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Rabies

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Rabies is a fatal viral infection that is most commonly transmitted by virus-laden saliva entering through a bite wound, scratch, or other break in the skin. Transmission through mucous membranes has also occurred. Because the virus travels along nervous tissue, blood-borne spread of rabies is very unusual.

Droplet infection (aerosol) is possible, 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. From the time of the bite, signs of 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 of the wound, severity of the wound, distance from the brain and amount and strain of virus introduced.

The virus remains at the bite site for a considerable amount of time, where it replicates in muscle cells. The virus then travels along nerves from the site of exposure to the spinal cord and brain, where it replicates rapidly. From the brain, the virus travels to salivary glands, where it can shed in large quantities for further transmission.

Initial signs of infection can be general and nonspecific, such as weakness, discomfort, inappetence and fever. Neuropathic (nerve) pain or a prickling/itching sensation at the site of a bite wound can be a more specific clinical sign. As the disease progresses, there is paralysis, difficulty swallowing, delirium and convulsions. Paralysis, coma and death (usually two to seven days after clinical signs of disease are observed) are the eventual end. Death is usually due to respiratory failure.

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Rabies has a worldwide distribution and can potentially infect any warm-blooded animal. In the United States, the virus is perpetuated in wildlife. In the northern Great Plains, specifically North Dakota, skunks are the primary carrier. Rabid skunks frequently undergo a behavioral change that increases potential human exposure. Rabies must be considered 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, hyperexcitability, 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 both 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, there is paralysis of the throat and jaw muscles, profuse salivation and difficulty swallowing (hydrophobia). The jaw may be dropped. Death eventually occurs as well.

Exposure Points

Oral symptoms of rabies in animals, like hypersalivation and difficulty chewing/swallowing, can be similar to other common health issues. Owners or veterinarians may perform oral examinations or treatments to try to determine the cause, thus exposing themselves to infective saliva. Paralysis or incoordination can also be due to other infectious and noninfectious causes, but rabies should always be a consideration with animals showing altered behavior.

Clinical Signs

- Cattle with the furious form will attack. Animals are alert and there is intermittent bellowing.
- 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 can become fearless, aggressive and active during the day. They may appear uncoordinated, blind or staggering. They may attack domestic pets. The rabies virus has not been isolated from skunk spray.
- Bats may be seen in the daytime, resting on the ground or attacking people and animals. Any bat found inside a home should be captured and submitted for testing.
- Rodents and lagomorphs (rabbits) are rarely rabid, but each case should be evaluated on an individual basis.

Prevention

- Examination of any animal showing signs of difficult chewing/swallowing, hypersalivation or any oral/facial paralysis should only be performed by a veterinarian with appropriate personal protective equipment (PPE) and animal handling facilities.
- Make sure companion animals are current on their rabies vaccinations. Licensed vaccines are available for dogs, cats, ferrets, horses and sheep.
- Contact your physician immediately if there is any question of human rabies exposure.
- Alert local animal control authorities and avoid contact with skunks, raccoons or other wildlife seen during the day in unusual locations.

Testing

Microscopic examination of tissue can lead a pathologist to suspect rabies, but a 100% diagnosis cannot be made on that alone. Definitive diagnosis requires a direct fluorescent antibody (DFA) test for rabies virus proteins. For the DFA test to be validated, specific regions of fresh brain tissue must be sampled.

Rabies Cases Submitted to NDSU VDL Since January 2015 (Updated June 2025)

Species	North Dakota Positives	All Positive Received Samples (including ND)	Total Tested
Bat	12	18	512
Bovine	10	11	436
Cat	7	14	1305
Dog	2	3	970
Fox	0	1	14
Horse	4	5	89
Goat	2	2	39
Raccoon	0	0	178
Skunk	38	50	152
Other	0	0	233

For more information on this and other topics, see www.ndsu.edu/extension