

# Rabies

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Rabies is a fatal viral infection. Transmission of rabies almost always occurs by the saliva-laden bite of an infected mammal. Infection through fresh wounds or mucous membranes is less likely but possible. Droplet infection (aerosol) is possible as well, particularly in congregations of cave-dwelling bats where saliva droplets are dispersed in the air.

The virus may be present in saliva three to five days (domestic dogs and cats) and up to eight days (skunks) before clinical signs are observed. Therefore, you can be bitten by a rabid animal that is not showing obvious signs of clinical disease.

From the time of the bite, signs of the disease typically occur in 14 to 90 days, but the incubation period can vary considerably. Reports from available literature document incubation periods as short as nine days and as long as seven years. This variability is due to a variety of factors such as the location and severity of the wound, distance of the wound from the brain, and the amount and strain of virus introduced.

The virus remains at the bite site for several hours and replicates in muscle cells, then travels along nerves to the spinal cord and brain. As a result, thoroughly washing the bite site is an effective method of removing the virus from the wound. From the brain, the virus travels to salivary glands, where it can be transmitted through a bite.

Infection is characterized by apprehension, excitability, headache, fever, malaise and sensory changes at the bite site. As the disease

progresses, symptoms include paralysis, difficulty swallowing, delirium and convulsions. Paralysis, coma and death (usually two to seven days after clinical signs of the disease are observed) are the eventual end. Death usually is due to respiratory failure.

Rabies has a worldwide distribution and potentially can infect any warm-blooded animal. In the United States, the virus is perpetuated in wildlife. In the northern Great Plains, specifically North Dakota, striped skunks are the primary carrier. Rabid skunks frequently undergo a behavioral change that increases potential human exposure. For instance, skunks seen during the daytime would be considered abnormal behavior because they are nocturnal animals.

Rabies must be a consideration in any animal that shows signs of nervous system disease. Behavioral change and unexplained paralysis should create a high level of suspicion. Anorexia, apprehension, nervousness, irritability, hyper-excitability, isolation, incoordination, altered vocalization, changes in temperament and uncharacteristic aggressiveness are all warning signs of rabies.

## The Disease in Humans and Animals

Rabies exists in furious and dumb (or paralytic) forms.

In furious rabies, the animal is irrational and will attack other animals, people or moving objects at the slightest provocation or noise. Animals assume an alert posture and expression with dilated pupils, and may chew or swallow foreign objects. Muscular incoordination, paralysis and death follow.

In dumb rabies, symptoms include paralysis of the throat and jaw muscles, profuse salivation and difficulty swallowing. The jaw may be dropped. Death eventually occurs as well.

Rabid animals with oral abnormalities such as paralysis or difficulty chewing or swallowing sometimes are examined by owners and for a foreign object or the purpose of administering medication, thus creating exposure to the infective saliva.

Do not perform an oral examination on an animal exhibiting behavioral or swallowing abnormalities. Consult your veterinarian.

### Symptoms

- Cattle with the furious form will attack. Animals are alert and bellow intermittently.
- Horses show distress and agitation. They may roll and create the impression of an episode of colic, or attempt to strike or bite.
- Foxes and coyotes may invade yards or homes and attack pets or people.
- Raccoons and skunks are fearless, sometimes uncoordinated, and

aggressive, and become active during the day. They may attack domestic pets. The rabies virus has not been isolated from skunk spray.

- Bats may be seen during the daytime, resting on the ground, or attacking people and animals.
- Rodents and rabbits rarely are rabid, but each case should be evaluated on an individual basis.

### Prevention

- Do not perform oral examinations on animals that appear to have difficulty chewing or swallowing, show any type of oral or facial paralysis, or show excessive salivation.
- Make sure companion animals are current on their rabies vaccinations. Licensed vaccines are available for dogs, cats, ferrets and horses.
- Contact your physician immediately if you have any question of human rabies exposure.
- Contact local animal control authorities and avoid contact with skunks or raccoons seen during the daytime in unusual locations.

### Exposure

*(adapted from [www.nasphv.org/Documents/RabiesCompendium.pdf](http://www.nasphv.org/Documents/RabiesCompendium.pdf))*

#### Animals That Bite Animals

Dogs, cats and ferrets that never have been vaccinated and are 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 for six months. Isolation in this context refers to confinement in an enclosure that precludes direct contact with people and other animals.

Rabies vaccine should be administered upon entry into isolation or up to 28 days before release to comply with pre-exposure vaccination recommendations. No U.S. Department of Agriculture-licensed biologics are available for post-exposure prophylaxis of previously unvaccinated domestic animals, and evidence indicates that the use of vaccine alone will not reliably prevent the disease in these animals.

Animals overdue for a booster vaccination should be evaluated on a case-by-case basis based upon severity of exposure, time elapsed since the last vaccination, number of previous vaccinations, current health status and local rabies epidemiology to determine the need for euthanasia or immediate revaccination and observation/isolation.

Dogs, cats and ferrets that are vaccinated should be revaccinated immediately, kept under the owner's control and observed for 45 days.

All species of livestock are susceptible to rabies; cattle and horses are the species most frequently reported to be infected. If signs suggestive of rabies develop, the animal should be euthanized and the head shipped for testing.

Unvaccinated livestock should be euthanized immediately. If the animal is not euthanized, it should be observed and confined on a case-by-case basis for six months.

Livestock exposed to a rabid animal and vaccinated with a vaccine approved by USDA for that species should be revaccinated immediately and observed for 45 days.

Handling and consumption of tissues from exposed animals might carry a risk for rabies transmission. Risk factors depend in part on the site(s) of exposure, amount of virus

present, severity of wounds and whether sufficient contaminated tissue has been excised. If an exposed animal is to be custom or home-slaughtered for consumption, it should be done immediately after exposure, and all tissues should be cooked thoroughly.

People handling exposed animals, carcasses and tissues should use barrier precautions. Historically, federal guidelines for meat inspectors required that any animal known to have been exposed to rabies within eight months be rejected for slaughter. USDA Food and Inspection Service (FSIS) and state meat inspectors should be notified if such exposures occur in food animals before slaughter.

The rabies virus is distributed widely in tissues of rabid animals. Tissues and products from a rabid animal should not be used for human or animal consumption or transplantation. Pasteurization and cooking will inactivate the rabies virus; therefore, inadvertently drinking pasteurized milk or eating thoroughly cooked animal products does not constitute a rabies exposure.

Other mammals exposed to a rabid animal should be euthanized immediately. Animals maintained in USDA-licensed research facilities or accredited zoological parks should be evaluated on a case-by-case basis in consultation with public health authorities. Management options may include isolation, observation or administration of rabies biologics.

## **Animals That Bite Humans**

The rabies virus is excreted in the saliva of infected dogs, cats and ferrets during illness and/or for only a few days before illness or death. Regardless of rabies vaccination status, a healthy dog, cat or ferret that exposes a person should be confined and observed daily for 10 days from the time of the exposure; administration of rabies vaccine to the animal is not recommended during the observation period to avoid confusing signs of rabies with rare adverse reactions.

Any illness in the animal should be reported immediately. Such animals should be evaluated by a veterinarian at the first sign of illness during confinement. If signs suggestive of rabies develop, the animal should be euthanized and the head submitted for testing. Any stray or unwanted dog, cat or ferret that exposes a person may be euthanized immediately and the head submitted for rabies examination.

Other animals that might have exposed a person to rabies should be reported immediately. Management of animals other than dogs, cats and ferrets depends on the species, the circumstances of the exposure, the epidemiology of rabies in the area, the exposing animal's history,

the animal's current health status and the animal's potential for exposure to rabies. The shedding period for the rabies virus is undetermined for most species. Previous vaccination of these animals might not preclude the necessity for euthanasia and testing.

## **Testing**

- Microscopic examination of tissue can lead a pathologist to suspect rabies, but a 100 percent diagnosis cannot be made on that alone. The definitive and most common method of diagnosis is called the fluorescent antibody (FA) test, and it is very effective. If results are inconclusive, alternative tests are available.
- Whenever exposure has occurred, brain tissue must be examined at the North Dakota Department of Health (1205 Avenue A W., Bismarck, ND 58501, (701) 328-5262) or the Veterinary Diagnostic Laboratory at North Dakota State University (Van Es Hall, Fargo, ND 58108, (701) 231-8307).

### **For more information on this and other topics, see [www.ag.ndsu.edu](http://www.ag.ndsu.edu)**

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