proof secondary containers. The secondary container must have universal biohazard stickers on the outside clearly visible from all angles. Place absorbent material inside the secondary container prior to transport of specimens, visually inspect specimens when they arrive at the point of destination for leakage during transport before removal, and take appropriate precautions during removal if leakage has occurred. All shipment of specimens by commercial carrier must conform to current U. S. Department of Transportation regulations.
- The use of disposable instruments for necropsy and tissue preparation is recommended. Re-usable instruments used during necropsy or in the preparation of tissues for diagnostic purposes shall not be handled prior to decontamination with an effective chemical agent. If feasible, instruments can be sterilized by autoclaving after necropsy and tissue preparation tasks before re-use.
- All tissue and carcass wastes must be secured within double plastic bags inside hard-sided, leak-proof secondary containers with tight-fitting lids for containment and transport. Terminal disposal must be by incineration or digestion.
- All non-tissue / carcass solid wastes must be collected in autoclavable biohazard bags within hard-sided, leak-proof secondary containers with a lid. Collected wastes must be autoclaved in an autoclave which is validated by spore testing.
- Certified biological safety cabinets (preferably class II) should be used for laboratory manipulations of suspect clinical specimens during testing to the extent possible.

II-4) Precautions for field research or agricultural work in areas where rabid reservoir hosts may be encountered:

The precautions in this section apply to persons conducting work which does not involve contact with reservoir animal hosts, but is being conducted in areas where reservoir hosts may be present.

- All persons to whom this section applies shall receive general rabies hazard awareness training prior to conducting field research or agricultural work.
- All personnel should be trained in first aid and have available a first aid kit.
- If bitten by an animal, follow the procedures in Section V.

III. Training

The responsibility for safety rests with the principal investigator / supervisor. No person shall be required or allowed to perform hazardous tasks without proper training before beginning those tasks. Safety training should be conducted upon initial hiring and annually thereafter, and must be documented.

Employees must be educated about their risk and methods, equipment and practices to control these risks. The topics required to be covered by training include:

- Awareness of the epidemiology, transmission and symptoms of rabies.
- Avoidance of bite exposures.
- Safe work practices and proper use of personal protective equipment.
- Pre-exposure vaccination for certain individuals (see below).
- Emergency and post-exposure management, first aid and medical therapies; occupational health program (if any).

In addition, students or faculty who conduct field work which would place them in contact with reservoir animals must have a first aid kit / bite kit.

For more information or assistance with training, contact the MSU Environmental Health & Safety, Biosafety Officer.

IV. Pre-Exposure Rabies Vaccination and Serological Testing

IV-1) Pre-Exposure Vaccination

Pre-existing humoral immunity to rabies virus will prevent the development of disease in persons who have been bitten by a rabid animal or otherwise exposed to rabies virus. Pre-exposure vaccination simplifies post-exposure prophylaxis by eliminating the need for rabies immune globulin (RIG) and may provide protection in the event that an exposure is not recognized. For these reasons, persons whose activities carry a risk of exposure to rabies are required to receive pre-exposure vaccination or sign a declination waiver. In addition, CVM personnel who travel on CVM business and are likely to encounter animals in areas of the world where most dogs have not been vaccinated against rabies and where immediate access to appropriate medical care is not readily available are also required to receive pre-exposure vaccination, or sign a declination waiver.

Pre-exposure vaccination against rabies consists of a series of three injections (1.0 mls), given on days 0, 7, 21 or 28. Depending on the formulation of the vaccine, it is administered either by the intramuscular (IM) or intradermal (ID) route.

The following persons / activities / occupations are required to receive the rabies vaccine or sign a declination waiver:

- Veterinarians, veterinary technical staff, veterinary students, and technology students in the College of Veterinary Medicine who come into contact with reservoir animals (including dogs and cats);
- Workers in the Veterinary Medical Diagnostic Laboratory who may come into contact with diagnostic specimens submitted for rabies evaluation;
- Persons who conduct research requiring them to enter caves;
- Persons who conduct research involving the capture or handling of bats;
- Persons who capture or handle other wild reservoir animals;
- Persons who conduct research on rabies virus;
- Travelers who meet any or all of the following conditions:
 - Those going to countries where rabies is present and who intend to have regular contact with animals (e.g., veterinarians);
 - Those going to countries where rabies is endemic and who will be more than 24 hours away from a reliable source of post-exposure vaccine and RIG;
 - Health and laboratory workers who in the course of their travels may come into contact with specimens or patients infected with the virus.

IV-2) Pre-Exposure Serologic Testing

In addition to vaccination, for individuals whose activities pose the highest risks of unrecognized exposure, periodic serological testing for adequate antibody titers is also required. Booster vaccine doses should be administered to maintain a serum titer corresponding to at least the recommendations of the Centers for Disease Control and Prevention.

Currently, ACIP (CDC's Advisory Committee on Immunization Practices) recommends a serum titer corresponding to complete neutralization of rabies virus at a 1:5 serum dilution by the rapid fluorescent focus inhibition test (RFFIT). A rabies-vaccinated person should receive a single booster vaccination when the antibody titer falls below that corresponding to complete neutralization at a serum dilution \geq 1:5 by the RFFIT. Complete viral neutralization at a 1:5 dilution is approximately equal to a titer of 0.1-0.2 IU/ml (depending on the reporting laboratory).

Some important notes about pre-exposure vaccination and serologic testing:

The frequency of required testing varies for these individuals:

Every 2 years: Frequent Risk Category

Workers who handle specimens from reservoir animals in the
Veterinary Medical Diagnostic Laboratory

Veterinarians and technicians working in the Animal Health Center

Persons who enter caves

Every 6 months: Continuous Risk Category

Persons who conduct research on rabies virus

Persons who capture or handle bats

- Pre-exposure vaccination does not abrogate the necessity to cleanse and treat bite wounds.
- Persons who are taking chloroquine derivatives as anti-malarial drugs should only receive the IM rabies vaccination, as these drugs suppress the immune response to ID rabies vaccine.

The following table summarizes the requirements for pre-exposure rabies vaccination and serologic testing:

<u>Personnel by Activity</u>	<u>Vaccination</u>	<u>Testing Frequency</u>
Veterinarians, Vet Technical Staff, Vet Students	Required	Every 2 years
Vet Diagnostic Lab workers, spelunkers	Required	Every 2 years
Rabies virus researchers; Bat handlers	Required	Every 6 months
Other wildlife researchers; travelers to rabies endemic areas	Required	Not required
All Others	Not required	Not required

V. Medical Management of Rabies Exposures

Successful medical management of rabies exposures depends upon two components, both of which must be administered promptly:

- Thorough cleansing of bite wounds with soap and water;
- Post-exposure prophylaxis

Students, staff and faculty who conduct field work which would place them in contact with reservoir animals must carry a first aid kit / bite kit. These first aid kits must contain virucidal antiseptic such as povidone-iodine or tincture of iodine.

All exposures or possible exposures to rabies must be evaluated by a qualified medical professional. On or near the CVM, students and employees may go to the Longest Student Health Center or the OCH Regional Medical Center.

V-1) Bite Wound Treatment

Exposures resulting from animal bites or other parenteral contact should be immediately cleansed with soap and warm water, if available. The wound should initially be encouraged to bleed, taking care not to massage the wound directly, followed by the application of pressure to control bleeding as necessary. Once bleeding has stopped or slowed sufficiently, povidone-iodine, tincture of iodine, or other virucidal antiseptic should be used liberally to irrigate the wound area.

Bite victims should be treated promptly by medical professionals. Initial anti-rabies post-exposure prophylaxis needs to be administered within 24 hours of exposure. Under most circumstances, bite wounds are not sutured unless very severe due to the high risk of bacterial infection.

V-2) Post-Exposure Prophylaxis

The type and extent of post-exposure rabies prophylaxis depends upon the pre-exposure status of the exposed individual:

Persons Previously Vaccinated against Rabies:

- One dose of rabies vaccine is administered (IM) on the day of the exposure (day 0), and a second dose is administered on day 3 post-exposure. No rabies immune globulin (RIG) is administered.

Persons Not Previously Vaccinated against Rabies:

- A total of 4 doses of rabies vaccine is administered (IM) on days 0, 3, 7, and 14.
- On day 0 (at the latest day 7 after vaccine dose is administered) a 20 IU/kg body weight dose of rabies immune globulin (RIG) is administered into and around the wound site.

Deviations and delays in the recommended post-exposure vaccination and RIG schedule should not occur; the regimen described above has been clinically proven to be effective, whereas deviations may not be.

VI. Non-Medical Post-Exposure Procedures

VI-1) Reporting of Exposures

All possible rabies exposures must be reported to the hospital director or laboratory supervisor who is responsible for seeing that appropriate documentation and reporting of the incident is completed in a timely manner.

- An Incident Report must be completed promptly after any exposure. The Incident Report should contain as much of the following information as possible:
 - a description of the exposed person's duties that relate to the exposure incident,
 - the route of exposure and detailed circumstances of the exposure,
 - the infectious, or potentially infectious material to which the employee was exposed; bite, other saliva contact, infectious tissues, culture fluid, etc.,
 - the disposition of the animal, in cases of animal bite,
 - any recommendations to prevent future exposures.

VI-2) Follow up – Evaluation of Suspect Animals

Where possible, the infectious or potentially infectious material to which the individual has been exposed will be evaluated for the presence of rabies virus. For most rabies exposures, this involves the evaluation of suspect animals involved in a bite exposure. Evaluation is coordinated with the local Public Health Department.

If the animal is not known to be vaccinated, the following apply:

- If the animal is healthy and available for evaluation, quarantine for 10 day observation;
- If the animal is not healthy, dies, or is known or suspected to be rabid, the animal should be euthanized and submitted for testing;
- If the animal is lost to follow-up evaluation, consult with public health officials. Generally, bites from wild carnivores or bats are regarded as rabid unless proven otherwise.

Appendix A: Contact Information for Exposures

Longest Student Health Services
(662) 325-2431

OCH Regional Medical Center
(662) 323-4320

MSU Environmental Health and Safety Office
(662) 325-3294

Mississippi State Department of Health
(601) 576-7400, 1-800-458-4948

Appendix B: Pre-Exposure Rabies Prophylaxis Questionnaire

**MSU-CVM
Pre-Exposure Rabies Prophylaxis Questionnaire**

Name _____

Date _____

Phone # _____

Supervisor _____

Employee Position Description **requires** direct patient contact. (Employee must complete this form.)

Employee Position Description does **not require** direct patient contact. (Employee

Authorized

Dat

Please check one:

I have been vaccinated for rabies. When? _____

My last titer check was _____

I have never been vaccinated for rabies.

Employees whose positions require direct contact with patients are highly encouraged to be vaccinated against rabies and have their rabies titer check periodically as recommended by their physician.

Employee Signature
