

RABIES CONTROL INTRODUCTION

Throughout human history, few illnesses have provoked as much anxiety as has rabies. Known as a distinct entity since at least 500 B.C., rabies has been the subject of myths and legends across time and cultures. And while the incidence of human cases in the US has declined markedly over several decades, rabies continues to inspire dread today. Amidst this concern is a great deal of misinformation about the disease.

Rabies (or hydrophobia), is a viral disease transmitted via the bite of an infected (rabid) animal or by its lick over an open cut. The rabies virus is present in the infected animal's saliva. After a person is bitten by an infected animal, the virus multiplies at the bite site, and then travels along nerves to the brain. Once in the human brain, inflammation causes delirium, painful muscle spasms in the throat, and usually death. Pet vaccination programs and prompt treatment of animal bites has reduced the number of rabies cases in the United States to 5 per year. There are an estimated 65,000 human rabies cases each year throughout the world.

The incubation period ranges from 10 days to more than a year, depending on the entry site. Rabies infection characteristically produces a rapidly progressive encephalomyelitis (inflammation of the brain and spinal cord), and should be considered as a possible cause of any such illness in humans or other animals. The early symptoms are fever, headache, and loss of appetite which are nonspecific. After a while the patient becomes restless and disoriented and may experience seizures. The term hydrophobia (Greek for "fear of water") comes from the patient's failed attempts to satisfy a characteristic thirst because painful throat spasms prevent swallowing. Coma and death usually follow 3 to 20 days after the onset of symptoms.

Once symptoms have appeared, treatment is limited to sedatives and painkillers. Few people with rabies have survived. If a bite has occurred and there is a risk of rabies, patients are passively immunized with antirabies serum followed by a series of rabies vaccinations. If this routine is begun within two days of the bite, rabies is usually prevented. An animal suspected of being rabid is killed. Veterinarians, animal handlers, some laboratory workers, and persons visiting countries where rabies is a constant threat are routinely vaccinated with an inactivated form of the rabies virus.

Rabies is primarily a disease of non-human animals. It appears that any mammal species can develop rabies. The prevalence of rabies in specific animal species varies greatly by geographical region. Knowing which animals are most likely to be rabid in a given location is essential to implementing appropriate preventive and postexposure measures.

Animal Rabies

Traditionally, rabies exists in two forms in a community. The urban form, propagated chiefly by unimmunized cats and dogs, and sylvatic, propagated in North America by bats, coyotes, foxes, raccoons and skunks. Infection in domestic animals represents a "spillover" from sylvatic reservoirs of infection. In the United States today, wildlife accounts for over 90% of reported cases of animal rabies. Every opportunity should be taken to educate the public on the risks of trauma and infectious diseases associated with contact with wild animals. The control of rabies in bats and terrestrial mammals is very difficult. Selective population reduction may be useful in terrestrial rabies outbreaks, but the success of these efforts depends on the circumstances surrounding each rabies outbreak episode. It is generally not feasible or desirable to attempt wild carnivore or bat population reductions as a means of rabies control. Wildlife vaccination in California is not currently indicated due to the rabies strain types present here and the lack of a spreading epizootic.

Animals with rabies may exhibit telltale signs that something is physically wrong. Excessive salivation, avoidance of food and water, unusual aggression, daytime activity in a nocturnal animal (bat, skunk, raccoon, etc.), impaired locomotion, varying degrees of paralysis (frequently beginning in the hind legs), extreme depression, or bizarre behavior are potential signs of rabies. These signs indicate that extreme caution must be taken when approaching or attempting to interact with the animal. Generally, a lack of fear of humans is also unusual behavior for wild animals. Special procedures are often required to trap animals for observation and/or rabies testing. If wild animals drink or eat out of a pet's bowl, there is little or no risk of rabies virus transmission to the pet. However, the practice should be discouraged because it may expose the pet to other illnesses.

By 1960, mandatory vaccination of dogs in the United States largely controlled canine and human rabies. This immune barrier has been established nationwide at a cost of over \$300 million annually. Cats are also vaccinated for rabies but it is not mandatory and feline rabies is now more common than canine rabies in the United States. With the widespread vaccination of cats and dogs in the United States, most endemic human rabies is a result of contact with rabid wildlife, particularly bats.

Animal Rabies Outside of the United States

Rabies has traditionally been associated with dogs more than any other animal, and in parts of the world where domestic animal control and vaccination programs are limited, dogs remain the most important reservoir of the disease for people. Other domestic and farm animals can be rabid, too, though, and rabies occurs in a variety of wild animal species found in other countries.

Consequently, persons who have been bitten by any animal in another country should be fully evaluated as soon as possible by health authorities in that country and by their personal physician in the US. Local health departments can assist physicians with this evaluation.

Animal Rabies Within the United States

While dog rabies is a major problem in much of the world, in the United States, animal control and vaccination programs assure that rabies remains rare in dogs, cats, and other domestic animals. In this country, over 90% of animal rabies cases occur in wildlife. Rabies has been detected in many different wild animal species. However, certain geographically distinct reservoirs of terrestrial rabies exist, each with its own variants of the virus. The boundaries of these reservoirs shift constantly. Within each area, rabies transmission occurs predominantly within the dominant reservoir species -- with occasional "spillover infection" to other species. There are currently four terrestrial reservoir species in the U.S.: raccoons, skunks, foxes and coyotes. In addition to these reservoirs of terrestrial rabies, indigenous rabid bats have been found in every state except Hawaii.

Animal Rabies in California

In 2001, there were 321 laboratory confirmed cases of rabies in animals. Wildlife accounted for over 99% of the rabid animals. Bats accounted for 52 percent of the rabid animals in California during 2001. Rabies is well established in skunk and bat populations in California. Every opportunity should be taken to educate the public on the risks of trauma and infectious diseases associated with contact with wild animals.

Animal Rabies in Los Angeles County

Bats are the most commonly rabid animal in Los Angeles County. The virus has been identified in several bat species. In 1979 the last rabid skunk was detected and our last case of domestic animal rabies occurred in 1987 when a woman visiting Acapulco, Mexico, adopted a wandering cat who was later bitten by a stray dog. The cat was ill when it arrived at the Los Angeles International Airport and was diagnosed as a rabies suspected within 48 hours by a San Fernando Valley veterinarian.

Types of Rabid Animals Within the United States

The four most common terrestrial reservoir species harboring rabies in the U.S. are: raccoons, skunks, foxes and coyotes. In addition to these terrestrial, indigenous rabid bats have been found in every state except Hawaii.

Raccoons: Raccoons remain the most frequently reported rabid animal in the United States. The raccoon rabies reservoir extends throughout the

southeastern, mid-Atlantic, and northeastern states. No other reservoirs of raccoon rabies have been identified. Rabid raccoons occasionally detected outside of the reservoir area have been found to have non-raccoon variants of the rabies virus, suggesting that they were infected by other species.

Skunks: Skunks are the second most frequently reported rabid animal in this country. Three virus variants are responsible for rabies in skunks. There are two large geographically distinct reservoirs of skunk rabies due to three different variants of the virus: one in California; the other in the central US from Montana to Texas. Rabid skunks reported in eastern states outside the reservoir areas apparently were infected by raccoons rather than by other skunks.

Foxes: Two variants of the rabies virus are associated with persistent reservoirs of rabies in foxes. One long-standing reservoir involves arctic and red foxes in Alaska (and Canada) and to a lesser extent, areas of New York, Vermont, New Hampshire, and Maine. A different variant of the virus has been associated with gray foxes, resulting in reservoirs in Texas and Arizona.

Coyotes: A rabies variant found in domestic dogs along the Texas-Mexico border has been seen in coyotes in southern Texas. Northward spread of this reservoir has been limited by an aggressive (and expensive) airdrop vaccination program.

Bats: Rabid bats of many different species have been found in all of the 48 contiguous states. To date, only one rabid bat has ever been identified in Alaska -- in the southeastern part of the state. Also, one rabid bat was found in a shipping container in Hawaii. Rabid bats are found yearly in Los Angeles County.

Rodents/small mammals: Providers are often asked about the risks associated with small wild mammals -- such as rats, mice, squirrels, chipmunks, rabbits and hares. Rodent bites are common, so rodents are often tested for rabies in the US. Despite the large number of rodents examined, it is exceedingly uncommon for one to be infected with rabies virus. It has been postulated that these animals are so small that they are unlikely to survive an attack of a larger rabid animal (such as a raccoon, skunk, or fox). Furthermore, although there have been several case reports of humans infected by rabid rodents in other countries, no transmission of rabies from a rodent to a human (or any other mammal) has ever been documented in the United States.

Other wild animals: Other wild animals in the US are occasionally found to be rabid. Most are infected with virus strains associated with terrestrial animal species, rather than bats. In 2001, 116 rabid non-reservoir wild animals were reported from the 50 states, including 49 groundhogs and 28 bobcats.

Rabies in People

Worldwide: At least 50,000 humans develop rabies each year. The overwhelming majority of cases occur in areas where dog rabies is common. Most have a history of having been bitten by a dog. In this country, human rabies is very rare; furthermore, most of the recent human rabies infections in the United States have been caused by variants of the rabies virus associated with bats.

U.S.: From 1980 through September 2002, there were 46 human rabies cases reported in the United States. Of those, 14 appeared to have been exposed in other countries. Of the remaining 32 people, two were infected with the canine strain of rabies present along the Texas/Mexico border and one was infected by a rabid skunk. The other 29 cases were caused by bat variants of the virus. A definite history of a bat bite was documented for only two of these 29 cases, and only 13 others had any known contact with a bat; no definite history of an encounter with a bat could be established for the remaining cases.

California

Between 1980 and September 2002, ten people in California died of rabies in California, most diagnosed after death.

Los Angeles County

The last person to die of laboratory confirmed rabies in Los Angeles County was in 1975. A 16-year-old girl from Mexico, who had been living in Los Angeles for eight months, became ill and was hallucinating. When the girl developed hydrophobia rabies was suspected. She was bitten by a dog while in Mexico. The dog later disappeared.
