

RABIES AND ANIMAL BITES

PUBLIC HEALTH ISSUE

Rabies in humans is an acute viral encephalomyelitis, which is the inflammation of the brain and spinal cord, and is almost always fatal. Worldwide there is an estimated 30,000 deaths from rabies a year, most occurring in less developed countries. In this century, the number of human deaths in the United States attributed to rabies has declined from 100 or more each year to an average of 2 or 3 each year. Two programs have been responsible for this decline. First, animal control and vaccination programs begun in the 1940's and oral rabies vaccination programs in the 2000's have eliminated domestic dogs as reservoirs of rabies in the United States. Second, effective human rabies vaccines and immunoglobulins have been developed.

There is no effective way to treat rabies once acute illness has begun. The current emphasis is on the prevention of the disease by avoiding exposure and providing vaccine or immune globulin as appropriate. When a person has been bitten by a rabid animal, or bitten by an animal that is high risk for having rabies, a prophylactic injection of immune globulin and a series of rabies vaccine shots usually begun immediately. Once clinical symptoms of rabies appear, the disease is almost always fatal.

LAWS AND REGULATIONS

- **RSA 436:99 – 109, Disease of Domestic Animals;** <http://www.gencourt.state.nh.us/rsa/html/XL/436/436-mrg.htm>
- **RSA 141-C:1-8, Communicable Disease -** <http://www.gencourt.state.nh.us/rsa/html/NHTOC/NHTOC-X-141-C.htm>

ROLE OF THE HEALTH OFFICER

This is an area that is usually covered by the animal control officer in town. Health officers may be asked to assist in the following:

- Enforce the Rabies Control Act ([RSA 436:99 - 109](#)) in conjunction with the local animal control officer. This law addresses the vaccination of domestic dogs and cats, quarantine of animals when there has been a human exposure, euthanization of the animal and submission of the head to the New Hampshire Public Health Laboratories for testing.
- Serve as a local source of public information and education about rabies (i.e. prevention, exposure, and transmission).

BACKGROUND

Rabies is a viral disease of the nervous system in humans and lower mammals. It is almost always fatal in humans once clinical symptoms begin. Signs and symptoms in humans usually start between 5 days to 1 year from the time of exposure. This is another reason that vaccination is recommended following exposure. The time from exposure to when symptoms may appear also varies depending on the site of exposure, the amount of rabies virus transmitted, viral strain, the immune status of the exposed person, and muscle and nerve supply at the exposure site.

Early signs include apprehension, headache, fever, tiredness, itching and/or pain at the exposure site. Later signs include difficulty with swallowing/fear of water (hydrophobia), delirium, convulsions, paralysis, and death.

Pathology: The virus multiplies in skeletal muscle near the exposure site, and then moves on to the nerves, the spinal cord and to the brain, then to salivary glands and saliva.

EXPOSURE

Exposure to rabies occurs when the saliva or neural tissue (brain or spinal cord) of an infected animal is introduced into open cuts or wounds in a person's skin or contacts the mucous membranes (mouth, nose, eyes). Humans are usually exposed when an infected animal bites them. Humans can also be exposed to rabies if an infected animal's saliva gets into a cut or open wound or into a person's eyes, nose or mouth. Rabies is not transmitted through blood, urine or feces. The virus can only be transmitted if the material containing the virus (i.e. saliva) is wet.

The two categories of exposure are:

- **Bite** - Any penetration of the skin by an animal's teeth. Bites, in general, are high-risk exposures.
- **Non-Bite exposure** - Scratches received from an animal, or scratches, abrasions, open wounds or mucous membranes contaminated with an animal's saliva or neural tissue. A common example of this type of exposure is touching a pet shortly after a rabid animal has attacked it and getting wet saliva from the animal in an open sore on a person's skin. While there is no documented record of a person contracting rabies in this manner, it is theoretically possible and, hence, the public is should be educated about non-bite exposures.

Finally, airborne, non-bite transmission has occurred in a bat cave and in laboratories where the rabies virus was being handled. Airborne transmission of rabies has *not been documented* in homes or any other settings.

The virus is not infectious when it is dry. Regular household bleach (at a solution of 1 part bleach and 10 parts water) kills the rabies virus. Rotting of a rabies-infected animal carcass kills the virus. Freezing does not destroy the virus. It is usually destroyed after a few minutes at temperatures greater than 122 degrees Fahrenheit. However, all meats should be cooked in accordance with safe cooking requirements, which typically are greater than 122 degrees.

RABIES VACCINATION AMONG HUMANS

Pre-exposure prophylaxis with rabies vaccine is recommended for individuals at *high risk* of exposure to potentially rabid animals, such as veterinarians and their staff, conservation and animal control officers, animal shelter personnel, trappers, other wildlife workers, or anyone who routinely is in contact with at-risk animals.

Post exposure prophylaxis (PEP) is indicated for persons possibly exposed to a rabid animal. Possible exposures include animal bites, or mucous membrane contamination with infectious tissue, such as saliva. PEP should begin as soon as possible after an exposure. There have been no vaccine failures in the United States (i.e. someone developed rabies) when PEP was given promptly and appropriately after an exposure.

Administration of rabies PEP is a medical urgency, not a medical emergency. Physicians should evaluate each possible exposure to rabies and as necessary consult with state public health officials regarding the need for rabies prophylaxis.

IMMUNIZATION OF DOMESTIC ANIMALS

Under state law ([RSA 436:100](#)) every dog, cat, and ferret 3 months of age and older shall be vaccinated against rabies. Young dogs, cats, and ferrets shall be vaccinated within 30 days after they have reached 3 months of age. Unvaccinated dogs, cats, and ferrets acquired or moved into the state shall be vaccinated within 30 days after purchase or arrival, unless under 3 months of age, as specified above. Every dog, cat, and ferret shall be

revaccinated at such intervals and with such vaccines as the Commissioner shall specify from time to time. In rabies infected areas, dogs, cats, and ferrets recently vaccinated must be kept under control for at least 30 days before being allowed to run free.

Vaccines start protecting dogs and cats about a month *after* they are vaccinated. It is recommended, but not required, that cows, horses, sheep and all other animals be vaccinated against rabies. More rabies cases are reported annually in cats than dogs. Cats are more likely to get rabies than dogs because they are hunters and are frequently outside at night when many wild animals are active.

State law (RSA 436:102) requires that each veterinarian, at the time of vaccinating any dog, cat, or ferret complete a certificate of rabies vaccination in triplicate which includes the following information: owner's name and address, description of dog, cat, or ferret (breed, sex, markings, age, name), date of vaccination, rabies vaccination tag number, type of rabies vaccine administered, manufacturer's serial number of vaccine, and the expiration date of the vaccination. Distribution of copies of the certificate shall be: the original to the owner, one copy retained by the issuing veterinarian and, within 40 days of the vaccination, one copy to the town or city clerk where the dog, cat or ferret is kept. The veterinarian and the owner shall retain their copies for the interval between vaccinations as specified in RSA 436:100.

For dogs, a metal or durable plastic tag, serially numbered, shall be securely attached to a collar or harness. The collar or harness with the vaccination tag shall be worn whenever the dog is out-of-doors, whether on or off the owner's premises. Cats and ferrets are not required to wear a collar or harness with the tag.

The offspring of wild animals crossbred to domestic dogs and cats (wild animal hybrids) are considered wild animals by the National Association of State and Public Health Veterinarians (NASPHV) and the Council of State and Territorial Epidemiologists (CSTE). Because the period of rabies virus shedding in these animals is unknown, these animals should be euthanized and tested rather than confined and observed when they bite humans. Wild animals and wild animal hybrids should not be kept as pets. Animals maintained in United States Department of Agriculture- licensed research facilities or accredited zoological parks should be evaluated on a case-by-case basis.

ANIMAL BITES

Rabies should be suspected in any animal that exhibits behavioral changes, such as becoming aggressive, agitated, hyperactive and easily excited. The animal may also become docile and even unusually friendly. A nocturnal animal may become active during the day. Unfortunately, these presentations are not unique to rabies and may be associated with other common diseases of domestic animals and wildlife. Finally, an infectious rabid animal may be healthy in appearance and behavior for a period of time prior to the onset of clinical rabies in that animal.

Bites by Wild Animals - The rabies virus is shed in the saliva of wild animals for varying lengths of time prior to the onset of clinical signs or symptoms. Therefore, confinement and observation of behavior for ten days is not an acceptable procedure for determining whether or not a wild animal was infectious for rabies at the time of a bite. A suspect high-risk wild animal that has exposed a human must be humanely euthanized. The brain, which must be handled carefully to prevent damage and decomposition of the brain tissue and contamination of the handlers, should be brought in to the New Hampshire Public Health Laboratories for testing.

A person bitten by a high-risk wild animal should contact their physician immediately to determine if the post exposure vaccination is needed. If the animal is available for testing, the New Hampshire Department of Fish & Game should be called to arrange for euthanasia and testing of the animal.

High Risk Wild Animals - The most common wild reservoirs of rabies are raccoons, skunks, bats, foxes, and coyotes. Bites from large rodents, especially woodchucks, should result in consultation with the state health department before a decision is made to initiate post exposure vaccination.

Small rodents (such as squirrels, rats, mice, hamsters, guinea pigs, gerbils, and chipmunks) and lagomorphs (such as rabbits and hares) are almost never found to be infected with rabies and have not been known to cause rabies among humans in the United States.

Signs of Rabies in Bats – Bats are responsible for the majority of domestically⁶ acquired human cases of rabies. People usually know when a bat has bitten or otherwise exposed them to rabies. However, because bats have small teeth that may not leave obvious marks, there are certain situations when a person may be considered exposed to rabies even in the absence of an obvious bite, including:

- If a person awakens to find a bat in their room,
- A bat is seen in the room of an unattended child, or
- A bat is seen in the room of a mentally impaired or intoxicated person.

People can not get rabies from having contact with bat guano (feces), blood or urine. If an exposure is possible, and the bat is available, the local animal control authority should be contacted to aid in capturing the animal for testing.

TREATMENT AND FOLLOW-UP OF AN ANIMAL BITE

- Wash the bite wound with large amounts of soap and warm water for ten minutes.
- Seek medical attention as soon as possible to evaluate if post-exposure vaccination is warranted.
- A physician should assess tetanus immunity status whenever a person has been bitten.

PROCEDURE FOR ANIMALS THAT EXPOSE A PERSON TO RABIES

It is important to inform people not to release any animals that may have exposed a person to rabies. There have been cases of human exposure to animals in which an animal that had been captured was released and not available for testing. Because the animal could not be tested, the exposed person had to undergo post-exposure treatment, perhaps unnecessarily.

- Report the bite or scratch to the local animal control officer.
- Try to capture the animal only if getting bitten is not a risk.
- Considering the possibility of animal rabies vaccine failure, the immunization status of a biting dog or cat is not used as the sole criterion for decision-making regarding management of the exposed person. The animal should be observed for a period of 10 days to be sure it was not infectious for rabies at the time of exposure.

State law describes what actions need to occur following a puncture of the skin or a “non-bite” exposure based on the vaccination status of the animal and whether or not it is symptomatic. A brief explanation follows, with full details found in RSA 436:105; 436-105-a; and 436-105-b. The owner of the animal is responsible for fees incurred for the confinement, examination, and/or testing of the animal.

- Dogs, cats, and ferrets that *have been* vaccinated in accordance with state law (RSA 436:100) and show no signs of rabies shall be confined for a period of ten days by the owner or another responsible person as required by local authorities. A veterinarian *must* examine them at the end of the ten days before being released from confinement. However, if signs suggestive of rabies develop during the observation period, the animal shall be humanely euthanized; its head removed, and sent for testing to the New Hampshire Public Health Laboratories.
- Dogs, cats, and ferrets that are apparently healthy, which are *unvaccinated* or whose *vaccination status is unknown*, shall be seized and impounded under the supervision of the local authorities for a period of ten days. If, upon examination by a licensed veterinarian, there are no signs of rabies at the end of the impoundment, the animal may be released to the owner. However, if signs suggestive of rabies develop during the impoundment period, the animal shall be humanely euthanized; its head removed, and sent for testing to the New Hampshire Public Health Laboratories.
- Dogs, cats, and ferrets that *are displaying symptoms*, which indicate a likelihood of infection with rabies, shall be immediately euthanized.
- When a stray dog or cat is the source of a potential human exposure, the local rabies control authority shall be responsible for the expense of confinement and veterinary examination. For stray ferrets, the state is responsible for these costs.
- Wild animals must not be quarantined and watched for signs of rabies. They must be humanely killed by game wardens or veterinarians and tested for rabies immediately.
- Prior vaccination of an animal may not preclude the necessity for euthanasia and testing if the period of virus shedding is unknown for that species. Management of animals other than dogs and cats depends on the species, the circumstances of the bite, and the epidemiology of rabies in the area.
- Farm animals that do not seem sick when they bite can usually be watched on site under the supervision of the owner.

PROCEDURES FOR DOMESTIC ANIMALS EXPOSED TO RABIES

Any animal that has been bitten or scratched by a wild, carnivorous mammal (or a bat) that is not available for testing should be regarded as having been exposed to rabies.

Dogs, Cats, and Ferrets - Unvaccinated dogs, cats, and ferrets exposed to a rabid animal should be euthanized immediately. If the owner is unwilling to have this done, the animal should be placed in strict isolation in a kennel under veterinary supervision and in cooperation with local authority (as stated in RSA 436) for a minimum of 6 months and vaccinated 1 month before being released. Dogs and cats that are currently vaccinated should be revaccinated immediately, confined, and observed for 90 days. When the animal is not immediately revaccinated, it shall be confined in strict isolation in a kennel for 6 months under the supervision of the local authority in cooperation with a licensed veterinarian.

Livestock - All species of livestock are susceptible to rabies; cattle and horses are among the most frequently infected of all domestic animals. Livestock exposed to a rabid animal and currently vaccinated with a vaccine approved by USDA for that species should be revaccinated immediately and observed for 45 days. Unvaccinated livestock should be slaughtered immediately. If the owner is unwilling to have this done, the animal should be kept under very close observation for 6 months.

The following are recommendations for owners of unvaccinated livestock exposed to rabid animals:

- If the animal is slaughtered within 7 days of being bitten, its tissues may be eaten without risk of infection, provided liberal portions of the exposed area are discarded. Federal meat inspectors must reject for slaughter any animal known to have been exposed to rabies within 8 months.
- Neither tissues nor milk from a rabid animal should be used for human or animal consumption. However, since pasteurization temperatures will inactivate rabies virus, drinking pasteurized milk or eating meat cooked to at least 122 degrees Fahrenheit does not constitute a rabies exposure.
- It is rare to have more than one rabid animal in a herd, or herbivore-to-herbivore transmission, and therefore it may not be necessary to restrict the rest of the herd if a single animal has been exposed to or infected by rabies.

Other Animals - Other animals bitten by a rabid animal should be euthanized immediately. However, any animal currently vaccinated with a vaccine approved by USDA for that species may be revaccinated immediately and placed in strict isolation for at least 90 days.

LABORATORY TESTING OF ANIMALS FOR RABIES

The standard test for detecting rabies is the fluorescent rabies antibody test on the brain tissue. This test takes 24 hours to complete. If the test is negative, rabies virus is considered not to have been in the saliva at the time of the exposure; and vaccine prophylaxis, if already begun, may be terminated. If the test is positive, it is assumed that the saliva was infectious at the time of exposure and that complete prophylaxis is necessary.

The NH Public Health Laboratories provides rabies testing at no charge on the following animals:

- A high-risk wild animal (fox, skunk, raccoon, or other carnivore, bat, woodchuck) that has exposed a human or domestic animal to possible rabies transmission by bite or not-bite exposure.
- For surveillance purposes, a high-risk wild animal which has not exposed a human or domestic animal when it is exhibiting abnormal behavior and is located in a part of the state from which rabies has not yet been confirmed in that species. The state veterinarian, the DPHS' Infectious Disease Investigation Section (IDIS), or the Fish & Game Department must authorize surveillance testing on a case-by-case basis.
- A cat, dog or other domestic animal displaying behavior suggestive of rabies which has exposed a human or domestic animal after a determination by the state veterinarian, the DPHS' IDIS, or the Fish & Game Department.
- An apparently healthy dog or cat, under observation for 10 days from the time it has exposed a human or domestic animal, which for any reason dies prior to the end of that 10-day observation period.
- A rodent (other than woodchuck) or a rabbit or hare, only if it has exhibited extremely unusual behavior and has exposed a human or domestic animal after a determination by the state veterinarian, the DPHS' IDIS, or the Fish & Game Department.

In addition to the above situations, a cat, dog or other domestic animal will be tested for rabies upon request from a licensed veterinarian for diagnostic purposes when no human or domestic animal exposure to that animal has occurred. A fee of \$175.00 will be charged for this testing.

HANDLING INSTRUCTIONS FOR RABIES SPECIMENS

1. Do not handle any material or animal possibly infected with rabies unless you have been adequately and currently immunized against rabies. Even when you have been immunized, the following precautions are necessary. If you think you have been exposed to rabies, contact your physician even if you have received pre-exposure vaccinations against rabies.
2. Do not touch live animals suspected of being rabid; they should be dead before any handling of the animal.
3. When necessary, kill the animal in a humane manner. The best method is a “jab stick” with euthanasia solution, but do not attempt to use this unless you have been trained. Any other methods should result in death as quickly as possible, but if there has been an exposure the head must be intact for testing. Do not shoot or club the animal in the head, because this may make testing impossible and the exposed person will require the full series of post-exposure vaccinations, which may have been avoided if testing were able to be performed.
4. Wear rubber gloves to handle the animal; wear two pairs, with a heavyweight pair on the outside. Wear goggles or other eye protection, a mask to protect nose and mouth, and disposable protection for your clothing. Wash thoroughly with soap and water after you are done and cleanup of the scene and tools is complete.
5. The tools used to handle an infected animal, and any scene contaminated by nervous system tissue from an infected animal, should be cleaned with fresh 10% bleach solution (1½ cup bleach with water to make up a gallon).
6. Bringing an animal to someone experienced in decapitation is recommended. Many veterinarians provide this service with domesticated animals. For wild animals, contact the NH Department of Fish and Game or your local animal control officer. Anyone who conducts this activity should use a shovel or other implement to place the carcass in a disposable box or bucket, taking care to avoid touching the outside of the container with the animal. Without touching the container, place it in a heavy plastic bag by inverting the bag over the container; seal the bag tightly by tying the neck of the bag on itself, not by using a twist tie, rubber band, or strap tie. Invert a second bag over the first, and seal that too. Refrigerate the specimen by lining a box with newspaper, and packing the specimen with ice. Take it to the decapitator, and follow the procedures of the facility. Dispose of all disposable items used to handle the animal at the decapitator if possible; if not, double bag them as above and treat them as a biohazard. The shovel and any other non-disposable but cleanable implements should be cleaned with 10% bleach solution; skin protection, eye protection, and mucous membrane protection should be worn until cleanup is complete.
7. Decapitation should be accomplished using a guillotine. Handle the head by double bagging it as described above and place in an insulated container with ice or coolants. If an insulated container is not available, place it in a box lined with newspaper and refrigerated with freezer packs or sealed plastic bottles with ice inside; plastic bottles filled with water and frozen work well. Close the box securely with tape and securely attach the Public Health Lab form to the outside of the box, and deliver it to the lab or contact the off-hours person from the lab for instructions on where to take it.
8. Carcasses of suspect animals may be disposed of safely by burying them under at least two feet of soil, at least 100 feet from the closest water supply.

HOW CAN THE SPREAD OF THIS DISEASE BE PREVENTED

- Do not handle wild animals. Teach children to avoid wildlife, strays and all other animals they don't know. Call the local animal control officer of the NH Fish and Game Department to report dead, sick or injured animals.
- If bitten by a wild or domestic animal, seek medical attention immediately and notify the local animal control officer.
- All bites by wild animals or contact with their saliva or brain or spinal cord tissue should be considered as possible exposure to rabies and must be evaluated medically.
- Keep trash containers tightly closed. Garbage attracts animals like skunks and raccoons.
- Vaccinate all dogs and cats against rabies and make sure their shots are kept up to date.
- If another animal has injured a dog, cat or other pet, handle it only with thick rubber gloves and have it examined by a veterinarian right away. Saliva from an attacking rabid animal remains infectious on the attached pet's fur until it has thoroughly dried.

IS RABIES REPORTABLE?

Yes. Rabies in animals and humans is reportable by New Hampshire law [RSA 141-C:1-8](#) to the Division of Public Health Services, Bureau of Communicable Disease Investigation Section. Any physician or other health care provider who assesses, diagnoses, or treats a person believed by him to be a case or suspect case of a reportable disease shall immediately report the same to the DPHS Bureau of Communicable Disease Control by telephone, mail or electronic transmission on forms provided by the commissioner.

For more information:

NH Bureau of Infectious Disease
1-800-852-3345 ext. 4496 (NH only), or 603-271-4496

NH Public Health Laboratories
1-800-852-3345 ext. 4461, or 271-4461

NH State Veterinarian
603-271-2404

NH Fish and Game Department
1-800-852-3411, or 271-3361 (nights/weekends)