



# Animal Bites and Rabies Risk

A Guide for Ohio Public Health Professionals





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# Purpose

The purpose of this document is to provide guidance to public health professionals when assessing exposures to the rabies virus in people and animals.

## Introduction

Rabies is a viral illness that causes fatal encephalitis in affected individuals. All mammals are susceptible. Exposure most commonly occurs when saliva from an infected animal is transmitted through a bite wound. In Ohio, rabies is found primarily in bats and raccoons. For more information about animal rabies epidemiology in Ohio, see the section titled *Animal Rabies* under [Ohio Department of Health's \(ODH\) Rabies website](#).

## Management of Humans Bitten by an Animal (Excluding Bats)

All mammalian bites to humans should be treated as a potential rabies exposure and a bite report filed with the jurisdiction where the bite occurred within 24 hours ([OAC 3701-3-28 Report of bite of dog or other animal](#)). The bite report is used to perform a risk assessment to determine the need for rabies post-exposure prophylaxis (rPEP). Each jurisdiction is responsible for collecting bite report data and reporting the data annually to ODH.

### What information is needed for the bite report?

Bite report forms are generated at the local level. The following information should be collected to assist with the risk-assessment:

- What type (species) of animal was involved in the bite?
- Can the biting animal be captured/confined?
  - If applicable, obtain owner's contact information and animal rabies vaccination records
- What was happening at the time the bite occurred (was the bite provoked or unprovoked)?
- Did the bite break the skin?
- Is the bite victim an adult or child?
- Where was the person bitten?
- Did the bite victim seek medical treatment and what was done?

### After the bite is reported, what should the bite victim do?

If not done already, bite victims should wash the wound with soap and running water and seek medical attention to be evaluated for:

- Additional wound cleaning

- Antibiotics
- Tetanus vaccination booster
- Primary wound repair
- Post-exposure prophylaxis (based on a risk-assessment)

## What is considered a rabies exposure?

The most common way a person is exposed to rabies is through a bite from an infected animal (refer to [Tables 1 & 2](#) for commonly infected species and common exposures and non-exposures). The risk of rabies from a non-bite exposure carries a low risk and must be evaluated case-by-case. Non-bite exposures include the introduction of infected saliva into mucous membranes or an open wound and, hypothetically, from a wet scratch.

## What is not considered a rabies exposure?

The rabies virus cannot penetrate intact skin and is quickly inactivated by ultraviolet light, drying, and disinfectants. Rabies cannot be contracted through contact with the environment around a rabid animal, from touching a rabid animal, being in the same room as a rabid animal ([bats are an exception](#)), or if a pet shares a food or water bowl with a rabid animal. Refer to [Tables 1 & 2](#) for commonly infected species and common exposures and non-exposures.

## Should the bite victim get post-exposure prophylaxis (PEP) right away?

Rabies PEP is a medical urgency and not an emergency. A risk-assessment should be conducted to determine whether PEP is necessary. Situations where PEP is more urgent includes when a young child is involved or the bite is to the head, neck, or face.

### Dogs, Cats, Ferrets, Livestock (including Horses)

- If the animal is available for quarantine or testing, it is recommended to wait until the rabies status of the animal has been determined before starting PEP.
- If the animal is not available for quarantine or testing, it is recommended that PEP be started promptly.

### Wildlife Species (Bats, Raccoons, Skunks, Fox, Coyotes)

- If the animal is available for testing, it is recommended to wait until the rabies status of the animal has been determined before starting PEP.
- If the animal is not available for testing, it is recommended that PEP be started promptly.
- If a child is bitten, the guardian and health care provider should consider starting the child on PEP. If the biting animal is available for testing and is negative for rabies, the child does not have to complete the remainder of the PEP protocol.
- If a person is bitten on the face, the health care provider should consider starting the person on PEP. If the biting animal is available for testing and is negative for rabies, the person does not have to complete the remainder of the PEP protocol.

### Other Species

- These should be assessed on a case-by-case basis by the local/state health department.



## Is there a safe waiting period to get PEP after an exposure?

Little data is available on the length of a “safe” waiting period following a rabies exposure; however, treatment is highly effective at preventing rabies if given as soon as possible following exposure. If PEP is delayed but the bite victim is asymptomatic, PEP is still recommended.

## What if a person starts PEP and the animal survives the quarantine period, or, the rabies test comes back as negative?

PEP can be discontinued.

## Management of Animals that Bite People (Excluding Bats)

If the biting animal is available for rabies testing, PEP can generally be delayed. Certain species of animals may be quarantined.

### What should be done about dogs, cats, and ferrets that bite people?

A bite report should be filed with the local health department where the bite occurred. A healthy dog, cat, or ferret that bites a person should be confined and observed for 10 days (from the time of the bite) regardless of the vaccination status to determine whether the animal was shedding virus at the time of the bite. Refer to [Table 3](#) for outcomes and recommendations during the 10-day observation period. Quarantines are issued and set by the local health department.

### Where is the animal confined during the 10-day observation?

Dogs, cats, and ferrets are usually confined and observed at home. Confining the animal prevents other animals or people from being exposed. The animal should be observed daily for any signs of illness. If the animal becomes ill, it should be examined by a veterinarian and the illness reported to the local health department. If the animal is unvaccinated or overdue for the rabies vaccine, it should be administered at the completion of the 10-day period.

### What if the animal is vaccinated during the 10-day observation?

If a vaccine will be administered, it must be done at the completion of the 10-day period in the rare event that the animal develops an adverse reaction which may mimic rabies infection. Inadvertent vaccination during the quarantine period does not otherwise interfere with the pathogenesis of disease and does not require the quarantine to be extended.

### What should be done about livestock and horses that bite people?

Cattle and horses are the most frequently reported infected livestock species in the U.S. Livestock and horses that bite a person should be confined and observed for 14 days (from the time of the bite) regardless of vaccination status to determine whether the animal was infectious at the time of the bite. The quarantine period is based on anecdotal evidence and may vary from state to state. Refer to [Table 4](#) for outcomes and recommendations during the 14-day observation period. Quarantines are issued and set by the local health department or the Ohio Department of Agriculture.

## What animals are livestock?

The term livestock is used in a broad sense and includes cattle, sheep, goat, llama, alpaca, and pigs.

## Where is the animal confined during the 14-day observation?

Livestock and horses are usually confined and observed at their current location. The biting animal should be observed daily for any signs of illness. If the animal becomes ill, it should be examined by a veterinarian and the illness reported to the local health department or the [Ohio Department of Agriculture, Division of Animal Health](#).

## Do livestock and horses have to be vaccinated against rabies?

Rabies vaccination is not required for livestock in Ohio but highly recommended for animals (including for which licensed vaccines are not available) that have frequent contact with humans or are assessed as particularly valuable or at a higher risk of being exposed.

## What if the animal is vaccinated during the 14-day observation?

If a vaccine is administered, it should be done at the completion of the 14-day period in the rare event that the animal develops an adverse reaction which may mimic rabies infection. Inadvertent vaccination during the quarantine period does not otherwise interfere with the pathogenesis of disease and does not require the quarantine to be extended.

## If a herd animal has been exposed to rabies what should be done about the rest of the herd?

Multiple rabid animals in a herd and herbivore-to-herbivore transmission of rabies are uncommon. Therefore, restricting the rest of the herd when a single animal has been exposed to or infected with rabies is not usually necessary.

## What should be done about other wild and domestic animals that bite people?

### Wild Animals and Hybrids

These animals should not be kept as pets. Examples of wild-domestic hybrids include coydogs, wolf hybrids, savannah cats, and safari cats. No parenteral rabies vaccines are licensed for use in these animals, and the viral shedding and incubation periods are unknown. Therefore, euthanasia and rabies testing are generally recommended when a person has been exposed.

### Lagomorphs, Small Rodents, and Pocket Pets (Domestic and Wild)

These animals are rarely found to be rabid and no documented transmission to humans has occurred. When exposed to a rabid animal, these small animals are not known to survive the attack to further transmit the virus. Unless there is an unusual circumstance surrounding a bite to a person (such as abnormal behavior or known exposure to a rabies vector species), these exposures are not considered a significant risk. These animals should not be quarantined and do not need to be tested.

### Other Domestic and Exotic Species

These should be assessed on a case-by-case basis. If a significant risk of rabies is determined, then euthanasia and testing of the biting animal is recommended. If the animal is unable to be tested, PEP is recommended. Contact ODH to discuss extended quarantines for low-risk situations.

## Management of Bat Encounters

Most people who have been bitten by a bat report a stinging or needle prick sensation, however, bat bites may go unnoticed since they may leave little or no evidence of a wound or puncture. A risk assessment must be conducted when bats are found in a building/home. For information about animals potentially exposed to bats, please see [Management of Animals That Have Been Exposed to Potential Rabies Vector Species](#).

### When should a bat be submitted for rabies testing?

If there is any chance that a person had physical contact with a bat, the bat should be tested for rabies. If the bat is not available for testing (discarded or released), then rabies post-exposure prophylaxis (PEP) should be administered. Common exposures include:

- A person that has been bitten by or has had any physical contact with a bat
- A person wakes up to find a bat in the bedroom
- A bat is found in a room with an unattended child
- A bat is found in a room with a person that cannot reliably communicate whether there was physical contact

For more examples of what is and is not considered an exposure, see [Table 5](#). In general, post-exposure prophylaxis can be delayed until test results are received. Situations where PEP is more urgent includes:

- When a young child is involved
- If the bite is to the head, neck, or face

### How do you capture a bat safely?

Do not use non-leather gloves, a pillowcase, blanket, towel, or something made of fabric to capture a bat since they can bite through these materials. Instead, use a container and lid (place airholes in lid if bat is alive) such as a coffee can, small cardboard box, or plastic container, tape to secure the lid, and leather gloves. For step-by-step instructions, refer to the steps below or refer to the Minnesota Department of Health's [website](#) for a video and handout. To capture a bat:

1. Close the doors and windows and turn on the lights in the room where the bat is located
2. Wait for the bat to land
3. While wearing gloves, approach the bat slowly and place the container over the bat
4. Slide the lid underneath the bat and flip the container over, trapping the bat inside
5. Secure the lid with tape

6. Do not shake or otherwise traumatize the bat as this can damage the brain, rendering it untestable
7. If the bat is dead, keep it in a cool place such as a refrigerator. Do not freeze
8. If the bat is alive, keep it in a dark, cool place until it can be euthanized. Euthanasia should only be performed by a trained professional that has received rabies pre-exposure prophylaxis
- a. If you are a public health professional and need information on how to properly euthanize a bat, see [Bat Euthanasia Guidelines \(Appendix A\)](#) and contact ODH
9. The whole body of the bat may be shipped for rabies testing

**Note:** If you are certain that no person or pet was exposed to the bat, it can be released.

## What if there might have been an exposure but the bat was let go or disposed?

If there is a possibility that there was an exposure to a bat (refer to [Table 5](#)), and the bat is unavailable for testing, post-exposure prophylaxis is recommended.

## What can be done to make sure bats stay out of the house?

It is not unusual to find bats in Ohio homes, and the mere presence of bats does not indicate the need for rabies PEP. The best way to avoid exposure is to prevent bats from getting into the home. Bats may enter the house through:

- Missing or broken chimney caps
- Eaves/soffit vent
- Broken siding
- Torn window screens
- Basement doors
- Behind downspouts and gutters
- Under loose shingles
- Dormer soffit/roof junction
- Under windowsills
- Where masonry meets siding or cornice
- Torn screens on gable vents

Bat proofing the home may require that the person work with a licensed pest control expert that specializes in bat control. This may include having to:

- Caulk openings larger than a ¼ inch by a ½ inch
- Install window screens, chimney caps, and draft-guards beneath doors to attics
- Fill electrical and plumbing holes with stainless steel wool or caulking
- Ensure all doors to the outside close tightly
- Cover outside entry points to prevent bats from roosting in attics or buildings
  - Loosely hang clear plastic sheeting or bird netting over entry areas. This will allow

bats to exit and not re-enter. When all the bats are gone, the openings can be permanently sealed.

**Note:** If you had bats in your home over the summer, September and October are the best months for conducting a bat exclusion. Exclusion during May through August is not recommended because young bat pups may become trapped. If a positive bat is found in a residence during this time and there are 15 or more bats inside a structure, consult with the [Ohio Department of Natural Resources](#) about removal of the roost.

## What are some things a person can do to find out if bats are in their home?

Consult with a licensed pest control expert that specializes in bat control. Signs of a bat roost in a house may include:

- Squeaking noises coming from the attic, walls or elsewhere
- Evidence of bat guano and crystallized urine
- Bare scratched areas on beams in the attic space, rafters, porches, and walls
- Seeing bats fly out of the house at dusk or into the house before dawn

## Rabies Post-Exposure Prophylaxis (PEP) Regimen for People

The PEP protocol will depend on whether a person has received rabies vaccinations previously and/or whether a person is immunocompromised or taking immunosuppressants (summarized in [Tables 6 & 7](#)).

### What is the PEP protocol for people who are healthy and immunocompetent?

In general, healthy, immunocompetent individuals who have not previously received rabies vaccination must receive both passive antibody (Human Rabies Immunoglobulin/HRIG/RIG) and 4 rabies vaccines. Healthy, immunocompetent individuals who have been previously vaccinated will need 2 rabies vaccines and no HRIG. Refer to [Table 6](#) for the administration schedule.

### What is the PEP protocol for people who are immunocompromised or are taking immunosuppressants?

Individuals who are immunocompromised or are taking an immunosuppressant (e.g. [corticosteroids or an anti-malarial](#)) while receiving PEP must receive passive antibody (Human Rabies Immunoglobulin/HRIG/RIG), 5 rabies vaccines, and have a titer taken 1-2 weeks after the last vaccine is administered.

## What is the PEP protocol for people who have previously been vaccinated for rabies?

Individuals who have been previously vaccinated will need 2 rabies vaccines and have a titer taken 1-2 weeks after the last vaccine is administered (no HRIG). Refer to [Table 7](#) for the administration schedule.

## How should the human rabies immunoglobulin (HRIG/RIG) be administered?

The dose is based on the person's body weight. No more than the recommended dosage of HRIG should be given. Exceeding the recommended dose can partially suppress active production of antibodies following vaccination.

- The recommended dosage of HRIG is 20 IU/kg body weight for all ages including children. Refer to the product insert for specifics
- Infiltrate as much of the HRIG as is anatomically feasible into and around the wound
- Administer any remaining HRIG intramuscularly (IM) at a site distant from the first vaccination site (either in the quadriceps or the deltoid opposite of where the vaccine was given)
  - Administration site for subsequent vaccines does not matter

**Note:** A new formulation of HRIG, called [HyperRAB](#), is available. HyperRAB is twice as concentrated as the original formulation (Hyperrab S/D). Refer to the product insert prior to administration.

## Where should the human rabies immunoglobulin (HRIG/RIG) be administered if there is no visible bite or if the bite is on a finger?

Human rabies immune globulin (HRIG) is recommended for both bite and non-bite exposures. HRIG should be infiltrated around the bite. If there is no wound, such as following a bat in the bedroom exposure, then the entire dose of HRIG may be given in the deltoid, in the opposite arm of where the rabies vaccine is given, or the quadriceps. Do not administer HRIG and the rabies vaccine in the same location.

## When should the human rabies immunoglobulin (HRIG/RIG) be administered?

HRIG should only be administered on the first day the rabies vaccine is given (considered Day 0). If HRIG was not administered on day zero, it can be given up to day seven of the PEP regimen. Beyond day seven, HRIG is not indicated.

## Why do some people have to get rabies immunoglobulin (RIG)?

Human rabies immune globulin (HRIG) provides passive immune protection. It provides an immediate supply of virus-neutralizing antibodies for the individual until active immunity develops in response to vaccine administration. Individuals that have been previously vaccinated should mount an immediate antibody response, making administration of HRIG unnecessary.

## Are there any precautions with the administration of HRIG?

Refer to a healthcare provider and the product insert for specific precautions and adverse reactions. [HRIG can interfere with live virus vaccines](#), therefore, the recommended interval between HRIG and measles-/varicella-containing vaccines is 4 months.

## Is the rabies vaccine dosed by weight?

No. A 1.0 ml dose of rabies vaccine is administered regardless of the weight or age of the individual.

## Does it matter where the rabies vaccine is administered?

Yes. The vaccine should be administered intramuscularly in the deltoid area of adults or the anterolateral thigh of young children. Do not administer the rabies vaccine in the gluteal. This may result in poor absorption resulting in ineffective protection.

## Is there more than one type of rabies vaccine and human rabies immunoglobulin (HRIG)?

Yes. Please refer to CDC's website, [Vaccine and Immune Globulin Availability](#), regarding rabies biologics in the U.S. Currently, there are two U.S. licensed rabies vaccines for human use, the human diploid cell vaccine (HDCV, Imovax® Rabies) and purified chick embryo cell vaccine (PCECV, RabAvert®). Both are considered equally safe and efficacious. It is recommended that a vaccine series be completed with the same vaccine throughout; however, there have been no documented cases of decreased efficacy or increased adverse reactions when the series is initiated with one product and completed with another.

There are four types of HRIG available in the U.S. [HyperRAB](#), the newest HRIG on the market, is twice as potent as its predecessors requiring less volume to be administered.

## Are there any adverse reactions associated with rabies biologics?

In general, there is a very low incidence of serious reactions to the rabies PEP regimen. Localized pain, erythema and itching at the administration site and headache and low-grade fever are the most reported reactions. Rabies PEP should not be interrupted or discontinued due to mild local or systemic adverse reactions to rabies vaccine. Non-steroidal anti-inflammatory drugs may be used to control mild adverse reactions.

A person with a history of serious [hypersensitivity to a vaccine](#) (some rabies vaccines may contain trace amounts of antibiotics such as neomycin) or human immunoglobulin product should consult with their physician. When the benefit outweighs the costs, antihistamines may be administered along with the rabies biologic. The person should be observed for the development of anaphylaxis immediately following vaccination. The individual may need to receive PEP at an emergency room as a precaution.

## What if a person deviates from the PEP schedule?

Once the decision to initiate PEP is made, it should be started as soon as possible. Every effort should be made to adhere to the recommended PEP vaccination schedule especially the first



two days of treatment (days 0 and 3). For most minor interruptions, the vaccination schedule can be shifted and resumed as if the patient were on schedule. For specific questions regarding deviations from the schedule, contact ODH.

## What if a person started post-exposure prophylaxis outside the United States?

People exposed to rabies outside the United States might receive post-exposure prophylaxis with regimens or biologics that are not licensed in the United States. In these instances, additional treatment may be required when the individual presents for care in Ohio. For specific advice on these cases, please contact ODH.

## What if the person cannot afford post-exposure prophylaxis?

Patient assistance programs that provide medications to uninsured or underinsured patients are available for rabies vaccine and Immunoglobulin. For information, please visit, [Programs for Uninsured and Underinsured Patients](#) on CDC's website.

## Rabies Pre-Exposure Prophylaxis (PrEP) Regimen for People

Pre-exposure vaccination is recommended for certain individuals according to their risk category. The same vaccine is used for both PrEP and PEP.

## Who should receive rabies PrEP and a titer (serologic testing)?

PrEP recommendations are based on [5 risk categories](#) which are ranked highest risk to lowest risk based on activities that bring them into contact with the rabies virus or potentially rabid animals such as:

- People who work with live or concentrated rabies virus in laboratories
- People who frequently do at least one of the following: handle bats, have contact with bats, enter high-density bat environments like caves, or perform animal necropsies
- Most veterinarians, veterinary technicians, animal control officers, wildlife biologists, rehabilitators, trappers, and spelunkers (cave explorers)
- Certain travelers to regions outside of the United States where rabies in dogs is commonly found (refer to CDC's [Yellow Book, Chapter 4 Travel-Related Infectious Diseases](#) and [Travelers' Health](#))

Recommendations for long-term immunogenicity depend on risk category. Long-term immunogenicity refers to the ability to mount an anamnestic response to rabies virus >3 years after completion of the primary rabies vaccination series. Refer to [Table 8](#) for the protocol.

For more information on getting a rabies titer, refer to [What are the steps to get a rabies titer test?](#) and [How do I interpret the titer results?](#)



## Why is PrEP important for those in the high risk categories?

These individuals have a higher risk of encountering the rabies virus due to their activities or occupation. PrEP simplifies the management of post-exposure treatment by eliminating the need for HRIG and decreasing the number of doses of rabies vaccine needed. PrEP may also offer partial immunity to persons whose PEP is delayed and provide some protection to persons at risk for unrecognized exposure to rabies. It does not eliminate the need for treatment following a possible exposure.

## What is the PrEP protocol?

There are two types of [rabies vaccines](#) available in the United States that can be used for PrEP. Either vaccine may be used, although it is recommended that the vaccine series be initiated and completed with the same vaccine product. Refer to [Table 8](#) for the protocol.

## Antibody Titers and Booster Vaccination for People (Post-Exposure Prophylaxis)

Testing of human sera is used to evaluate an immune response to rabies virus antigens. If the immune response is undetectable, a booster vaccination is recommended.

## Who should get a rabies titer as a part of the post-exposure prophylaxis?

For most persons completing postexposure prophylaxis, routine serological testing is not necessary. Certain groups do require a titer, such as:

- Individuals that are immunosuppressed, immunocompromised, or are taking immunosuppressants
- When there is significant deviation from the prophylaxis schedule (consult ODH)
- A person that received prophylaxis internationally with a product of questionable quality or storage conditions (consult with ODH)

## What are the steps to get a rabies titer test?

A blood sample must be drawn and serum from that sample must be submitted to a laboratory that performs the Rapid Fluorescent Focus Inhibition Test (RFFIT). This is the only accepted test for accurately determining rabies virus neutralizing antibody levels.

A list of laboratories that perform the RFFIT can be found on the [Centers for Disease Control and Prevention](#) website.

## How do I interpret the titer results?

Contact your physician.

WHO (international) guidelines require a rabies antibody level greater than or equal to 0.5 IU/mL to demonstrate an adequate response to vaccination. [ACIP](#) (United States) now endorses a rabies antibody level greater than or equal to 0.5 IU/mL which replaces the previous minimum acceptable rabies antibody titer (1:5 (~0.11 IU/mL)). ACIP aligned with WHO because

the higher value provides a more conservative limit for indicating inadequate response to rabies vaccination and the need for booster doses.

## Diagnostic Testing for Human Rabies

Ante-mortem and post-mortem testing are available for suspect human rabies cases.

### A physician has requested rabies testing for a patient - what are the next steps?

All testing (ante-mortem/post-mortem) for human rabies is performed at the Centers for Disease Control and Prevention. Pre-approval must be obtained, and all specimens must go through the Ohio Department of Health Laboratory unless otherwise specified. For pre-approval, contact ODH. For guidance on sample collection and shipping requirements, see [Ante Mortem/Post Mortem Testing](#) on CDC's website.

The following paperwork must be included with the shipment:

1. The [CDC Specimen Submission Form](#), CDC DASH Form 50.34
2. The Ohio Department of Health Laboratory [Microbiology Specimen Submission Form](#)
3. The [Possible Human Rabies - Patient Information Form](#), CDC 55.30 (E)

### What is the difference between ante-mortem and post-mortem testing (humans)?

The main difference is the type of specimen(s) required for testing. Ante-mortem testing requires saliva, a neck biopsy, serum, cerebrospinal fluid, and if available, a brain biopsy. Post-mortem testing requires a brain tissue specimen.

### What if the exposed person refuses to get prophylaxis?

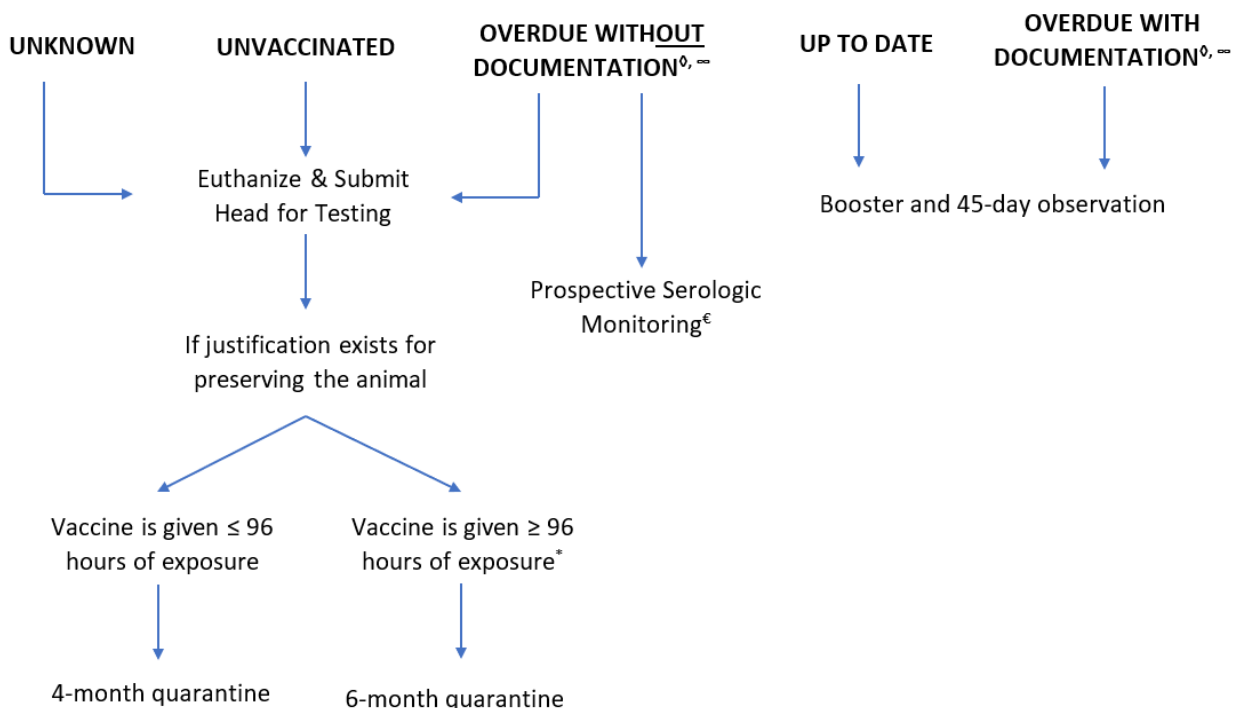
The local health department and ODH provides recommendations based on the most current guidelines from the Advisory Committee on Immunization Practices (ACIP) and the National Association of State Public Health Veterinarians (NASPHV). The final decision to get PrEP, PEP, a rabies titer, or booster vaccine must be made by the individual in consultation with his/her physician.

# Management of Animals That Have Been Exposed to Potential Rabies Vector Species

## Dogs and Cats

If a dog or cat is bitten by a rabies vector species and the biting animal got away, what should be done?

The public health action will be determined by the vaccination status of the bite victim which may be classified as unvaccinated, unknown, overdue without documentation, up to date, or overdue with documentation:



\*Rabies vaccine must be administered at least 28 days before the end of the quarantine period; however, prompt vaccination gives the animal the best chance of survival.

<sup>0</sup> See [How is vaccination status defined](#) for more information.

<sup>∞</sup> Overdue status will be determined by the animal's veterinarian.

<sup>€</sup> See [Prospective Serologic Monitoring](#) for more information about Prospective Serologic Monitoring

## Prospective Serologic Monitoring (PSM)

If approved by the local health department as an appropriate alternative and the animal is currently healthy, the owner can request PSM.

PSM entails collecting a blood sample before and after the administration of a rabies booster. If an animal was previously vaccinated, the animal will demonstrate an anamnestic response. The PSM protocol can be found on the National Association of State Public Health Veterinarians website, [Prospective Serologic Monitoring Protocol](#). If PSM is performed, the animal must be placed in quarantine until results are received.

PSM results will be indicated as:

- An adequate anamnestic response is documented: the animal will be observed for 45 days
- An inadequate anamnestic response is found: the animal will be quarantined for 4-6 months

## Ferrets, Livestock, Horses, and Other Domestic Animals

If these animals are bitten by a rabies vector species and the animal got away, what should be done?

The public health action depends on a number of factors including vaccination status of the bite victim:

Rabies Vaccine Status	Ferrets	Livestock & Horses	Other Domestic Animals
Unvaccinated or Unknown	Euthanize & submit head for testing ↓	Euthanize & submit head for testing ↓	Assessed case-by-case in consultation with ODH
	If justification exists for preserving the animal exists, 6-month quarantine*	If justification exists for preserving the animal exists, 6-month quarantine**	
Up to Date	Booster and 45-day observation	Booster and 45-day observation	
<u>Overdue</u>	Assessed case-by-case in consultation with ODH	Assessed case-by-case in consultation with ODH	

\*Rabies vaccination must be administered at least 28 days prior to the release of quarantine

\*\*Rabies vaccination for livestock/horses is not a state requirement

For more information about off-label use of rabies vaccines in livestock please see [Off-Label Vaccines – Livestock](#).

### Overdue Vaccination Status

Overdue status is determined by the veterinarian. These animals will be assessed on a case-by-case basis. Assessment should include exposure details, time elapsed since last vaccination, number of previous vaccinations, health status, and local rabies epidemiology.

### Off-Label Vaccines - Livestock

The use of an off-label vaccine may provide some protection to the animal when challenged against the rabies virus, however, the safety and efficacy are unknown. Public health must categorize animals receiving off-label vaccines as unvaccinated.

### If a herd animal has been potentially exposed to or infected with rabies, what should be done with the rest of the herd?

Multiple rabid animals in a herd and herbivore-to-herbivore transmission of rabies are uncommon. Therefore, restricting the rest of the herd if a single animal has been exposed to or infected with rabies is not usually necessary.

### Do livestock or horses have to be vaccinated against the rabies virus after an exposure?

Rabies vaccination for livestock/horses is not a state requirement but is highly recommended for animals that are particularly valuable or have frequent contact with people, even if it is off label.

### Is there a post-exposure prophylaxis (PEP) protocol for animals?

There is no approved post-exposure prophylaxis (PEP) protocol for animals exposed to the rabies virus; however, prompt cleaning and disinfection of bite wounds or areas in contact with potentially infected material is recommended. Administering a rabies vaccine (even if the animal is up to date on its rabies vaccination) as soon as possible may also provide protection.

### What should be done if an animal is suspected to have rabies?

If at any time an animal is suspected have rabies, a veterinarian should be consulted. Until rabies can be ruled out, these animals should be confined, have restricted human and animal contact, and contact the local health department. Those handling a potentially rabid animal should take precautions to avoid bites and contact with saliva. Water repellent gloves and gowns should be worn to protect the skin. Eye protection and a mask or a visor face shield is also encouraged when there is a risk of salivary droplet contact. Routine disinfection neutralizes rabies virus.

Wildlife that are displaying odd behavior or appear ill should be reported to the local health department or the Ohio Department of Natural Resources. Depending on the epidemiology of rabies in the area, the animal may be captured, euthanized, and submitted for rabies testing.

## Diagnostic Testing for Animal Rabies

Animals only can be tested post-mortem.

### What are the approved tests?

Direct Fluorescent Antibody (dFA) testing is the gold standard for rabies detection in animals. Since the virus is neurotropic, brain tissue is used to test for the rabies antigen. The Ohio Department of Health Laboratory (ODHL) is the only laboratory in the state of Ohio that can perform this testing.

### How long does it take to get results?

Once the specimen has been received by the Ohio Department of Health Laboratory, results are usually available at the end of the next business day. Specimens received on Friday or the day before a holiday may be held until the next business day for testing.

### What do the test results mean?

The specimen will be resultated as by the Ohio Department of Health Laboratory as positive, negative, or indeterminant (unsatisfactory or test not performed).

#### Positive

Rabies virus was detected in the tissue sample. Consider contact with animal's saliva and/or neural tissue an exposure. For management of human exposures, refer to, [Rabies Post-exposure Prophylaxis](#), and for animal exposures refer to, [Management of Animals that have been Exposed to Potential Rabies Vector Species](#).

#### Negative

Rabies virus was not detected in the tissue sample. Those exposed to animal's saliva and/or neural tissue do not need post-exposure prophylaxis. Animals being held in quarantine due to contact can be released.

#### Indeterminant (Unsatisfactory or Test Not Performed)

The test is unable to rule-in/rule-out rabies virus in the tissue due to missing, damaged, mutilated, or decomposed samples (which may be termed as "test not performed or unsatisfactory"). These results will generate the same public health recommendations as positive results for animals known to be rabies vector species.

### What is the difference between variant typing and a rabies reservoir?

#### Variant Typing

In the United States, several genetically distinct rabies virus variants have been identified in terrestrial mammals, including bats, raccoons, skunks, and foxes. All rabies variants cause clinical disease; however, some variants are more virulent than others. Mammals are susceptible to all variants. USDA licensed rabies vaccination for animals and pre-exposure and post-exposure prophylaxis for people are effective against all rabies variants.

## Reservoirs

Although all mammals are susceptible to rabies, only a few serve as terrestrial reservoirs for the disease. As a reservoir, these animals maintain the circulation of rabies virus in a defined area. In Ohio, raccoons serve as the (terrestrial) reservoir of raccoon rabies variant in the northeastern part of the state.

## Why are some specimens submitted to the CDC for variant typing?

ODHL submits dFA positive, non-bat specimens to the Centers for Disease Control and Prevention (CDC). Variant typing is achieved by using monoclonal antibody testing and RT-PCR. Variant typing aids to determine the source of the virus (through comparison on a phylogenetic tree) and whether spillover or translocation has occurred which helps direct intervention efforts.

## What is the direct Rapid Immunohistochemical Test (dRIT)?

The United States Department of Agriculture (USDA), Animal and Plant Health Inspection Services (APHIS), Wildlife Services (WS) field surveillance team performs a screening test called the direct rapid immunohistochemical test (dRIT) on roadkill and oddly acting animals. This surveillance is conducted in northeastern Ohio where raccoon rabies variant is enzootic. All positive dRIT results must be confirmed by dFA. The dRIT is not a suitable test for suspect rabid animals with human or animal exposure - testing is not done daily, and confirmation testing is needed which delays prompt public health intervention(s).

## If an animal is euthanized during its observation or quarantine period, should it be submitted for rabies testing?

Yes. If animal dies for any reason (and regardless of its vaccination status) during its observation/quarantine period the head must be submitted for rabies testing ([Ohio Administrative Code 3701-3-29 Biting animal to be confined; veterinarian to report](#)).

## Shipping for Animal Specimens

### Where do I send animal specimens to be tested for rabies?

The Ohio Department of Health Laboratory is the only lab in the state of Ohio that performs dFA testing. Samples should be shipped overnight directly to ODHL. The lab does not accept specimens after 5pm, on weekends, or on holidays. For more information about shipping a sample, contact the Ohio Department of Health Laboratory and refer to the [Rabies Test Submission Report \(Animal\)](#)

### How much does rabies testing cost?

The state absorbs the fee for testing and shipping for approved samples when sent through the local health department or a veterinary clinic. If a veterinary clinic is interested in shipping samples directly to the laboratory, please provide them with shipping instructions and courier information.

Exceptions: A fee will be charged for shipping and testing of [low risk rabies vectors and non-rabies vector species](#). For more information about what samples are considered “approved” contact either the local health department or ODH. For more information about the cost for testing of non-approved animal species, contact the lab at (888) 634-5227.

### What animal samples should be collected and sent to the Ohio Department of Health Laboratory?

Never send a live animal. The animal should be humanely euthanized by a trained individual that has received PrEP in a manner that preserves the brain. The brain must be relatively fresh and in good condition, as the test cannot be reliably performed if the different regions of the brain cannot be identified.

#### Small animals

For small mammals such as bats, the whole body can be submitted.

#### Medium animals

For animals such as dogs, cats, raccoons, and ferrets, the head must be removed before submission. Do not remove the brain, as the sections required for testing are easily damaged. See [Guidelines for Head Removal and Carcass Disposal \(Appendix B\)](#) for more information.

#### Large animals

For animals such as horses and cattle, only the brain should be submitted. The Ohio Department of Agriculture (ODA), Animal Disease and Diagnostic Lab (ADDL) will accept the entire head, remove the brain, and send the brain to ODHL. For more information on fees, shipping, and submission forms, contact ODA, ADDL at (614) 728-6220 or visit their website and search for [Test and Fees Search](#). The [Microbiology Specimen Submission Form](#), in addition to the [ADDL General Submission Form](#), must accompany all specimens first going to ODA, ADDL.



## How should the specimen be handled and shipped?

Caution must be taken during sample preparation to avoid direct personal contact with specimens. Pre-exposure vaccination is recommended for persons preparing rabies specimens. Please refer to the [ODHL Rabies Test Submission Form \(page 2\)](#) or the guidance document, [Shipping Guidelines for Animal Rabies Specimens \(Appendix C\)](#), for additional details. For shipping questions, please call the ODHL at 1-888-634-5227, the shipping carrier, and refer to the [Electronic Code of Federal Regulations](#).

## Will the Ohio Department of Health Laboratory (ODHL) return the head after testing?

The ODHL does not return specimens to the submitter. They are severely disfigured during testing, and for owners this is often more traumatic than the knowledge of decapitation. Though strongly discouraged, a special request may be made provided the submitter pays for the return shipping and handling. ODHL reserves the right to refuse any requests. If the rabies test result is either indeterminate or positive, the head will not be returned.

## Animal Quarantine

### What are the recommendations for rabies quarantine? \*

Local health departments and the Ohio Department of Agriculture (regarding livestock) have the authority to impose quarantines on animals that have exposed a person or have potentially been exposed to rabies. These agencies will determine the specific restrictions, location, and length of quarantine, [ORC 955.26 Rabies quarantine](#).

Quarantine generally involves:

- Keeping animals in the home or the barn in the case of livestock.
  - If the animal must go outside, it must be supervised and kept on a leash in a confined area (fence)
  - In certain circumstances, quarantine may be ordered at an animal control agency or veterinary clinic. All expenses incurred will be the responsibility of the owner.
- Restricting unnecessary contact with humans and non-quarantined animals
- Discouraging licking and play that may encourage biting behavior
- Educating owners on signs of rabies
  - If the animal should develop any illness or display any unusual behavior during the quarantine period, the owners should contact a local veterinarian for examination and notify the regulatory agency

\*Isolation is used to separate persons or animals who have a communicable disease from those who are healthy, while quarantine is used to separate and restrict the movement of well persons or animals who may have been exposed to a communicable disease to see if they become ill ([U.S. Department of Health and Human Services](#)).

## Animal Rabies Vaccination

### Can owners vaccinate their own pets?

Parenteral rabies vaccines should be administered by or under the supervision of a licensed veterinarian. Owner vaccination is strongly discouraged due to the lack of accountability on vaccine storage and administration. Owner-vaccinated animals are considered unvaccinated when a public health risk is assessed.

### Can the rabies vaccine be administered to off-label species and hybrids?

The safety and efficacy of the rabies vaccine has not been established in species other than those listed on the product label; however, it may afford some protection. Off-label use of the vaccine should be considered for valuable, at-risk animals and for those that have frequent contact with the public. For the purposes of protecting public health, these animals will be considered unvaccinated.

### How is vaccination status defined?

A USDA-licensed vaccine must be administered by or under the supervision of a veterinarian for the approved species. Local jurisdictions define who is permitted to administer the vaccine.

An animal is considered immunized 28 days after its initial vaccination. Regardless of the age of the animal at its first rabies vaccine, a booster should be administered one year later. Proof of vaccination is confirmed by a valid rabies vaccination certificate ([NASPHV form 51](#)) that is signed by the veterinarian. This assures for proper storage and administration of the vaccine.

- If an animal's vaccination history is unknown, assume it has never been vaccinated
- A previously vaccinated animal is considered currently vaccinated immediately after a booster, even if it was overdue

### How should rabies vaccination be documented?

Vaccination status should be documented on [NASPHV Form 51](#), the rabies vaccination certificate recommended by the National Association of State Public Health Veterinarians (NASPHV), or an equivalent. The form must be completed in full and signed by the administering or supervising veterinarian. Computer-generated forms containing the same information are also acceptable ([Compendium of Animal Rabies Prevention and Control, 2016](#)).

### Can rabies serology (titer) be used instead of vaccination?

Serology cannot be used in place of a rabies vaccination. Rabies virus antibody titers are indicative of a response to either a vaccine or infection and do not directly correlate with protection. Other immunologic factors play a role in preventing rabies and our abilities to measure and interpret those other factors are not well-developed. Therefore, evidence of circulating rabies virus antibodies in animals should not be used as a substitute for booster vaccinations ([Compendium of Animal Rabies Prevention and Control, 2016](#)). Positive titers may be required by some countries prior to import to verify vaccination.

## Animal Rabies in Ohio

### What are the main rabies vector species in Ohio?

In Ohio, bats and raccoons serve as the reservoirs of the disease. Regardless, any bite or close encounter with an animal that is a rabies vector species should be reported to the local health department within 24 hours. This allows for early intervention to prevent disease.

### What species have been infected with rabies in Ohio?

Between 1980 and 2019, 1,675 Ohio animals have tested positive for rabies. The majority have been bats (1,112), followed by raccoons (252) and skunks (213). Other rabid wild and domestic animals included: fox (23), cows (22), horses (16), dogs (14), cats (14), groundhogs (3), coyote (2), opossum (2), deer (1), and chipmunks (1). For the most recent animal rabies data, see “Where does rabies occur in Ohio” on the [Ohio Department of Health’s \(ODH\) Rabies website](#).

### What about other reportable animal diseases?

Rabies is the only animal disease that is reportable to the local health department/the Ohio Department of Health. Other reportable animal diseases must be reported to the Ohio Department of Agriculture’s Division of Animal Health. A list of reportable animal diseases can be found at [OAC 901:1-21-02 Designation of dangerously contagious or infectious and reportable diseases](#).

## Contact List

Ohio Department of Health, Bureau of Infectious Diseases, Zoonotic Disease Program  
246 N. High St.  
Columbus, OH 43215  
Phone: 614-752-1029  
Fax: 614-564-2437  
[Zoonoses@odh.ohio.gov](mailto:Zoonoses@odh.ohio.gov)

Ohio Department of Health, Bureau of Public Health Laboratory  
8995 E. Main Street, Building 22  
Reynoldsburg, OH 43068  
Phone: 888-634-5227  
Fax: 614-387-1505  
[odhlabs@odh.ohio.gov](mailto:odhlabs@odh.ohio.gov)

Ohio Department of Agriculture, Division of Animal Health, Animal Disease and Diagnostic Laboratory  
8995 E. Main St.  
Reynoldsburg, OH 43068  
Phone: 614-728-6220  
Fax: 614-728-6310  
[animal@agri.ohio.gov](mailto:animal@agri.ohio.gov)

## Tables and References

Table 1. Commonly Encountered Rabies Vector Species

<b>Potential Rabies Vectors</b>				
<b>Domestic Animals</b>	Alpaca	Goat		
	Cat	Horse		
	Cow	Llama		
	Dog	Mule		
	Donkey	Pig		
	Ferret	Sheep		
<b>Wild Animals (captive wild and hybrid animals)</b>	Badger	Deer	Monkey	Raccoon
	Bat	Elk	Moose	Skunk
	Bear	Ermine	Mountain lion	Weasel
	Beaver	Fisher	Muskrat	Wolf
	Bison	Fox	Opossum	Wolf/dog hybrid
	Bobcat	Lynx	Otter	Wolverine
	Cat hybrid	Marten	Porcupine	Woodchuck/Groundhog
	Coyote	Mink	Puma/Cougar	
<b>Species that are not rabies vectors*</b>	All amphibians	Gopher	Mole	Squirrel
	All birds	Guinea pig	Mouse	Vole
	All reptiles	Hamster	Rabbit	
	Chipmunk	Hare	Rat	
	Gerbil	Hedgehog	Shrew	

\*Small rodents and rabbits are rarely infected with rabies; therefore, it is not recommended to test these species. Rabies post-exposure prophylaxis for people exposed to these species is discouraged unless a unique situation has been identified. Please consult with ODH prior to submitting samples from these species.

Table 2. Rabies Exposures (excluding bats\*) to Humans and Domestic Animals

	<b>High Risk of Exposure: Post-exposure prophylaxis <u>recommended</u></b>	<b>No Risk of Exposure: Post-exposure prophylaxis <u>not recommended</u></b>
<b>Terrestrial Mammals*</b>	<ul style="list-style-type: none"> <li>• Animal bite that broke the skin</li> <li>• An animal licked fresh, open wound</li> <li>• Neural tissue or saliva from an animal had contact with mucous membranes</li> <li>• [Rare] a wet scratch from an animal that breaks the skin and is contaminated by saliva</li> </ul>	<ul style="list-style-type: none"> <li>• A person/animal touched something a rabid animal touched</li> <li>• Infected saliva had contact with intact skin</li> <li>• A person/animal was in the same room as the rabid animal (bats are an exception)</li> <li>• Properly cooked meat or pasteurized milk from rabid animal was ingested (although this is strongly discouraged)</li> <li>• A person petted a rabid animal</li> <li>• A person/animal had contact with urine, feces, blood, or skunk spray of a rabid animal</li> <li>• An animal ate or drank from a bowl after a rabid animal did</li> <li>• Dry scratch</li> </ul>
<b>Other</b>	<ul style="list-style-type: none"> <li>• A person received an organ transplant from an infected donor</li> <li>• Aerosolization of rabies specimen while processing in a laboratory without personal protective equipment or use of biosecurity cabinet.</li> </ul>	<ul style="list-style-type: none"> <li>• Inhalation such as when spelunking</li> </ul>

\*For bat exposures, see [Table 5](#).

**Table 3. 10-Day Observation Period for Dogs, Cats, & Ferrets that Bite People**

<b>Outcome</b>	<b>Recommendations</b>
The animal is healthy at the end of the 10-day period	The bite victim does not need PEP
	If animal is overdue or unvaccinated for rabies vaccine*, administer vaccine <u>after</u> the completion of the 10-day observation
The animal becomes ill during the 10-day period	The animal must be evaluated by a veterinarian and the illness reported to the local health department to determine whether euthanasia and rabies testing are warranted
The biting animal dies <u>for any reason</u> or is euthanized during the 10-day confinement period	The head must be submitted for rabies testing ( <a href="#">OAC 3701-3-29</a> )

\*Per OAC 3701-3-29, “No dog, cat, or ferret shall be released from the required quarantine unless and until it has a current rabies vaccination status as demonstrated by a rabies vaccination certificate signed by a licensed doctor of veterinary medicine.”

**Table 4. 14-Day Observation Period for Livestock & Horses that Bite People**

<b>Outcome</b>	<b>Recommendations</b>
The animal is healthy at the end of the 14-day period	The bite victim does not need PEP
	<a href="#">Rabies vaccination is recommended but not required for livestock in Ohio</a>
The animal becomes ill during the 14-day period	The animal must be evaluated by a veterinarian and the illness reported to the local health department or the Ohio Department of Agriculture to determine whether euthanasia and rabies testing are warranted
The biting animal dies <u>for any reason</u> during the 14-day confinement period	The head must be submitted for rabies testing ( <a href="#">OAC 3701-3-29</a> )

**Table 5. Examples of Bat Exposures and Non-exposures\***

<p align="center"><b>High Risk of Exposure: Post-exposure prophylaxis <u>recommended</u></b></p>	<p align="center"><b>No Risk of Exposure: Post-exposure prophylaxis <u>not recommended</u></b></p>
<ul style="list-style-type: none"> <li>• Bat found in room with a previously unattended child or pet, a person with sensory or mental impairment, or an intoxicated person</li> <li>• Person touched a bat without seeing which part of the bat they touched</li> <li>• Bat flew into someone and had contact with bare skin</li> <li>• Adult saw a bat fly near a child and the child reports “it hit me”</li> <li>• Someone, with bare feet, stepped on a live or dead bat</li> <li>• An unidentified flying object hit someone at dusk or dawn, left a mark(s) where it hit, and the place that it came from is where bats may roost such as <a href="#">caves, rock crevices, old buildings, bridges, mines, and trees</a></li> <li>• Person awoke to find a bat in room with them</li> <li>• Person slept in camp cabin which was small, closed-in, and bats were swooping past sleeping people</li> <li>• Person put hand in firewood or brush, felt pain, and then sees bat</li> <li>• Person touches the teeth of a bat</li> </ul>	<ul style="list-style-type: none"> <li>• Adult touched fur, wings, or legs of a live bat while looking at it</li> <li>• A bat brushed past thick long hair of teenager or adult, and they are certain there was no skin contact</li> <li>• Person had contact with a completely dried-up carcass of bat</li> <li>• A bat swooped past an awake teenager or adult, but the person did not feel bat touch them</li> <li>• A dead bat found in the room of a home with no evidence that a child was in the room unsupervised or that anyone had slept in that room the night before</li> <li>• Bats were heard or seen in walls or attic of a house</li> <li>• Bats were found in other parts of a house, even if bedroom doors were open</li> <li>• Bats were heard or seen hanging from upper rafters of large A-frame cabin</li> <li>• Bat guano or other signs of bats (<a href="#">staining near active roost entries, roost chatter, or musky odor</a>) was found in sleeping quarters</li> <li>• Bat found in place where no one has been</li> <li>• An adult is certain that a bite or other exposure of saliva to a mucous membrane or open wound did not occur</li> <li>• A person/animal touched something a bat touched</li> </ul>

\*For situations in which exposure is difficult to determine, consult with the Ohio Department of Health. The only way to definitively determine whether an animal is infected with rabies is to euthanize it and test brain tissue.



Table 6. Rabies Post-Exposure Prophylaxis; Healthy, Immunocompetent Persons, Including Pregnant Women

Vaccination Status	Treatment	Dosage/Administration	Day of Regimen *
<b>Not Previously Vaccinated</b>	Wound cleansing	Soap and water; if available, use virucidal agent to irrigate (e.g., povidine-iodine solution)	Day 0
	Tetanus toxoid	Booster dose should be considered	Day 0
	Human rabies immunoglobulin (HRIG)	See product insert for dosing. -Infiltrate HRIG into and around wound if feasible -Remaining HRIG can be given IM at a site distant from the vaccination site (e.g., opposite arm as rabies vaccine)	Day 0 (up to Day 7 if not previously administered)  HRIG is not recommended after Day 7
	Rabies Vaccine	1.0 mL dose given IM in the deltoid area (anterolateral part of thigh in young children) <b>NEVER GIVE IN THE GLUTEALS</b>	Day 0, 3, 7, & 14
<b>Previously Vaccinated</b>	Wound Cleansing	Soap and water; if available, use virucidal agent to irrigate (e.g., povidine-iodine solution)	Day 0
	Tetanus toxoid	Booster dose should be considered	Day 0
	Human rabies immunoglobulin (HRIG)	<b>DO NOT GIVE</b>	N/A
	Rabies Vaccine	1.0 mL dose given IM in the deltoid area (anterolateral part of thigh in young children) <b>NEVER GIVE IN THE GLUTEALS</b>	Day 0 & 3

\*Day 0 is the day the first dose of vaccine is administered.

Table 7. Rabies Post-Exposure Prophylaxis (PEP); Immunocompromised Persons

Vaccination Status	Treatment	Dosage/Administration	Day of Regimen*
<b>Not Previously Vaccinated</b>	Wound cleansing	Soap and water; if available, use virucidal agent to irrigate (e.g., povidine-iodine solution)	Day 0
	Tetanus toxoid	Booster dose should be considered	Day 0
	Human rabies immunoglobulin (HRIG)	See product insert for dosing. <ul style="list-style-type: none"> <li>• Infiltrate HRIG into and around wound if feasible.</li> <li>• Remaining HRIG can be given IM at a site distant from the vaccination site (e.g., opposite arm as rabies vaccine)</li> </ul>	Day 0 (up to Day 7 if not previously administered)  HRIG is not recommended after Day 7
	Rabies Vaccine	1.0 mL dose given IM in the deltoid area (anterolateral part of thigh in young children) <b>NEVER GIVE IN THE GLUTEALS</b>	Day 0, 3, 7, 14, & <b>28</b>
	Post-vaccination serologic testing	RFFIT antibody titer	1-2 weeks after last vaccine is administered
<b>Previously Vaccinated</b>	Wound Cleansing	Soap and water; if available, use virucidal agent to irrigate (e.g., povidine-iodine solution)	Day 0
	Tetanus toxoid	Booster dose should be considered	Day 0
	Human rabies immunoglobulin (HRIG)	<b>DO NOT GIVE</b>	N/A
	Rabies Vaccine	1.0 mL dose given IM in the deltoid area (anterolateral part of thigh in young children) <b>NEVER GIVE IN THE GLUTEALS</b>	Day 0 & 3
	Post-vaccination serologic testing	RFFIT antibody titer	1-2 weeks after last vaccine is administered

\*Day 0 is the day the first dose of vaccine is administered.

**Table 8. Rabies Pre-Exposure Prophylaxis Protocol**

<b>Risk Category</b>	<b>Who This Typically* Affects</b>	<b>Recommendations**</b>
<b>Risk Category 1</b> <i>Highest risk</i>	People who work with live or concentrated rabies virus in laboratories	Days 0 and 7  <b>AND</b>  Check titer every 6 months
<b>Risk Category 2</b>	People who frequently do at least one of the following: handle bats, have contact with bats, enter high-density bat environments like caves, or perform animal necropsies	Days 0 and 7  <b>AND</b>  Check titer every 2 years
<b>Risk Category 3</b>	People who interact with, or are at higher risk to interact, with mammals other than bats that could be rabid, for a period longer than three years after they receive PrEP  This group includes: <ul style="list-style-type: none"> <li>• Most veterinarians, veterinary technicians, animal control officers, wildlife biologists, rehabilitators, trappers, and spelunkers (cave explorers)</li> <li>• Certain travelers to regions outside of the United States where rabies in dogs is commonly found</li> </ul>	Days 0 and 7  <b>PLUS</b>  Either a one-time titer check after 1 year and up to 3 years following the first 2-dose vaccination  <b>OR</b>  1-dose booster between 3 weeks and 3 years following the first vaccine in the 2-dose vaccination
<b>Risk Category 4</b>	Same population as risk category 3, but at a higher risk for ≤ three years after they receive PrEP	Days 0 and 7
<b>Risk Category 5</b> <i>Lowest risk</i>	General U.S. population	None

\*The typical characteristics described may not include the characteristics of all activities that fall within the described risk group.

\*\*Day 0 is the day the first dose of vaccine is administered.

# Appendices

## Appendix A: Bat Euthanasia Guidelines – Container Method with Overdose of Isoflurane (1/24/2018)

### **Purpose**

To provide guidance for those jurisdictions that perform euthanasia on bats for public health testing purposes. Although other methods may be utilized, the container method with overdose of isoflurane has been proven to be one of the safest, most humane, and effective methods of euthanasia. The "[American Veterinary Medical Association \(AVMA\) Guidelines for the Euthanasia of Animals: 2013 Edition](#)," recognizes using an overdose of isoflurane as an acceptable method of euthanasia in small mammals. The use of an overdose of isoflurane for euthanasia of bats is one example that meets this criterion and is not meant to be exhaustive. While there is little objective information in the literature regarding humane techniques for euthanasia in bats, the basic principles of euthanasia apply. Death must be as painless and distress free as possible. Any technique chosen must induce loss of consciousness as quickly as possible, followed by cardiac and respiratory arrest. The technique must also be reliable, irreversible, and most importantly, safe for humans.

The AVMA euthanasia guidelines recognize the inherent lack of control over free-ranging wildlife, and that the quickest and most humane means of terminating the life of free-ranging wildlife may not always meet all criteria established. Moreover, the method selected will often be situation specific, as a means of minimizing potential risks to the animal's welfare, personal safety, and potential infectious disease concerns. The guidelines specifically state that "human safety is of utmost importance for all euthanasia procedures." The procedure as well as other considerations are detailed below. It is recommended that jurisdictions establish a relationship with a local veterinary clinic if a live animal is submitted and isoflurane is unattainable. Live animals will not be accepted at the state lab.

### **Background Information**

#### *Animal Handling*

Any bat may be infected with rabies; therefore, bats should NEVER be handled with bare hands. Non-permeable gloves (i.e., nitrile or leather work gloves) must be worn when handling bats. All personnel handling bats on a regular basis should be vaccinated against rabies and be properly trained in the use of euthanasia techniques. If a vaccinated person is not accessible, then a person with previous experience is preferred.

Personnel must be provided with appropriate personal protective equipment (PPE) which may include rabies vaccination (Pre-exposure Prophylaxis, more commonly referred to as PrEP), gloves, and proper ventilation or scavenging system when using isoflurane. Caution and extra care should be used if these ideal circumstances cannot be met while performing euthanasia on a bat that must be tested.

### *Isoflurane*

Isoflurane is a general inhalation anesthetic drug that is produced in liquid form and administered by vaporizing the liquid. It is not a controlled substance; therefore, no Drug Enforcement Administration (DEA) license is needed to order the chemical. Procedures should be in place to reduce worker exposure to isoflurane particularly those who are pregnant or have pre-existing respiratory conditions. The company's [Material Safety Data Sheet \(MSDS\)](#) must be reviewed prior to use to ensure that appropriate measures are taken to maintain the safety and health of individuals. The MSDS is a technical document that contains information on the hazardous ingredients of the product, its physical and chemical characteristics, its effect on human health, handling precautions, measures to control exposure, emergency and first aid procedures, and methods to contain a spill.

### *Rabies Vaccination and Titers*

All personnel handling bats should receive the initial rabies vaccination series (PrEP) and have a rabies antibody titers checked every two years. If an individual's titer is inadequate, a booster vaccine should be given. Please refer to the [Advisory Committee for Immunization Practices \(ACIP\)](#) for the most updated PrEP vaccine schedule.

### **Procedure**

1. Use a small clear glass, plastic jar, or bottle that can be completely sealed, such as a "Tupperware®" or "Rubbermaid®" container. An airtight metal container is preferred.
2. Place a piece of cotton or gauze into the chamber and pour a small amount (several drops) of the isoflurane up to 5ml (1 teaspoon) on the cotton. Alternatively, an eye dropper can be used to decant the anesthetic.
3. Close the container for a minute, to "charge" the container. After the container is charged, quickly place the bat into the container and close the lid.
  - a. When placing the bat in the chamber, make sure the bat does not contact the isoflurane directly.
  - b. The bat will likely die within 10-15 minutes; keeping it in the chamber for 20-30 minutes will ensure death.
  - c. Be cautious when opening the container to remove the bat.
4. Confirm its death by looking for an absence of breath, movement, or reaction to stimuli. If it is not dead, repeat the above instructions.
5. When finished, and after having removed the dead bat from the container, open the container away from all personnel (this can be done outdoors), and let the remaining anesthetic evaporate from the container and from the cotton or gauze.
  - a. Keep the dead bat at ~4°C/39.2°F (including when shipped to the laboratory for testing).
6. Once the gas has evaporated, the cotton or gauze should be placed in a Ziploc® bag and then discarded with regular solid waste.
7. The container can then be disinfected with any common household disinfectant.
8. Wash your hands with soap and water when finished.

## Unacceptable Bat Euthanasia Methods

The following methods are considered unacceptable for either humane or sample quality considerations:

- Freezing, with or without anesthesia.
- Drowning, with or without anesthesia.
- Use of car exhaust or other unapproved gases.
- Blunt force trauma and gunshot.
- Ether.
- Thoracic compression.
- Cooling to induce torpor (a state of physical or mental inactivity) followed by freezing.

### For more information, please visit:

- American Veterinary Medical Association  
<https://www.avma.org/resources-tools/avma-policies/avma-guidelines-euthanasia-animals>
- Centers for Disease Control and Prevention and the National Institute for Occupational Safety and Health  
<https://www.cdc.gov/niosh/index.htm>
- Food and Drug Administration  
[https://www.accessdata.fda.gov/drugsatfda\\_docs/label/2010/017624s036lbl.pdf](https://www.accessdata.fda.gov/drugsatfda_docs/label/2010/017624s036lbl.pdf)

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8. “Human Rabies Prevention—United States, 2008. Recommendations of the Advisory Committee on Immunization Practices”. *MMWR* 2008; 57:1-28.
9. “Guidelines for Euthanasia of Nondomestic Animals,” American Association of Zoo

Veterinarians, 2006.

## Appendix B: Guidelines for Head Removal and Carcass Disposal (7/2/19)

### Removal of Heads for Rabies Testing

Decapitation of rabies suspects should be performed by those with proper training and who have already received pre-exposure prophylaxis. Although there has never been a case of human rabies associated with decapitation, the brain, spinal cord, salivary glands, and the saliva may contain rabies virus that could be infectious. Precautions should be taken to avoid direct contact with skin, splashing into mucous membranes, and exercise caution with the use of sharp instruments. Hatchets and power saws may aerosolize infectious material and are not recommended for routine decapitations.

### Personal Protective Equipment

Protective covering for clothing should include a surgical gown, plastic apron, or coveralls. Hands should be protected with rubber gloves which may also be worn under heavyweight autopsy gloves. Face and eye protection should be worn, and a full-face shield is recommended. The animal should be placed in a tub or another area that can be properly disinfected. Alternatively, plastic sheeting can be placed under the animal, or the animal can be decapitated after being placed inside a body bag to catch the draining fluids. A sharp knife or scalpel will be needed.

### Methods

- With the animal in dorsal recumbency and the head extended, incise the skin immediately caudal to the larynx.
- The trachea should be sectioned and the muscles and associated soft tissue should be bisected to the level of the spinal cord.
- The head can be flexed, extended, or rotated to identify the atlanto-occipital joint so that the ligaments can be incised.
- Hyper-extend the head to expose the spinal cord for cutting and then sever the rest of the skin and soft tissue. Another method is to complete a circumferential incision to the level of the spinal cord followed by rotation of the head to sever the cord. If there is not adequate exposure to the spinal cord, continue locating and severing the vertebral ligaments.
- The head should be allowed to drain before placing it in a bag for packaging. All contact surfaces and instruments should be thoroughly cleaned and [disinfected](#) (rabies is an enveloped virus).

### **Carcass Disposal**

Because the rabies virus is primarily concentrated in the brain and salivary glands, only the head is considered medical waste. The remaining carcass can be disposed of by any legal means available in that locality. The carcass should be double bagged before transport. If the animal was positive, incineration would inactivate the virus and the remains would not be infectious. If the animal is to be buried, ensure that scavengers cannot recover the body. If the ground is too frozen for excavation, the body should not be left outside; the cold temperatures can preserve the virus for extended periods of time.



## Appendix C: Shipping Guidelines for Animal Rabies Specimens (6/28/19)

### Specimen Collection

Do not submit live animals. The animal should be humanely euthanized without damage to the head. The head must be removed from the body and submitted intact for examination. The entire body of a bat may be submitted. For livestock samples, the [Ohio Department of Agriculture, Animal Disease and Diagnostic Laboratory](#) may be contacted for brain removal. Do **NOT** freeze the specimen. The specimen should be kept cold, preferably at 4°C/39.2°F. The specimens must be sent to the lab in an appropriate specimen shipping container (see specifics below).

**Note:** *Water-repellent gloves, protective clothing, and goggles should be worn for safety when handling the specimen. Carcasses should be disposed of in accordance with local and state laws.*

### Shipping Materials

The shipper is responsible for the proper packaging and labeling of diagnostic specimens. Tools, cages, and other surfaces potentially contaminated can be disinfected with a 10% solution of sodium hypochlorite (household bleach) in water. A 10% solution of bleach is 1-part bleach and 9-parts water.

Materials:

- Outer cardboard box.
- Insulated container (larger/heavier heads will require box with thicker walls).
- 2 biohazard bags; if biohazard bags are not available, heavy plastic bags may be used but they must be double bagged and properly sealed to prevent leakage.
- Ice packs (store frozen until needed).
- If available, absorbent sheets (newspaper may be used) to be placed in bags along with the specimen.
- One zip-lock bag for the [rabies test submission report form](#).



### Packing Instructions

1. Place specimen in bag and seal.

- When shipping more than 1 specimen in the same container, make sure that each specimen is individually bagged and clearly marked (masking tape works well as a makeshift label).
2. If sharp objects protrude from the specimen (i.e., bone fragments), wrap the specimen in several layers of newspaper prior to putting the specimen into plastic bag.
3. Place the bagged specimen(s) into another biohazard/garbage bag and seal.
4. Do not use glass, wire, tag fasteners, or other materials which could puncture packaging or cause injury.
5. A fully completed Rabies Test Submission Report form ([HEA 2539](#)) must be included for each specimen submitted.
  - Place the form in a Ziploc bag. If necessary, securely affix it in an envelope to the outside of the container.
6. Seal container securely with tape.
7. Wash hands.
8. Disinfect all materials contaminated in specimen preparation process with a 10% solution of sodium hypochlorite in water.

**Note:** Next day delivery is preferred for all specimens.

### **Shipping**

Specimens should be either hand delivered or sent overnight by courier service to ODHL between the hours of 8am to 5pm Monday through Friday. Do **NOT** ship on Fridays or before holidays as there may be no one at the lab to accept the delivery. If the specimen cannot be shipped out immediately, keep the specimen refrigerated. Do **NOT** freeze the specimen. Freezing the specimen will cause a delay in testing and possibly an unsatisfactory result or untestable specimen.

**Note:** There is no after-hours or weekend access to the laboratory facility to drop off specimens.

### **References and Additional Information**

Rabies Test Submission Report:

Visit [www.odh.ohio.gov](http://www.odh.ohio.gov) and search for “Form: ODH Laboratory Rabies Test Submission”

American Veterinary Medical Association, Training for Packaging and Shipping Lab Specimens: <https://www.avma.org/resources/practice-management/required-training-packaging-and-shipping-lab-specimens>

## Additional Resources

[Use of a Reduced \(4-Dose\) Vaccine Schedule for Postexposure Prophylaxis to Prevent Human Rabies: Recommendations of the Advisory Committee on Immunization Practices](#)

[Human Rabies Prevention – United States, 2008: Recommendations of the Advisory Committee on Immunization Practices](#)

[Use of a Modified Preexposure Prophylaxis Vaccination Schedule to Prevent Human Rabies: Recommendations of the Advisory Committee on Immunization Practices — United States, 2022](#)

[CDC Traveler’s Health: General Recommendations for Vaccination & Immunoprophylaxis](#)

[CDC Traveler’s Health: Yellow Book – Chapter 4 “Rabies”](#)

[AVMA Position on Canine Hybrids](#)

[AVMA Wolf and Wolf-dog Crosses Not Eligible to be Added to Dog Vaccine Labels](#)

[OAC 3701-3-29 Biting animal to be confined; veterinarian to report](#)

[NASPHV Rabies Compendium, 2016](#)