

New Jersey Department of Health

Rabies Background and Technical Information

The History of Rabies

Rabies is an ancient disease. It is well described in writings by Egyptians dating back to 2300 B.C. Rabies is caused by a virus that is present predominately in the saliva of rabid animals. The virus is transmitted by the bite of an infected animal. Rabies virus causes an inflammation of the brain, and is almost always fatal once symptoms develop. In wild and domestic animals, rabies virus may affect the part of the brain which regulates behavior, causing the animal to attack without fear or provocation. The rabies virus may also cause other changes in animal behavior, such as disorientation, impaired mobility, and unusual vocalizations. Wild animals that are normally out only at night may be seen during the day, approaching humans and domestic pets that they ordinarily would avoid.

In the earlier part of this century, New Jersey had a large problem with canine rabies. In 1939, the worst year for recorded cases of dog rabies, 675 dogs and four humans died of rabies. In 1942, a rabies program focused on the mass vaccination of dogs and pick-up of stray animals was initiated. As a result of these efforts, New Jersey experienced its last case of the canine rabies strain in 1956.

In 1960, the first case of rabies in bats was detected in the State. Since 1966, the number of rabid bats per year has ranged from 20 to 55 and between 2% and 5% of the bats submitted to the state laboratory for testing were positive for rabies.

In 1977, rabid raccoons were first detected in West Virginia. It is believed that rabies was present in raccoons captured in Florida, where raccoon rabies was well established, and imported into West Virginia by hunters. Once raccoon rabies was established in West Virginia, it spread at a rate of approximately 35 to 50 miles per year into Maryland, Washington D.C., Delaware, and Pennsylvania. This rabies epizootic* spread into New Jersey through Warren and Hunterdon counties in October 1989 and spread throughout the State in three years. The raccoon rabies epizootic now extends throughout New England and as far west as Ohio, and south into the gulf states.

All areas of the State of New Jersey have been affected by the raccoon rabies epizootic. Suburban areas in which raccoons, people and pets are in close proximity have had the highest number of cases. From 1989 through 2017, over 7,500 New Jersey terrestrial animals were confirmed to have rabies. Annually, there are between 200 and 270 terrestrial animal cases annually. The breakdown of rabid animals by species is 77% Raccoons, 14% skunks, 4% cats, 2% foxes, and 2% groundhogs. Other species of animals have also been diagnosed with rabies, are deer, rabbits, dogs, horses, cows, opossums, sheep, goats, beavers, ferrets, bear, and bobcat.

*epizootic is a term used to denote an epidemic of disease in an animal population

In 1997, a New Jersey man was diagnosed with rabies. He had removed bats from his house and may have been bitten by a bat in the process. This was the first human case of rabies since 1971, when a man was bitten by a bat and received partial treatment with the previously used duck embryo type of rabies vaccine. The currently used vaccines have never failed when administered properly.

Human Exposure to Rabies

Rabies virus infection most commonly occurs when a rabid animal bites an individual. Rabies can also occur when infected saliva from a rabid animal contaminates an open wound (one which was bleeding within the past 24 hours), a scratch or skin abrasion, or a mucous membrane.

In addition to saliva and the salivary glands, tissues and fluid of the central nervous system (i.e., brain and spinal cord) can contain high amounts of the virus. Virus is rarely found in other body organs and fluids.

People cannot get rabies by just petting an animal, or even by getting saliva contaminated with rabies virus onto their intact skin. In order for them to get rabies, they must be bitten or the virus must come in contact with a recent wound or break in the skin or onto their mucous membranes (such as into the eye or mouth). However, any physical contact with a bat should be carefully evaluated for rabies preventative treatment. Bats have such tiny teeth that a bite may go undetected.

If you are bitten or attacked by an animal, do the following:

- a. Wash the wound immediately with plenty of water and soap.
- b. Learn as much as you can about the animal. If the animal is with an owner, get the owner's name and address. If it is a wild or stray animal, look to see if there are any features that will allow you to identify it later on. If it is possible, safely capture the animal and confine it and call your local animal control officer.
- c. Contact your physician or local emergency room for wound care and consultation regarding the need for rabies preventative treatment.
- d. Report the incident to your local health department.

If a dog or cat bites a human, the animal must be observed for ten days to see if clinical signs of rabies develop. This is necessary even if it has been vaccinated, as very rarely, vaccination fails to protect an animal and it develops rabies. At the longest, a dog or cat can have rabies virus in its saliva for only 2-3 days before it develops rabies signs. Therefore we know that if a dog or cat remains healthy for at least 10 days after it bites someone, it could not have had the rabies virus in its saliva at the time of the bite. If an animal does not have virus in its saliva, it cannot transmit the disease through a bite.

Pet ferrets can also be observed for 10 days when they bite people. However, because of their propensity to bite, the Department discourages the keeping of ferrets as pets in households with small children. There are several well documented reports of ferrets attacking and severely biting infants.

Squirrels, mice, and other small rodents have only very rarely been found to have rabies, and have never been known to transmit rabies to humans or other animals. In general, preventative rabies treatment is not recommended after a bite from one of these animals unless it is unusually vicious or appears obviously ill. Groundhogs are the only rodents that are likely to be infected in areas where the raccoon rabies variant is present.

In order to test animals for rabies they must first be euthanized for the brain to be examined. Blood or saliva testing of suspect rabid animals is not a reliable method of diagnosis for rabies. The only sure method for determining if an animal has rabies is to look for the presence of the rabies virus in the brain under the microscope with a special fluorescent antibody test technique.

Preventing Rabies Infections

Obtain medical care for all animal bites and scratches - Although raccoons are the most frequently infected animals in the current rabies epizootic, other animals such as skunks, foxes and groundhogs are often bitten and infected by rabid raccoons. Wild animals with rabies do not always display signs of illness and can be perfectly healthy in appearance. There is also a type of rabies virus that is found in bats. All bites and scratches from these animals should be washed out immediately and receive prompt medical attention. Avoid all contact with bats, particularly sick or downed ones. If possible, capture all wild animals that have bitten or exposed humans or domestic animals and work with local authorities to arrange for rabies testing. Consult a doctor immediately for evaluation when you are bitten or scratched by any animal and report all bites to your local health department.

Vaccinate all dogs and cats - It is also recommended that owners of other domestic animals such as ferrets, horses, and livestock consider vaccinating their animals, especially if the public has access to the animals. Vaccination of domestic animals is very important because raccoons are very good at spreading rabies to other animals. Unvaccinated domestic animals can contract rabies from wild animals and transmit the infection to humans. There are safe and effective vaccines to protect dogs, cats, and most livestock against rabies. Your dog or cat can be vaccinated at a private veterinarian's office or at a municipal-sponsored rabies clinic (call your municipal clerk to ask about rabies clinics held in your area). Unvaccinated pets or other domestic animals that have had contact with a known or suspect rabid animal may have to be euthanized to avoid the risk of developing rabies, or placed in strict isolation from humans and other animals for a period of six months, until it is certain that the animal is free of rabies.

Avoid contact with wild animals - Do not feed wild mammals or keep them as pets. Although you cannot get rabies by petting a wild animal, you are likely to get bitten if you try to pet or feed a wild animal. It is natural for wild animals to bite people that try to pet or feed them. Wild animals will also attack and bite when defending their young, which may be nearby but not visible. There are no injectable

rabies vaccines approved for use in wildlife or hybrid crosses of domestic animals and wildlife, such as wolf-dog hybrids. Homes and yards should be made "animal-proof" by first ensuring that all garbage, pet food, and other food sources are stored in animal resistant containers, as raccoons and other wild animals love to feast on your leftovers. Do not leave leftover pet food outdoors as it will attract raccoons. Make sure outbuildings are secure from invasion by raccoons and skunks looking for a cozy place to stay. Chimneys should be capped, as raccoons like to den in chimneys. Steps should be taken to exclude bats from houses and other structures by sealing the openings they may use to access buildings. This should be done during the winter (November-March) when bats have left for hibernation. The entry points are often near the roof edge such as under the eaves, soffits, and flashing around the chimney. A variety of materials can be used to seal openings including 1/4inch hardware cloth, fly screening, sheet metal, wood caulking, expandable polyurethane, or fiberglass insulation.

Control stray domestic animals - Abandoned and unwanted dogs and cats should not be left to roam, as they can contract rabies from rabid wildlife and then transmit the infection to community residents and their pets. The municipal animal control officer is responsible for responding to complaints by residents of stray domestic animals, as well as any animal suspected of being rabid.

Human Rabies Preventative Treatment

There is no known effective treatment for human rabies once symptoms develop, but rabies can be prevented if rabies immunoglobulin and vaccine are given shortly after exposure to the virus. This is called "rabies post exposure prophylaxis" or PEP.

PEP is no longer the painful process that it used to be. The current vaccines are much safer and more effective than the previously used vaccine. Post exposure prophylaxis begins with a dose of rabies immune globulin infiltrated around the wound, if possible, and the remainder administered intramuscularly at an anatomical site distant from the vaccine. This is followed by a series of 4 vaccinations given over 14 days in the upper arm. This vaccine has been extensively used for many years with very few serious side effects.

The chance of a person becoming infected with rabies after an exposure that was untreated depends upon the type of exposure (such as bite) and where on your body the exposure occurred. In general, penetrating bite wounds to areas of the body with a rich nerve supply, such as the face, are highest risk. Studies have shown that not all bites from rabid animals result in infection with the rabies virus. However, since there is no treatment for this disease once symptoms begin, it is recommended that all persons exposed by a known or suspect rabid animal should receive rabies post exposure prophylaxis. Immediately washing the exposed area with water and soap is an important factor in helping to prevent infection.

Rabies postexposure prophylaxis has been 100% effective in preventing rabies when given properly, resulting in very few human cases in the United States.

The following is a list of the clinical stages of human rabies infection. Not all of these symptoms may occur in every case of human rabies.

- a. Incubation period - Usually 20-90 days; very rarely as long as several years.
There are no symptoms during this period.
- b. Prodromal Phase - lasting 2 to 10 days
 - fever
 - anorexia (poor appetite), nausea, vomiting
 - headache
 - malaise, lethargy
 - pain or paresthesia (numbness or tingling) at site of the bite
- c. Acute Neurological Phase - lasting 2 to 7 days
 - hyperactivity
 - disorientation
 - hallucinations
 - seizures, neck stiffness
 - hydrophobia or aerophobia (intense fear of water or air caused by pain from tightening of muscles in the throat)
 - paralysis or weakness
- d. Coma - lasting 0-14 days
- e. Death, or extremely rarely, recovery

Where can I get more information on rabies?

New Jersey Department of Health: <http://www.nj.gov/health/cd/topics/rabies.shtml>
Centers for Disease Control & Prevention: <http://www.cdc.gov>

Your healthcare provider

Your pet's veterinarian

Your local health department