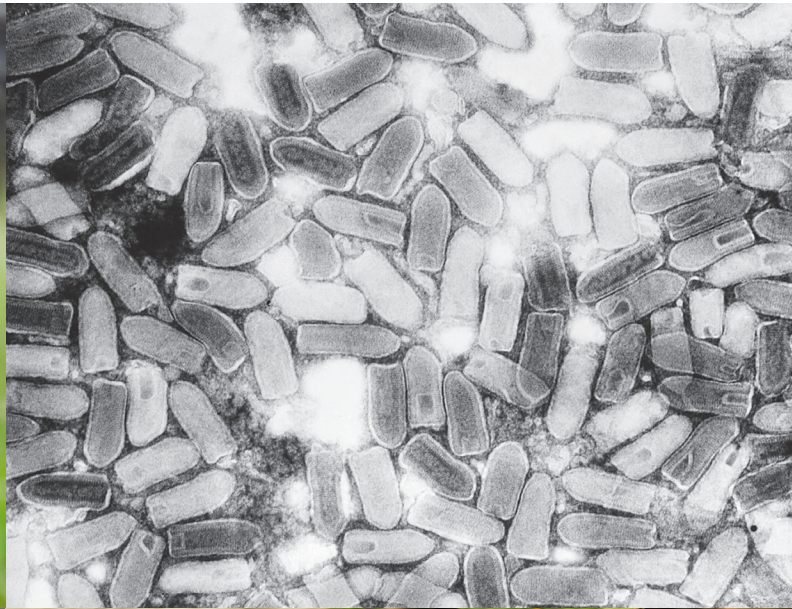


Tennessee Rabies Control Manual – 2021 –



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Introduction

The purpose of this manual is to provide current information on rabies control in Tennessee. It is intended for use by local health departments, animal control programs, veterinarians, and healthcare providers. Recommendations contained in this manual are based on the following publications:

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

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

[Compendium of Animal Rabies Prevention and Control, 2016](#)

[Tennessee Code Annotated](#) (Title 68, Chapter 8)

Rabies Control Working Group and Consultants:

Tennessee Department of Health

Communicable and Environmental Diseases and Emergency Preparedness

John Dunn

Mary-Margaret Fill

Jane Yackley

Dilani Goonewardene

Janelle Wenstrup

Lori LeMaster

Mark Tenpenny

John Roman

Ryan Mason

Laboratory Services

Bryan Mason

Vicki Lambert

Partners

University of Tennessee College of Veterinary Medicine

Marcy Souza

Tennessee Department of Agriculture

Douglas Balthaser

Kenneth Kim

USDA Animal and Plant Health Inspection Service-Wildlife Services

Erin Patrick

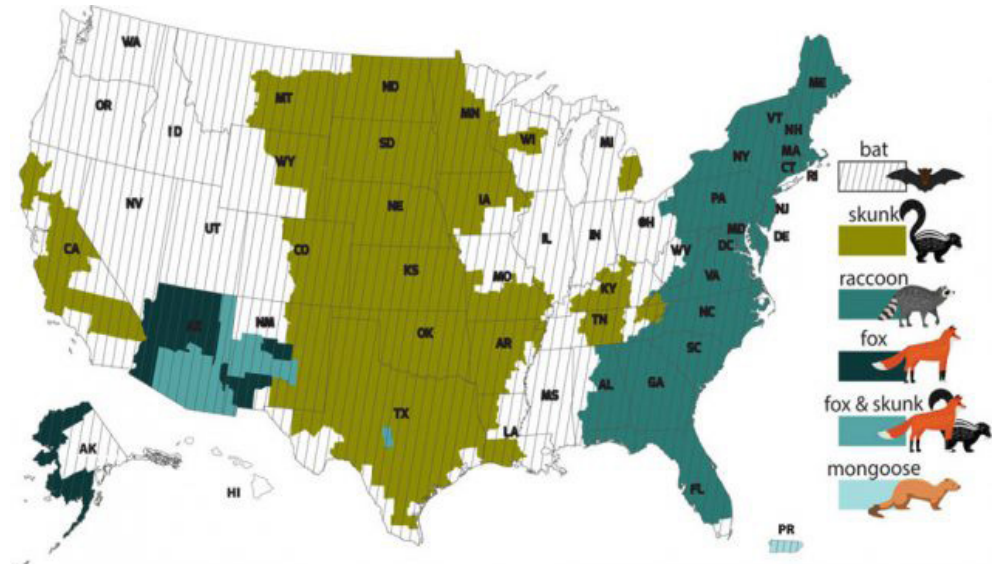
Overview

Rabies is a viral disease of mammals that is present in most countries of the world. All species of mammals, including humans, are susceptible to rabies virus infection, but only a few species are important as reservoirs for the virus.

Epidemiology

Rabies in Animals

Rabies in the United States is maintained in wild animal populations. Raccoons, skunks, and foxes are reservoir hosts in defined geographic areas. Bats are also reservoir hosts and maintain a number of bat-associated variants of the rabies virus. All states except Hawaii have reported rabies in bats. In Tennessee, skunks are the most common reservoir. To see the number of animal cases in Tennessee between 2015-2019 Refer to the [Cumulative Tennessee Animal Rabies Cases map](#) on page 10.



https://www.cdc.gov/rabies/exposure/animals/wildlife_reservoirs.html
Wildlife Reservoirs for Rabies

Rabies in Humans

Human rabies is rare in the United States as a result of domestic animal vaccination, animal control activities, and effective biologics for post-exposure prophylaxis (PEP). Nationwide only 2-3 cases of rabies in humans are reported each year. The most recent human rabies case in Tennessee occurred in 2002 and was due to a bat exposure. From 2010 to 2017, rabies was identified in 40 domestic animals in Tennessee, including 24 dogs, 10 horses, 4 cats, 1 cattle, and 1 pig. From 2010 to 2018, 16 human cases of rabies were identified in the United States. Among human cases, 8 were bat variant, 3 were raccoon variant, 5 were canine variant (due to exposure outside the US), and 1 was unknown.

Exposure to Rabies

Types of Exposure

Potential exposures to rabies are classified into 2 general categories: bite and non-bite.

Rabies is generally transmitted by a bite from a rabid animal, although certain non-bite situations may present a risk for transmission of the virus. Organ and tissue transplantations from donors who died of unrecognized rabies infection have resulted in secondary cases of rabies in at least 16 transplant recipients worldwide, including 5 in the United States. Though this is an extremely rare situation, it constitutes a high risk of transmission. No other laboratory-confirmed cases of human-to-human spread of rabies have ever been documented. A few cases of aerosol transmission of rabies virus have occurred in laboratories and possibly in a cave containing millions of bats. Rabies virus transmission via contamination of mucous membranes or an open wound with fresh saliva or CNS tissue is possible but unlikely.

Risk Assessment

Any potential exposure to rabies requires a prompt risk assessment. The first consideration is whether the exposure was bite or non-bite. Very few documented cases of rabies in humans have involved non-bite exposures, and these resulted from highly unusual situations.

Rabies virus is only present in saliva and nervous tissue of a rabid animal. Touching a rabid animal or contact with blood, urine, or feces does not constitute an exposure. The virus is fragile and does not persist in the environment; it is rapidly inactivated by sunlight, common disinfectants, and detergents. In general, if

material is dry then it contains no infectious rabies virus. However, the virus can remain infectious indefinitely in frozen material.

Other considerations when assessing an exposure include the type of animal involved and the situation leading to the bite. The risk of rabies transmission from normal, healthy domestic and non-reservoir wild animals is very low, whereas the risk from rabies reservoir species (skunks, bats, and possibly raccoons in Tennessee) is high. The risk associated with exposure to any animal showing signs of illness—especially neurologic illness—is increased. Finally, the risk from an unprovoked attack is greater than that from a provoked attack. If a person is attempting to handle a wild animal, any attack should be considered provoked. Refer to the [Rabies Exposure Flow Chart on page 11](#) and consult local or state public health officials when determining the level of rabies risk involved in an exposure.

Public Health Follow-up on Exposures

Epidemiologists or clinical staff at the local or state health department should be consulted when decisions are being made about testing an animal for rabies or recommending PEP for a potentially exposed person. Consultation is available with epidemiologists at the Tennessee Department of Health (TDH) Central Office in Nashville 24 hours a day by calling 615-741-7247. You can also reach out to your local health department for guidance. For a list of local health department locations and phone numbers visit: <https://www.tn.gov/health/health-program-areas/localdepartments.html>. If the animal is available for testing and is considered a high rabies risk, the State Public Health Laboratory should be notified of its impending arrival and the urgency of the test results (see [Laboratory Testing on page 6](#)).

If the animal tests positive for rabies, the results are indeterminate, or the specimen is unsatisfactory for testing, the lab will immediately notify appropriate points of contacts in Epidemiology and Environmental Health at the TDH Central Office. Epidemiology and Environmental Health will then notify their counterparts in the regional and local offices. Regional and local staff will coordinate with county health departments and animal control agencies as necessary to ensure appropriate follow-up actions are taken.

Prevention and Control

Domestic Animals

The primary defense for domestic animals against rabies is vaccination. A number of rabies vaccines are licensed for use in dogs, cats, ferrets, horses, cattle, and sheep. Veterinarians may also consider administering vaccines off-label to other species. Vaccination of domestic animals also provides primary protection for humans against exposure to rabies (see <http://www.nasphv.org/Documents/NASPHVRabiesCompendium.pdf> for additional information).

NOTE: Tennessee law requires that dogs and cats over 6 months of age be currently vaccinated against rabies. Required frequency of booster vaccinations depends upon the labeled duration of the vaccine used. State law does not specify whether 1- or 3-year vaccines must be used; however, local jurisdictions may have more stringent rules regarding rabies vaccination. A dog or cat is considered currently vaccinated only if the initial vaccination was administered at least 28 days previously, a valid certificate exists, and the revaccination date on the certificate has not been reached.

Management of a Domestic Animal Potentially Exposed to a Rabid Animal

Vaccinated: If a domestic animal that is currently vaccinated or overdue for vaccination is exposed to a confirmed or suspected rabid animal, it should receive a booster vaccine immediately and be observed by the owner for 45 days. Any sign of illness during this time should be promptly evaluated by a veterinarian. (see [Rabies Exposure Flow Chart on page 11](#)).

Unvaccinated: If an unvaccinated domestic animal is exposed to a confirmed or suspected rabid animal, it should be euthanized immediately. Alternatively a dog or cat may be strictly isolated for 4 months such that it has no direct contact with humans or other animals. Ferrets may also be isolated for 6 months in the same manner. Rabies vaccine should be administered as soon as possible after the exposure. Any illness during the confinement period should be evaluated by a veterinarian and reported to public health.

Wild Animals

The only licensed wildlife vaccine in the United States is Raboral V-RG[®], which is approved for oral vaccination of wild raccoons and coyotes.



Raboral V-RG[®] Rabies Vaccine Baits

No injectable vaccines are licensed for use in wild animals; however, wild animals kept in exhibits or zoos, or captive-bred wildlife permitted for private ownership may be vaccinated off-label by a licensed veterinarian.

Wild animals (wild or captive-bred) that are vaccinated off-label will be treated as unvaccinated by public health in the event of a human or domestic animal exposure. Wild-caught mammals may be incubating rabies and should be quarantined for at least 6 months after capture, although there is no well-defined quarantine period for wild animals. A captive wild mammal that is exposed to a confirmed or suspected rabid animal should be euthanized immediately. Wild animals should not be translocated to other areas; rabies and numerous other diseases can be introduced into new populations, resulting in serious risks to domestic animal, wildlife, and human health.

Humans

The best ways to protect humans against rabies exposure are 1.) avoiding wild or unfamiliar animals and 2.) vaccination of pets. People should not attempt to touch or feed wild or unfamiliar domestic animals and should contact animal control or wildlife officials when necessary for an animal that appears sick, injured, or otherwise in distress.

Management of an Animal that Bites a Person

Dogs, cats, ferrets: If a person is bitten by a healthy, vaccinated or unvaccinated, domestic dog, cat, or ferret, the animal should be confined and observed for 10 days from the time of the bite. Observation may take place at the home, an animal control facility, or a veterinary clinic. The location of confinement may vary depending on local ordinances, and some local jurisdictions may have rules requiring confinement at an animal control facility or veterinary clinic. Administration of rabies vaccine is not recommended during the observation period to avoid the risk of a rare adverse reaction causing signs that may be confused with rabies. The 10-day observation period is based on studies showing that dogs, cats, and ferrets do not shed rabies virus in their saliva for more than a few days before showing clinical signs of rabies. Therefore, if an animal remains healthy for a period of 10 days after a bite, rabies transmission was not possible at the time of the bite—regardless of the vaccination status or rabies exposure history of the animal. If the animal appears sick at the time of the bite or at any point during the subsequent 10 days, it should be evaluated by a veterinarian. If rabies is considered a possibility, the animal should be euthanized and tested. Public health officials and a healthcare provider should be consulted about the need to begin PEP immediately or to await test results. (see [Human that is bitten by an animal chart on page 12](#)).

Other domestic animals: For potential exposures involving other domestic animal species such as livestock, public health officials should be consulted. No observation period has been established for animals other than dogs, cats, and ferrets. The animal's health and vaccination status, the circumstances of the bite, and the epidemiology of rabies in the area will be considered in determining a course of action.

Wild carnivores: For exposures involving wild carnivore species such as raccoons, skunks, and foxes, the animal should be considered potentially rabid, and the exposed person should begin PEP as soon as possible in consultation with the state or local health department. If the animal is available, it should be tested for rabies, and, if negative, PEP can be discontinued.

Bats: No more than 1 percent of bats in the wild are thought to be rabid; however, a bat that is seen in daytime, behaves erratically, or lands on a person is more likely to be rabid. As a rule, bats should be left alone. If a person has uncontrolled direct contact with a bat (i.e. the person cannot say with certainty that

there was no possible contact with the mouth of the bat), the bat should be safely captured, if possible, and tested for rabies. If the bat is unavailable for testing, PEP should be initiated. The absence of a visible injury does not rule out the need for PEP. In most cases when a bat is seen in a house but no human contact is reported, there is no need for rabies testing or for PEP. In cases where a bat is found in the room with a sleeping or incapacitated person or a young child, and a bite cannot be definitively ruled out, the bat should be tested if available. If it is not available for testing, a healthcare provider and local or state public health officials should be consulted regarding the need for PEP.

Other wildlife: For exposures involving non-carnivores wildlife species, public health officials should be consulted. If the animal is available it may be tested for rabies; if not, PEP may be recommended based on local rabies epidemiology and the circumstances of the bite. Some animals, such as small rodents (e.g. rats, mice, squirrels, chipmunks) and lagomorphs (e.g. rabbits, hares), are generally not considered a risk for rabies transmission; in most cases rabies testing of these species is not necessary and will not be performed by the public health laboratory. If extremely abnormal or aggressive behavior is observed in these species, please consult with public health.

Hybrids: The offspring of wild animals crossbred to domestic dogs and cats are considered wild animals. As such, no observation period is defined for management after a bite, and no vaccines are licensed for use in these animals. Tennessee law defines a hybrid as an animal with documented genetic heritage of at least 25 percent wild animal. All other animals should be considered domestic species.

Vaccination of Humans

Pre-exposure prophylaxis (Pre-EP): Pre-EP is the use of rabies vaccine to induce immunity prior to rabies exposure. Pre-EP consists of 3 doses of vaccine, given on days 0, 7, and either 21 or 28, and is recommended for certain groups at higher than usual risk of exposure to rabies (e.g. veterinarians and their staff, animal diagnostic laboratory workers, wildlife workers, animal control officers, cavers). Pre-EP simplifies the post-exposure regimen and may protect against unrecognized exposures.

Serologic titers are recommended every 2 years for groups at “frequent risk” for exposure. The Centers for Disease Control and Prevention (CDC) recommends a booster vaccine if the titer is less than complete neutralization at a 1:5 serum dilution (approximately 0.1-0.2 IU per ml) by the rapid fluorescent focus inhibition test (RFFIT). The World Health Organization (WHO) recommends a booster if the titer falls below 0.5 IU per ml. See [Appendix A: Serologic Testing and Booster Recommendations on page 9](#) for more information on serologic testing recommendations and a map for the “frequent” and “infrequent” risk zones in Tennessee.

Pre-EP is also recommended for certain travelers to rabies-endemic regions where animal exposures are likely and appropriate PEP may be unavailable. Issues that should be considered are rabies epidemiology in the region, length of stay, intended activities, and local availability of modern anti-rabies biologics.

Post-exposure prophylaxis (PEP): PEP is given after an exposure to prevent disease. PEP for persons who have not previously been vaccinated against rabies consists of a single dose of human rabies immune globulin (HRIG) on day 0 along with a course of 4 doses of rabies vaccine on days 0, 3, 7, and 14. A 5th dose on day 28 should be added for immunosuppressed individuals. Previously vaccinated persons who have received a complete regimen of either pre- or post-exposure rabies prophylaxis, regardless of time since vaccination or current antibody titer, receive only two rabies vaccine boosters on days 0 and 3 and should not receive HRIG. Healthcare providers: see [Rabies Post-Exposure Prophylaxis Guide on page 18](#) for more information.

Although PEP should be initiated as soon as possible after a high-risk exposure, it is not a medical emergency. Management of wounds is a priority. Proper wound care is essential and can substantially decrease the risk of rabies transmission. A wound should be washed thoroughly with soap and water and, if possible, irrigated with a virucidal solution such as povidone-iodine. Suturing ideally should be avoided.

HRIG should be infused around the wound as much as is anatomically feasible and any remaining dose injected intramuscularly at a site distant from that of the initial vaccine dose. HRIG dosage may vary based on body weight. Because HRIG might partially suppress active production of antibody, no more than the recommended dose should be given. If HRIG is not available at the time of initiation of PEP, it may be given up to 7 days after the first dose of vaccine. Vaccine should be administered in the upper arm (deltoid

muscle) in adults; the thigh muscle may be used in children. **Rabies vaccine should not be injected into the gluteal muscles.**

Minor deviations from the recommended vaccination schedule are not important, but major deviations should be discussed with public health officials. PEP for persons previously vaccinated with a modern cell-culture rabies vaccine, regardless of time since vaccination or current antibody titer, consists of wound care as described above and 2 doses of vaccine given on days 0 and 3. HRIG should NOT be administered.

Although PEP should ideally be initiated within 5–10 days of a high-risk exposure, it is recommended at any time, regardless of the delay, as long as clinical signs of rabies have not developed. Once the rabies virus enters the CNS it is protected from the immune system, and PEP will not be effective. However, given the long and highly variable incubation period, it is impossible to accurately assign a time limit for effective PEP. Exposures to highly innervated areas such as the face and hands have been associated with shorter incubation periods. In such cases it is especially important to begin PEP quickly when the biting animal is at high risk of being rabid (i.e. a rabies reservoir species or other animal with clinical signs and history suggestive of rabies).

See [Indications for Rabies Post-Exposure Prophylaxis on page 13](#) for guidance on determining when PEP is needed and [Anti-Rabies Biologics Approved for Use in Humans on page 5](#) for more information on anti-rabies biologics and where to obtain them.

Post-Exposure Prophylaxis Protocol

Post-Exposure Prophylaxis for Non-Immunized Individuals	
Wound cleansing	PEP should begin with immediate thorough cleansing of all wounds with soap and water. If available, a virucidal agent such as povidone-iodine solution should be used to irrigate the wounds.
Human Rabies Immune Globulin (HRIG)	If possible, the full dose should be infiltrated around wounds; any remaining volume should be administered IM at an anatomical site distant from vaccine administration. HRIG should not be administered in the same syringe as vaccine. Because HRIG might partially suppress active production of antibody, no more than the recommended dose should be given
Vaccine	HDCV or PCECV 1.0 ml, IM (deltoid) on days 0, 3, 7, and 14.
Post-Exposure Prophylaxis for Previously Immunized Individuals	
Wound cleansing	PEP should begin with immediate thorough cleansing of all wounds with soap and water. If available, a virucidal agent such as povidone-iodine solution should be used to irrigate the wounds.
HRIG	HRIG should not be administered.
Vaccine	HDCV or PCECV 1.0 ml, IM (deltoid) on days 0 and 3.

Also see page 18 for [Rabies Post-Exposure Prophylaxis](#) for a 1 page guide.

Anti-Rabies Biologics Approved for Use in Humans

Biologic	Product Name	Manufacturer	Dose	Route
Human diploid cell vaccine	Imovax® Rabies	Sanofi Pasteur	1.0 mL	Intramuscular ^a
Purified chick embryo cell vaccine	RabAvert®	Novartis	1.0 mL	Intramuscular ^a
Rabies immune globulin	Imogam® Rabies-HT	Sanofi Pasteur	20 IU/kg	Local ^b
	HyperRAB® S/D	Talecris	20 IU/kg	Local ^b

^aThe deltoid muscle should be used in adults and adolescents; the quadriceps may be used in young children. Rabies vaccine should never be administered in the gluteal muscles.

^bAs much product as is anatomically feasible should be infiltrated into and around the wound, with any remaining dose administered intramuscularly in the deltoid or quadriceps, distant from the site of vaccine administration.

Where to Obtain Anti-Rabies Biologics

Post-exposure prophylaxis: Hospital emergency departments are the only facilities that routinely stock human rabies virus and immune globulin for post-exposure use in Tennessee. Health departments do not stock or otherwise provide these biologics but can assist in locating a hospital that does. After initiation of the post-exposure prophylaxis series, you may be able to obtain the follow-up doses at an outpatient clinic or arrange with your primary care provider to order and administer the vaccine. For a list of hospitals that have rPEP in stock [see Appendix K \(page 19\)](#).

Pre-exposure prophylaxis: A travel clinic is often the best place to obtain vaccine for pre-exposure prophylaxis. Otherwise, you may be able to arrange with your primary care provider to order and administer the vaccine.

Laboratory Testing

Animal Rabies Testing

The TDH Division of Laboratory Services tests between 1,200 and 1,600 animals per year for rabies. A rabies specific direct fluorescent antibody (DFA) is the current standard of testing performed at public health laboratory facilities in Nashville and Knoxville. The DFA based test is highly accurate and requires at least three hours to perform.

Permissible Submitters

City and county animal control agencies, local health departments, and veterinarians may submit specimens for rabies testing. The general public is prohibited from directly submitting a case for rabies testing to the laboratory; testing requests must be routed through a recognized professional submitter.

Specimens for Rabies Testing

Acceptance Policy and Costs

Testing resources are intended for use in situations where the test result will influence public health-related decisions. Only mammals that have potentially exposed a person or domestic animal to rabies should be submitted for rabies diagnostics. (See [Exposure to Rabies on page 1](#) and [Guidelines for Animal Submission for Rabies Testing on page 14](#) for additional guidance).

Even though a case is sent by a recognized submitter, this does not ensure that it will be tested. TDH is the final authority in determining whether a case is tested or not. Assuming a case arrives with proper justification, rabies testing is provided by the State of Tennessee free of charge.

Collection, Packaging, and Identification

Brain tissue is examined for the presence of rabies virus, so animals should be euthanized in a manner that will not damage the brain (especially the cerebellum and brain stem). The state public health laboratories do not have facilities to dispose of whole carcasses; therefore, only the head should be submitted for rabies testing. Exception: when submitting bats, ship the entire animal. For large animals such as cattle and horses, submit only the brain. Consult a veterinarian for brain removal.

If it is not possible to recover the brain from a large animal, send the head only to either the CE Kord Animal Health Diagnostic Laboratory or the University of Tennessee College of Veterinary Medicine, Veterinary Medical Center, Diagnostic Laboratory (contact information at end of section).

Preparing a Specimen for Shipment or Drop Off

1. Within 24 hours of the animal's death, retrieve its head by severing at the midpoint between the base of the skull and shoulders. It is best to only leave 1–2 vertebrae connected to the skull.
2. Keep the specimen refrigerated but not frozen. Do not formalin fix.
3. Double bag the specimen using zip lock or heavy plastic bags, and seal each bag. If sharp edges such as bone fragments are evident, wrap the specimen in newspaper to prevent puncture of

the plastic bags. Place the bagged specimen in an insulated box with enough ice packs to keep it cool. Stabilize the specimen with newspaper or absorbent paper to prevent movement or damage during transport. See [Packaging Instructions for Rabies Testing \(Nashville Lab\) on page 15](#) or [Packaging Instructions for Rabies Testing \(Knoxville Lab\) on page 16](#).

4. If only submitting brain tissue, place the tissue in a hard-sided container to prevent damage during transport, double-bag the container, and keep the tissue cool with ice packs and an insulated cooler.
5. Treat any specimen infested with fleas, ticks, maggots, ants, or other pests with parasiticide prior to packing.
6. If submitting multiple specimens, make sure each is double bagged separately to prevent cross-contamination. Each specimen must have a separate [Laboratory Submission Form for Rabies Testing \(page 17\)](#) and must be clearly identified with a specimen identification number or case number that matches the number on the test request form.
7. Tape the completed submission form to the shipping container.

Shipment

It is important to submit the animal within 48 hours of the time of death for accurate test results, as brain tissue may rapidly deteriorate. Avoid shipping specimens on weekends or holidays unless prior approval has been obtained from a TDH epidemiologist or the rabies laboratory manager. Refrigerate the specimen while awaiting shipment. Do not freeze.

Follow the shipping guidelines of your carrier. Shipping of specimens should be coordinated with the local health department or animal control agency. Ship the specimen by the fastest means possible to the laboratory facility in Knoxville or Nashville (contact information at end of section). Transport by the submitter's personal courier is preferred, but shipment by commercial couriers is acceptable, if permitted. It is against U.S. Postal regulations to send this type of specimen through the mail.

Specimens arriving during weekends or holidays will be tested the next business day. All specimens should be submitted within 48 hours of death and must arrive at the lab by 12:00 PM to ensure same day testing. Those received after 12:00 PM will be tested the following business day. Complete the requisition form with as much information as possible to ensure that bite victims and submitters can be easily contacted. Required information is denoted on the form by an asterisk.

Unsatisfactory Specimens

A specimen will be reported as unsatisfactory if any of the following conditions are present:

- The brain material is damaged or deteriorated to the extent that anatomical features of the brain are not distinguishable.
- The required brain structures (i.e. cerebellum and brain stem) are not evident in the head submitted.
- The specimen is fixed in formalin.

The rabies laboratory almost always makes an effort to test specimens in unsatisfactory condition, positive results are sometimes yielded from tissues in poor condition.

NOTE: Frozen specimens are not necessarily unsatisfactory; however freezing and thawing can be very damaging to brain tissue. Testing of a frozen specimen will be determined once the specimen has thawed. If a frozen specimen is received, laboratory staff will complete a controlled thaw which will result in at least a 1-day delay for rabies testing.

Test Not Performed

A specimen will be reported as "test not performed" if any of the following conditions are present:

- The specimen is received without an accompanying submission form.
- A form is received without an accompanying specimen.
- The information on the submission form does not match the animal submitted.
- The specimen does not receive authorization from TDH.

Reporting Procedure and Interpretation

Positive, indeterminate, and unsatisfactory rabies test results are reported immediately by telephone to the TDH Environmental Health office in Nashville. Communication and follow-up then proceeds as outlined in the “Communications” section on pages 3-4. Specimens with indeterminate results are referred to the CDC for examination by additional testing methods. Negative reports are mailed to the specimen provider.

Laboratory Locations and Contact Information

Public Health Laboratories (for rabies testing)

TDH Laboratory Services

630 Hart Lane
Nashville, TN 37243
Phone: (615) 262-6300
Fax: (615) 262-6393

Knoxville Regional Laboratory

2101 Medical Center Way
Knoxville, TN 37920
Phone: (865) 549-5201
Fax: (865) 549-5199

Animal Diagnostic Laboratories (for removal of brains from large animals—rabies testing not performed)

CE Kord Diagnostic Laboratory

436 Hogan Road
Nashville, TN 37220
Phone: (615) 837-5125

UT CVM Diagnostic Laboratory

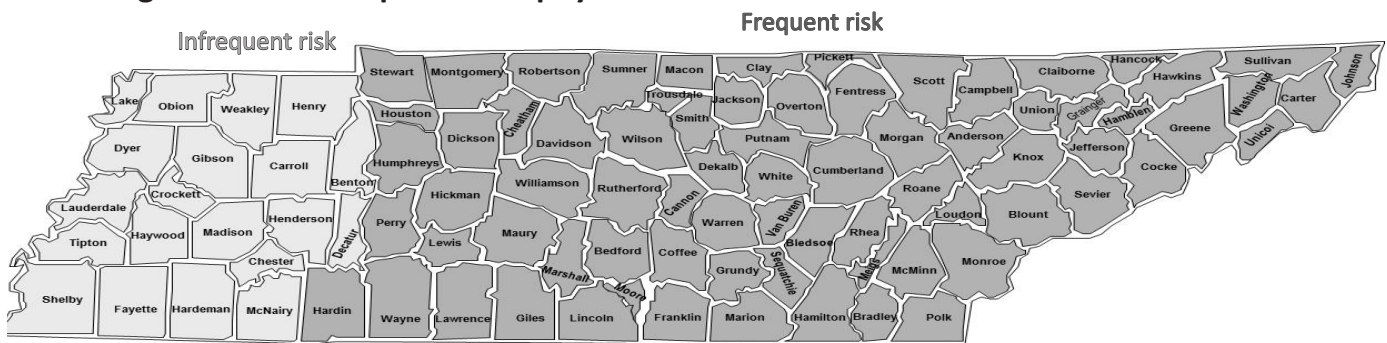
2407 River Drive
Knoxville, TN 37996
Phone: (865) 974-5673

Appendix A: Serologic Testing and Booster Recommendations

Risk Category	Nature of Risk	Typical Populations	Pre-Exposure Recommendations
Continuous	Virus present continuously, often in high concentrations, with specific exposures likely to go unrecognized; bite, nonbite, or aerosol exposure possible	Rabies research laboratory workers; rabies biologics production workers	Primary course with serologic testing every 6 months; booster vaccination if antibody titer is below acceptable level*
Frequent	Exposure usually episodic, with source recognized, but also might be unrecognized; bite, nonbite, or aerosol exposure possible	Rabies diagnostic laboratory workers; cavers; veterinarians and staff; animal control and wildlife workers in rabies-enzootic areas; all persons who frequently handle bats	Primary course with serologic testing every 2 years; booster vaccination if antibody titer is below acceptable level*
Infrequent	Exposure nearly always episodic with source recognized; bite or nonbite exposure possible	Veterinarians and animal control staff in areas where rabies is uncommon; veterinary students; travelers to rabies-enzootic areas where access to medical care is limited	Primary course with no serologic testing or booster vaccination

*Minimum acceptable antibody level is complete viral neutralization at a 1:5 serum dilution (CDC recommendation) or 0.5 IU per ml (WHO recommendation) by the rapid fluorescent focus inhibition test.

Risk Categories For Pre-Exposure Prophylaxis in Tennessee Counties



Commercial laboratories performing the rapid fluorescent focus inhibition test for rabies virus antibody for human and animal specimens:

Atlanta Health Associates

309 Pirkle Ferry Road, Suite D300

Cumming, GA 30040

www.atlantahealth.net

Kansas State University

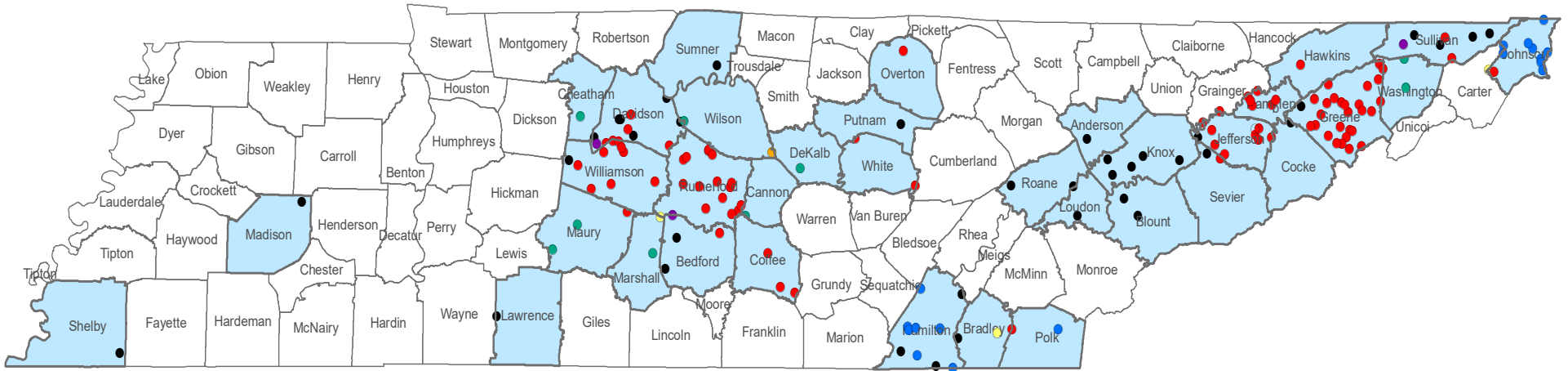
2005 Research Park Circle

Manhattan, KS 66502

<http://www.ksvdl.org/rabies-laboratory/rffit-test/index.html>

Testing at KSU may also be requested through Quest Labs as “Rabies Vaccine Response End-Point Titer”.

Cumulative Tennessee Animal Rabies Cases 2016-2020



	2016	2017	2018	2019	2020	Total
Bat	9	10	6	9	3	34
Cat	1	1	0	1	0	3
Dog	5	1	1	1	1	8
Fox	1	2	0	0	0	3
Horse	1	0	0	0	0	1
Raccoon	3	6	2	4	2	15
Skunk	29	17	21	7	10	74
Total	49	37	30	22	16	138

1 Dot = 1 positive animal
 Bat
 Cat
 Dog
 Fox
 Horse
 Raccoon
 Skunk

Location information about rabies positive animals is only available at the county level. Dots within each county are randomly placed and do not represent the exact location of the animal.



Rabies Exposure Flow Chart

For animals exposed or suspected to have been exposed to a rabid animal

****Local or state public health authorities should be consulted immediately****



Domestic animals (Dogs, cats, ferrets)

VACCINATED*

Revaccinate immediately and observe for 45 days under owner's control.

Any illness in the animal during the observation period should be reported immediately to the local health department

**Either currently vaccinated or overdue for vaccination. Currently vaccinated is defined as initial dose given at least 28 days previously or boosters have been given in accordance with established guidelines.*

UNVACCINATED

Dog or cat: Euthanize immediately or, if the owner is unwilling, vaccinate as soon as possible and place in strict isolation for 4 months.

Other: Euthanize immediately or confine and observe, on a case-by-case basis, for 6 months.

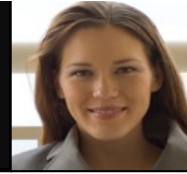
If signs suggestive of rabies develop during the isolation period, the animal should be euthanized and tested for rabies. Contact the local health department for assistance.

Wild animals and hybrids (Any offspring of wild animals crossbred to domestic animals)

If exposed to a rabid animal, it should be euthanized immediately. If the owner is unwilling, consult public health authorities. No injectable rabies vaccines are licensed for use in wild animals or hybrids; however, vaccination status may be considered by public health authorities in determining disposition of animal.

Source: "Compendium of Animal Rabies Prevention and Control 2016". Available at <http://www.nasphv.org/Documents/NASPHVRabiesCompendium.pdf>.

Human that is bitten by an animal



Wash wound thoroughly with soap and water. Seek medical attention for the wound if necessary. THEN consider the type and availability of the biting animal in consultation with local or state public health authorities.



Healthy dog, cat, or ferret

Observe animal for 10 days. If the animal remains healthy, rabies cannot have been transmitted at the time of the bite, regardless of the animal's vaccination status. There is no need to test animal or for bitten person to receive postexposure prophylaxis.*

OR



Other healthy domestic animal

Very low risk. Evaluate on a case-by-case basis in consultation with public health authorities.

Rabies reservoir species (raccoon, skunk, fox, bat)



Contact local health department to arrange testing of animal for rabies. If animal is not available for testing, the bitten person should receive postexposure prophylaxis.†

OR

Other wild animal (non-reservoir species)

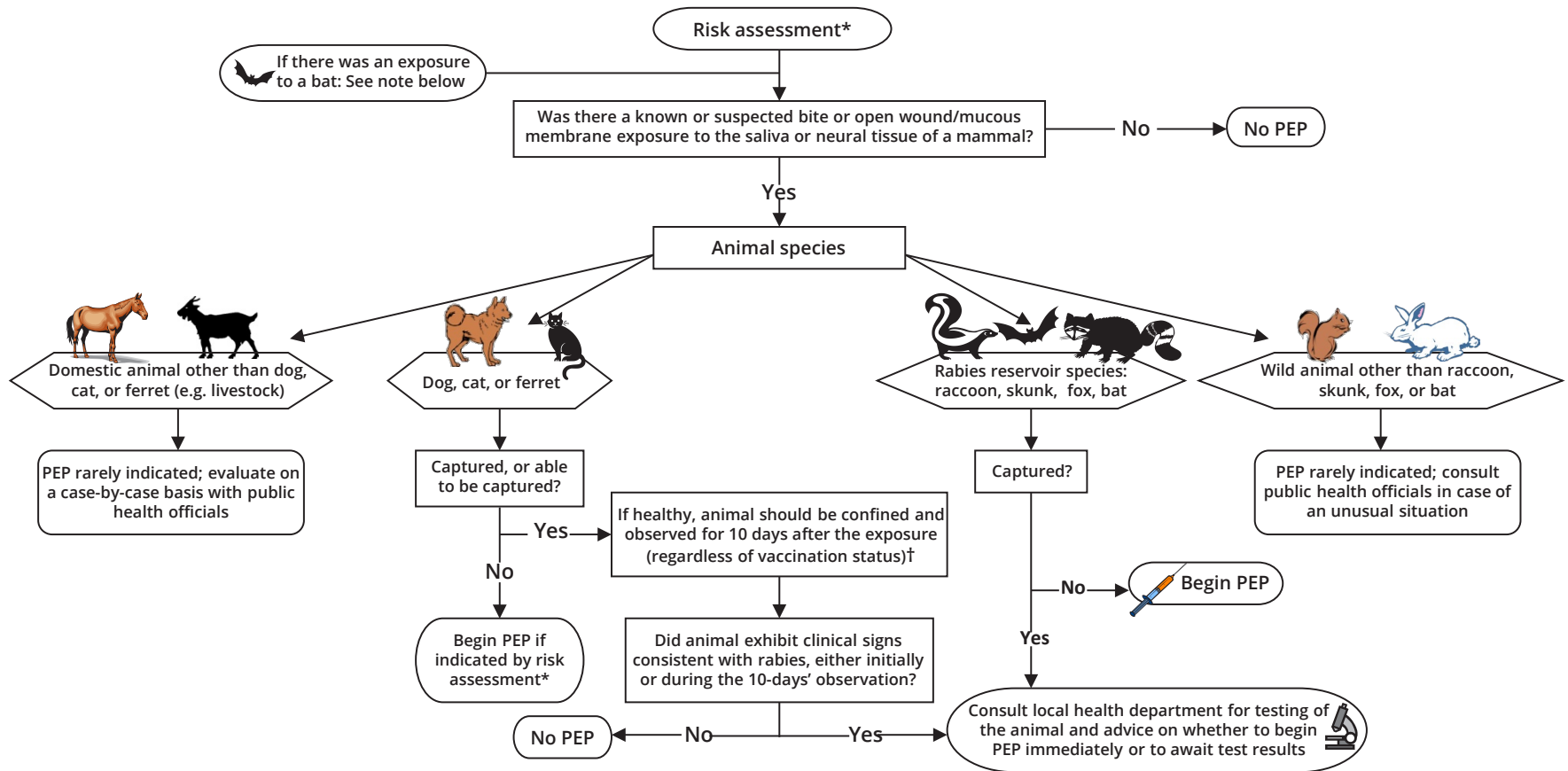


Testing or postexposure prophylaxis rarely indicated. Evaluate on a case-by-case basis in consultation with public health authorities.

*Any illness in animal during the observation period should be evaluated by a veterinarian and reported immediately to local health department.
†See "Human Rabies Prevention—United States, 2008", available at <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr57e507a1.htm>, for additional details and post-exposure prophylaxis protocols for rabies-vaccinated and unvaccinated individuals.


Indications for Rabies Postexposure Prophylaxis (PEP)

General guidance only, to be used in combination with public health consultation



*Risk assessment includes the species of animal, its health/vaccination status, the circumstances of the exposure, and local rabies epidemiology. A non-bite exposure or a bite from an apparently healthy dog or cat, even if unvaccinated, is very unlikely to transmit rabies and rarely requires PEP. Possible exposure to rabies is a medical urgency, not an emergency. There is time to allow local animal control to attempt to locate the animal for observation or testing, as appropriate.

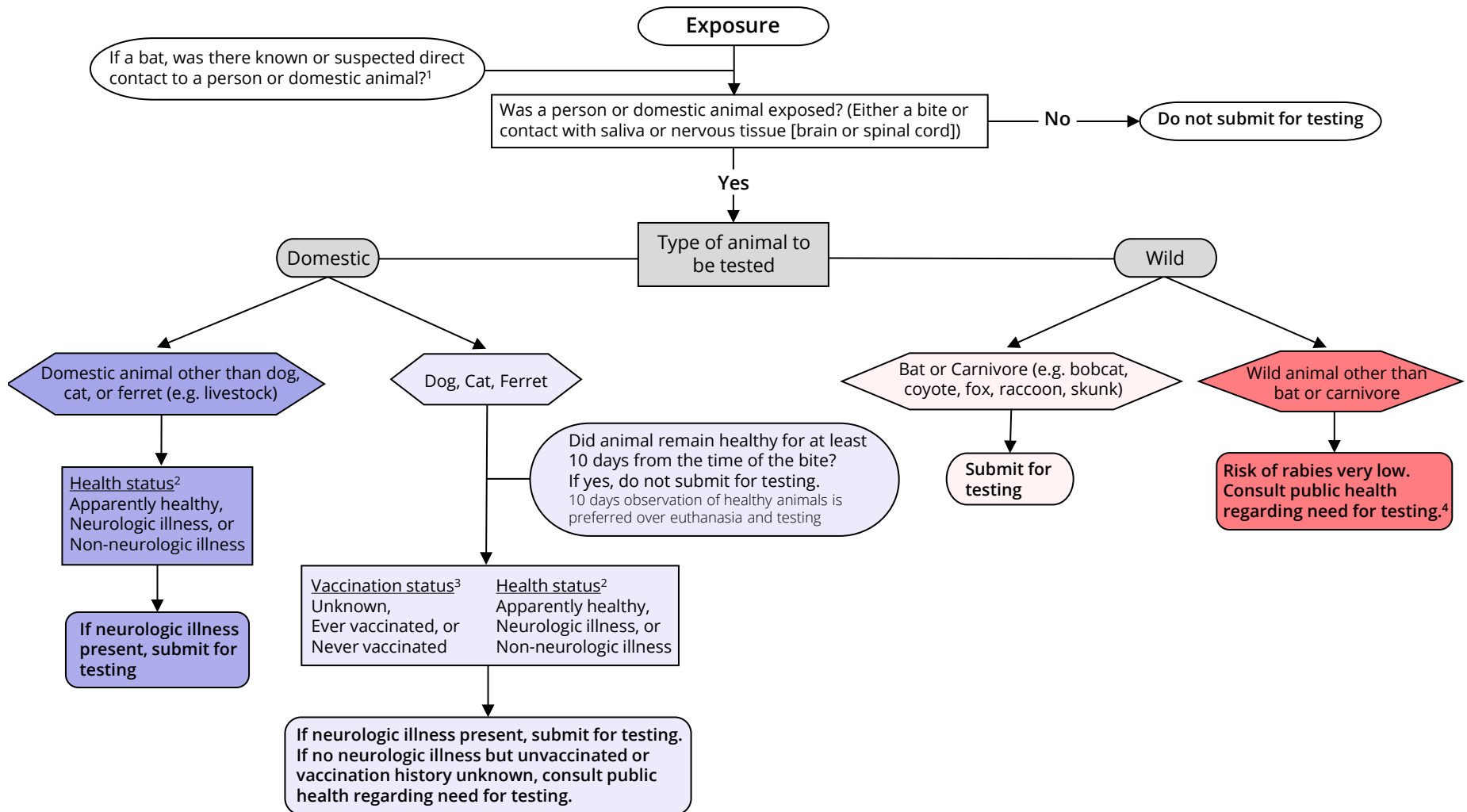
†The local health department should generally be involved in monitoring animals during the 10-day observation period; however, local animal control may perform this function in some areas.

 Bat exposures: PEP is recommended for a person who has direct contact with a bat, unless the person can be certain that no bite occurred or the bat tests negative for rabies. When a bat is found indoors and there is no history of contact, the risk of exposure to rabies is typically very low. PEP can be considered for persons who were in the same room with a bat and might be unaware that direct contact had occurred (e.g. a deeply sleeping person awakens to find a bat in the room, or a bat is found in the room with an unattended child or incapacitated adult), and the bat is not available for testing. In such cases PEP is not warranted for other household members.

Public health officials are available by telephone 24 hours per day for consultation; however, health departments in Tennessee do not stock anti-rabies biologics for PEP. CDC no longer recommends a 5th dose of rabies vaccine for PEP in immunocompetent persons, although product package inserts do not reflect this change.

Tennessee Department of Health Epidemiologist On Call: 615-741-7247

Guidelines for animal submission for rabies testing



¹ If a bat was in the room with a sleeping person or an unattended young child or pet, unrecognized direct contact may be suspected.

² If animal was healthy at the time of bite/exposure, it is very unlikely to be rabid. Neurologic illness greatly increases the likelihood of rabies.

³ If animal has ever received at least 2 rabies vaccines, it is very unlikely to be rabid.

⁴ Small rodents (e.g. squirrels, chipmunks, mice, hamsters, rats) are not considered a risk for rabies transmission and generally will not be tested.

Tennessee Department of Health: 615-741-7247



Fed-Ex Category B Compliant Rabies Specimen Packing Instructions (Nashville)

ITEMS NEEDED:

- 2 heavy zip lock bags, or 1 heavy zip lock bag and 1 heavy plastic bag
- 1 Category B certified insulated (Urethane, Polystyrene, Styrofoam, etc.) cardboard shipper (meets IATA drop/crush standards)
- 1 envelope
- 1 biohazard label and 1 UN3373 Biological Substance, Category B label
- Packing tape
- Newspaper/packing paper
- Ice packs
- Rabies Submission Form

STEP 1: Place animal head in a liquid-tight zip lock or heavy plastic bag and make sure it is adequately sealed. **If there are any bone fragments that might puncture the bag, wrap the head in several layers of newspaper/absorbent paper.**

STEP 2: Place first bag into a second zip lock or heavy plastic bag along with absorbent material such as paper towels and ensure it is adequately sealed. Label the specimen bag with an identification name or submitter number given on the Submission Form (if applicable). Place a biohazard label (required) on the specimen bag.

STEP 3: Place labeled specimen in a Category B certified insulated cardboard box surrounded by ice packs. Fill any empty space with newspaper, etc. to stabilize the specimen and prevent movement during transport.

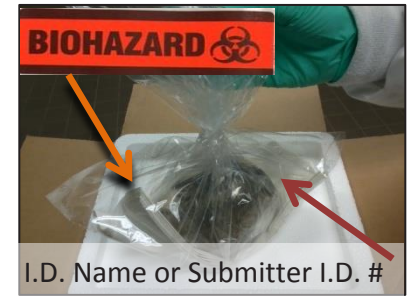
STEP 4: Ensure the insulated cardboard box is sealed, and place the Rabies Submission Form in an envelope taped to the top of the insulated (not outer cardboard flaps) lid.

STEP 5: Tape the cardboard flaps closed. Place the Fed Ex mailing label on the top of the package. Place a "UN3373 Biological Substance, Category B" label (required) on the front of the package.

Check SATURDAY Delivery if sent out on Friday. Call the TDOH Laboratory Services (Nashville) if there are questions: 615-262-6350.



Step 1



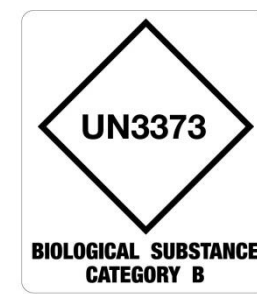
Step 2



Step 3



Step 4



Step 5

Send FedEx Priority Overnight

Tennessee Dept Health –
Laboratory Services
c/o Rabies Lab
630 Hart Lane
Nashville, TN 37216

Send Fed EX tracking to
to
bryan.p.mason@tn.gov



Fed-Ex Category B Compliant Rabies Specimen Packing Instructions (Knoxville)

ITEMS NEEDED:

- 2 heavy zip lock bags, or 1 heavy zip lock bag and 1 heavy plastic bag
- 1 Category B certified insulated (Urethane, Polystyrene, Styrofoam, etc.) cardboard shipper (meets IATA drop/crush standards)
- 1 envelope
- 1 biohazard label and 1 UN3373 Biological Substance, Category B label
- Packing tape
- Newspaper/packing paper
- Ice packs
- Rabies Submission Form

STEP 1: Place animal head in a liquid-tight zip lock or heavy plastic bag and make sure it is adequately sealed. **If there are any bone fragments that might puncture the bag, wrap the head in several layers of newspaper/absorbent paper.**

STEP 2: Place first bag into a second zip lock or heavy plastic bag along with absorbent material such as paper towels and ensure it is adequately sealed. Label the specimen bag with an identification name or submitter number given on the Submission Form (if applicable). Place a biohazard label (required) on the specimen bag.

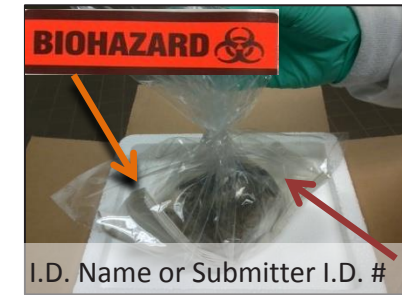
STEP 3: Place labeled specimen in a Category B certified insulated cardboard box surrounded by ice packs. Fill any empty space with newspaper, etc. to stabilize the specimen and prevent movement during transport.

STEP 4: Ensure the insulated container is sealed, and place the completed Rabies Submission Form in an envelope taped to the top of the insulated (not outer cardboard flaps) lid.

STEP 5: Tape the card board flaps closed. Place the Fed Ex mailing label on the top of the package. Place a “UN3373 Biological Substance, Category B” label (required) on the front of the package. Obtain authorization from the Knoxville Regional Lab if there is a need to send a specimen on a Friday. If authorized, check SATURDAY Delivery if sent out on Friday. Call the TDOH Laboratory Services (Knoxville) if there are questions: 865-549-5201.



Step 1



Step 2



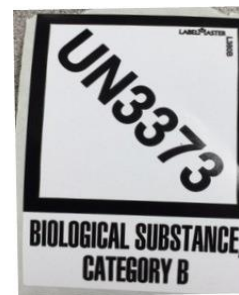
Step 3



Step 4



Step 5



Send FedEx Priority Overnight

Tennessee Dept Health –
Knoxville Regional Lab
c/o Rabies Lab
2101 Medical Center Way
Knoxville, TN 37920

Send Fed-EX tracking to
Vicki.Lambert@tn.gov
And call **865-549-5201**



Tennessee Department of Health
Division of Laboratory Services
Rabies Submission

**Place State Lab Accession
Label Here**
(TDH use only)

***Indicates required fields**

SPECIMEN COLLECTION INFORMATION		SUBMITTER INFORMATION	
*Kind of Animal:		*Submitting Facility:	Submitter Number:
*Date Specimen Collected:		Address:	
Specimen Collector Name:		City:	County:
Phone Number of Collector: () -		State:	Zip Code:
Animal Collection Site (Address or GPS):		Phone Number: () -	Fax Number: () -
City:	State:	E-mail Address:	
Zip Code:	*County:		
* REASON FOR SUBMISSION (Provide details below)		*PUBLIC HEALTH CONTACT	
<input type="checkbox"/> Person Exposed <input type="checkbox"/> Other Animal Exposed <input type="checkbox"/> Surveillance Program		<input type="checkbox"/> Has a Public Health Official been contacted regarding this submission? <input type="checkbox"/> Yes <input type="checkbox"/> No Name of contact: _____	
Was the attack provoked? <input type="checkbox"/> Yes <input type="checkbox"/> No	Date of Death: __/__/__	<input type="checkbox"/> Natural Death <input type="checkbox"/> Euthanized	
OWNER OF ANIMAL			
Last Name:		First Name:	Middle Initial:
Address:		Phone Number: () -	
City:	County:	State:	Zip Code:
*PERSON EXPOSED <input type="checkbox"/> YES <input type="checkbox"/> NO			
Last Name:		First Name:	Middle Initial:
<input type="checkbox"/> Male	<input type="checkbox"/> Female	Date of Birth: __/__/__	
Address:		Phone Number: () -	
City:	County:	State:	Zip Code:
Date of Exposure: __/__/__	Exposure Type: <input type="checkbox"/> Bite <input type="checkbox"/> Saliva Contact <input type="checkbox"/> Neurological Tissue <input type="checkbox"/> Scratch		
	Exposure Site: <input type="checkbox"/> Arm <input type="checkbox"/> Foot <input type="checkbox"/> Hand <input type="checkbox"/> Head <input type="checkbox"/> Leg <input type="checkbox"/> Throat <input type="checkbox"/> Torso		
*OTHER ANIMAL EXPOSED <input type="checkbox"/> YES <input type="checkbox"/> NO			
Type of Animal Exposed:		Date of Exposure: __/__/__	
Owner Last Name:		Owner First Name:	Owner Middle Initial:
Address:		Phone Number: () -	
City:	County:	State:	Zip Code:
ADDITIONAL SPECIMEN INFORMATION			
Vaccination History:			
List of Clinical Signs:			
Date of First Clinical Signs: __/__/__			
Additional Information:			
LABORATORY FACILITIES		Billing Information (TDH use only)	
<input type="checkbox"/> Nashville Central Laboratory, 630 Hart Lane Nashville, TN 37216 615-262-6350			
<input type="checkbox"/> Knoxville Regional Laboratory, 2101 Medical Center Way Knoxville, TN 37920 865-549-5201			

Rabies



Post-Exposure Prophylaxis Guide

Rabies post-exposure prophylaxis, or PEP, is recommended

if a person was bitten by or had a high-risk exposure to:

1. A rabies-positive animal
2. A rabies vector species (bat, raccoon, skunk) that is unavailable for testing

PEP is **NOT** recommended if a person was bitten by a dog or cat that can be observed for 10 days. Contact the local health department to file a bite report or for help with locating/observing domestic animals.

Consult Tennessee Department of Health if you are unsure if PEP is indicated.

The standard PEP regimen for non-immunized, immunocompetent persons includes administration of human rabies immune globulin, or HRIG, and the rabies vaccination series:

1

Wound cleansing

- Clean wound(s) immediately with soap and water.
- If possible, thoroughly irrigate with anti-virus agent, like povidone-iodine.
- Provide additional wound care as necessary.

2

HRIG

Administer 20 IU/kg body weight dose on day 0*

- Infiltrate HRIG in and around the wound area. Give any remaining HRIG IM in a site distant from the vaccine. If there is no wound (i.e. bat found in sleeping room), administer HRIG in quadriceps or deltoids.
- Do **NOT** inject HRIG and vaccine at the same site or inject HRIG into the gluteus.
- HRIG can be given up to (and including) day 7 in the PEP regimen. If given more than 7 days after rabies vaccine, HRIG can interfere with the immune response.

3

Vaccine

Administer 1.0 mL dose on days 0, 3, 7 and 14**

- Administer vaccine IM in the deltoid area of adults or anterolateral thigh of young children.
- Do **NOT** inject HRIG and vaccine at the same site or inject vaccine into the gluteus.

*The first day of the PEP treatment regimen is designated as day 0.

**Vaccination schedule deviations of a few days are not a great concern and the patient should resume the series. Titers maybe drawn to evaluate immune response. Consult TDH if there are significant schedule deviations.

Special Considerations



Previously vaccinated persons who have received a complete regimen of either pre- or post-exposure rabies prophylaxis receive only two rabies vaccine boosters on days 0 and 3 and **SHOULD NOT** receive HRIG.



Immunocompromised

persons receive a fifth vaccination on day 28 and should be tested for seroconversion 7 to 14 days following completion of PEP.



Children can be given vaccine in the anterolateral thigh and should receive the same weight-based dose of HRIG as adults (20 IU/kg).



Pregnant women can follow the standard PEP regimen.



Department of
Health



Tennessee Department of Health
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Call TDH 24/7 at 615-741-7247

or consult the **Tennessee Rabies Manual:**

tn.gov/health/cedep/zoonotic-diseases/rabies.html

**Appendix K: Hospitals That Typically Stock Rabies Post-Exposure Prophylaxis
As of January 2020**

TDH recommends calling ahead to ensure the facility has rPEP in stock before visiting.

Facility Name	Address	City	ZIP code	County	Phone
Tennova Healthcare - Shelbyville (Heritage Med Ctr)	2835 Hwy 231 N	Shelbyville	37160	Bedford	(931) 685-5433
Blount Memorial Hospital	907 E Lamar Alexander Pkwy	Maryville	37804	Blount	(865) 983-7211
Tennova Healthcare - Cleveland (SkyRidge Medical Center)	2305 Chambliss Ave NW	Cleveland	37311	Bradley	(423) 559-6000
Tennova Healthcare - LaFollette Medical Center	923 E Central Ave	LaFollette	37766	Campbell	(423) 907-1200
Tennova Healthcare - Newport Medical Center	435 Second St	Newport	37821	Cocke	(423) 625-2200
Tennova Healthcare - Harton (Harton Reg Med Ctr)	1801 N Jackson St	Tullahoma	37388	Coffee	(931) 393-3000
Unity Medical Center	481 Interstate Dr	Manchester	37355	Coffee	(931) 728-6354
Centennial Medical Center	2300 Patterson St	Nashville	37203	Davidson	(615) 342-1000
St. Thomas Midtown (Baptist Hospital- Nashville)	2000 Church St	Nashville	37203	Davidson	(615) 284-5555
St. Thomas West Hospital	4220 Harding Pike	Nashville	37205	Davidson	(615) 222-2111
Summit Medical Center	5655 Frist Blvd	Hermitage	37076	Davidson	(615) 316-3000
Horizon Medical Center	111 Highway 70 East	Dickson	37055	Dickson	(615) 446-0446
Tennova Healthcare - Dyersburg Regional	400 E Tickle St	Dyersburg	38024	Dyer	(731) 285-2410
Southern TN Reg. Health System - Sewanee (Emerald- Hodgson Hosp)	1260 University Ave	Sewanee	37375	Franklin	(931) 598-5691

Facility Name	Address	City	ZIP code	County	Phone
Southern TN Reg. Health System - Winchester (Southern TN Med Ctr)	185 Hospital Rd	Winchester	37398	Franklin	(931) 967-8200
Milan General Hospital	4039 Highland St	Milan	38358	Gibson	(731) 686-1591
Southern TN Regional Health System - Pulaski (Hillside Hospital)	1265 E College St	Pulaski	38478	Giles	(931) 363-7531
Morristown-Hamblen Healthcare System	908 W 4th N St	Morristown	37814	Hamblen	(423) 492-9000
Erlanger Medical Center (Baroness)	975 East Third Street	Chattanooga	37403	Hamilton	(423) 778-7000
Erlanger North	632 Morrison Springs Rd	Chattanooga	37415	Hamilton	(423) 778-3300
Memorial Healthcare System	2525 de Sales Avenue	Chattanooga	37404	Hamilton	(423) 495-2525
Memorial Hixson Hospital	2051 Hamill Road	Hixson	37343	Hamilton	(423) 495-7100
Parkridge East Hospital	941 Spring Creek Rd	Chattanooga	37412	Hamilton	(423) 894-7870
Parkridge Medical Center	2333 McCallie Ave	Chattanooga	37404	Hamilton	(423) 698-6061
Wellmont Hawkins County Hospital (Hawkins County Memorial Hospital)	851 Locust Street	Rogersville	37857	Hawkins	(423) 921-7000
Henry County Medical Center	301 Tyson Ave	Paris	38242	Henry	(731) 642-1220
Tennova Healthcare - Jefferson Memorial Hospital	110 Hospital Dr	Jefferson City	37760	Jefferson	(865) 471-2500
East Tennessee Children's Hospital	2018 W Clinch Ave	Knoxville	37916	Knox	(865) 541-8000
Fort Sanders Regional Medical Center	1901 W Clinch Ave	Knoxville	37916	Knox	(865) 541-1111
Parkwest Medical Center- Knoxville	9352 Park W Blvd	Knoxville	37923	Knox	(865) 373-1000

Facility Name	Address	City	ZIP code	County	Phone
Tennova Healthcare - North Knoxville Medical Center	7565 Dannaheer Dr	Powell	37849	Knox	(865) 859-8000
Tennova Healthcare - Turkey Creek Medical Center	10820 Parkside Dr	Knoxville	37934	Knox	(865) 218-7011
University of Tennessee Medical Ctr	1924 Alcoa Hwy	Knoxville	37920	Knox	(865) 305-9000
Southern TN Reg. Health System - Lawrenceburg (Crockett Hosp)	1607 S Locust Ave	Lawrenceburg	38464	Lawrence	(931) 762-6571
Fort Loudoun Medical Center	550 Fort Loudoun Medical Center Dr	Lenoir City	37772	Loudon	(865) 271-6000
Parkridge West Hospital (Grandview Medical Center)	1000 TN-28	Jasper	37347	Marion	(423) 837-9500
Maury Regional Medical Center	1224 Trotwood Ave	Columbia	38401	Maury	(931) 381-1111
Starr Regional Med. Center-Athens (Athens Reg. Med. Ctr.)	1114 W Madison Avenue	Athens	37303	McMinn	(423) 745-1411
Starr Regional Med. Center-Etowah (Woods Memorial Hosp.)	886 U.S. 411, Main Entrance	Etowah	37331	McMinn	(423) 263-3600
Sweetwater Hospital Association	304 Wright St	Sweetwater	37874	Monroe	(865) 213-8200
Tennova Healthcare - Clarksville (Gateway Med Ctr)	651 Dunlop Ln	Clarksville	37040	Montgomery	(931) 502-1000
Livingston Regional Hospital	315 Oak St	Livingston	38570	Overton	(931) 823-5611
NorthCrest Medical Center	100 Northcrest Dr	Springfield	37172	Robertson	(615) 384-2411
St. Thomas Rutherford Hospital (Middle TN Med. Ctr)	1700 Medical Center Pkwy	Murfreesboro	37129	Rutherford	(615) 396-4100

Facility Name	Address	City	ZIP code	County	Phone
Big South Fork Medical Center	18797 Alberta St	Oneida	37841	Scott	(423) 569-8521
Baptist Memorial Hospital - Collierville	1500 W Poplar Ave	Collierville	38017	Shelby	(901) 861-9000
Baptist Memorial Hospital - Memphis	6019 Walnut Grove Rd	Memphis	38120	Shelby	(901) 226-5000
Methodist Healthcare North	3960 New Covington Pike	Memphis	38128	Shelby	(901) 516-5200
Methodist University Hospital	1265 Union Ave	Memphis	38104	Shelby	(901) 516-7000
Regional One Health (Reg. Med.Ctr Memphis)	877 Jefferson Avenue	Memphis	38103	Shelby	(901) 545-7100
St. Francis Bartlett	2986 Kate Bond Rd	Barlett	38133	Shelby	(901) 820-7000
Holston Valley Medical Center	130 W Ravine Rd	Kingsport	37660	Sullivan	(423) 224-4000
Indian Path Community Hospital	2000 Brookside Dr	Kingsport	37660	Sullivan	(423) 857-7000
Hendersonville Medical Center	355 New Shackle Island Rd	Hendersonville	37075	Sumner	(615) 338-1000
Unicoi County Memorial Hospital	2030 Temple Hill Rd	Erwin	37650	Unicoi	(423) 735-4700
St. Thomas River Park Hospital	1559 Sparta St	McMinnville	37110	Warren	(931) 815-4000
Franklin Woods Community Hospital	300 Med Tech Pkwy	Johnson City	37604	Washington	(423) 302-1000
Johnson City Medical Center	400 N State of Franklin Rd	Johnson City	37604	Washington	(423) 431-6111
Volunteer Martin (Volunteer Community Hosp)	161 Mount Pelia Road	Martin	38237	Weakley	(731) 587-4261
St. Thomas Highlands Hospital	401 Sewell Dr	Sparta	38583	White	(931) 738-9211
Williamson Medical Center	4321 Carothers Pkwy	Franklin	37067	Williamson	(615) 435-5435
Tennova Healthcare - Lebanon (University Med Ctr-Lebanon)	1411 W Baddour Pkwy	Lebanon	37087	Wilson	(615) 444-8262