Rabies in Washington

Rabies is a zoonotic virus that causes acute encephalomyelitis. All mammals are susceptible to rabies virus. Preventing human infections is an important public health activity.

Background

Rabies viruses belong to the Lyssavirus genus, of which there are 14 known species. One of these, known as classical rabies virus, causes 99.9% of all human cases of rabies worldwide and is the only one present in the United States. Other Lyssavirus virus species are adapted to bats not indigenous to this country.

Bats are known rabies reservoirs in all parts of the continental United States, with rabies virus identified in at least 33 species of insect-eating bats. In the United States, 6.7% of bats submitted for rabies virus testing at public health laboratories were positive for rabies virus during 2001–2009. The true prevalence of rabies virus among bats is thought to be less than 1%. While raccoons, foxes and skunks are other natural rabies reservoirs in North America (Figure 1), none


Use the web link below to subscribe to epITRENDS:
https://public.govdelivery.com/accounts/WADOH/subscribe/new

Use the same link to manage subscriptions, including unsubscribing.
are known reservoirs in the Pacific Northwest. In Africa and Asia, dogs are the primary reservoir species. Although rabies virus variants are maintained within the specific reservoir species to which they are adapted, spillovers from one animal species to another are possible (e.g., a cat developing rabies after being bitten by a bat), but such infections usually result in limited onward transmission.

Rabies virus is transmitted from one mammal to another when wounds or mucous membranes are exposed to the saliva or neural tissue of a rabid mammal. Blood alone is not considered a risk factor. Rarely, rabies has been transmitted through organs transplanted from a person whose infection was not recognized.

**Rabies in Humans**

Incubation following exposure to saliva or infected neurologic tissue from an animal is usually 3 to 8 weeks but varies depending on wound severity and the relative distance of the exposed site from nervous tissue and the brain. Symptoms of rabies can be atypical and death is nearly always unavoidable after symptom onset. In humans, the initial clinical signs include fever, malaise, headache, and sensory changes at the site of the bite. Signs progress to excitability, delirium, convulsions, and spasms of muscles associated with swallowing. Eventually patients develop muscular paralysis, loss of consciousness, coma, and death.

Palliative treatment is typically initiated for human rabies cases. Aggressive experimental treatment with a combination of modalities has been successful in a very limited number of human rabies cases. If human rabies is suspected in a patient, infection control measures should be implemented promptly to prevent exposure of healthcare providers to saliva and other secretions of the patient due to theoretical concerns about person-to-person transmission. When human rabies cases occur, typically numerous healthcare providers are provided post-exposure prophylaxis (PEP).

In humans, a presumptive antemortem rabies diagnosis is possible with a combination of antibody testing done on serum and cerebrospinal fluid and antigen testing done on nuchal (neck) biopsies and saliva. Postmortem diagnosis using immunofluorescence of brain tissue provides a definitive diagnosis in humans. The Centers for Disease Control and Prevention (CDC) can conduct the testing for suspected human rabies cases. Washington State Department of Health can assist with arranging CDC consultation and specimen submission for such testing when a human rabies case is suspected.

Figure 2. Direct fluorescent antibody stain showing rabies viral antigen

[www.cdc.gov](http://www.cdc.gov)
Worldwide, rabies is responsible for an estimated 55,000 human fatalities, principally in Africa and Asia; about 98% of rabies cases are due to canine rabies (Figure 3). Nationally, one to three human rabies cases occur each year in this country. In contrast to international rabies patterns, the majority of domestically acquired human rabies infections in the United States are due to bats. Since 2006, 13 out of 15 human rabies cases in this country were associated with bat rabies virus variants.

**Epidemiology in Washington**

Two cases of human rabies were diagnosed in Washington in 1995 and 1997, the first cases in a generation. Both cases were fatal and associated with bat rabies variants. Insectivorous bats are the only known reservoir species in Washington. Since 1988, only three animal species other than bats (two cats, one llama, and one horse) tested positive for rabies in Washington; virus genotyping was possible in three of these and confirmed presence of bat rabies variants.

During 2006–2017, 3,458 bats were submitted from Washington for rabies virus testing. Of the 2,907 identified bats with conclusive test results, rabies positivity was 6.1% (176 bats), representing 10 of 16 indigenous species tested. The overall number of identified bats submitted for rabies testing was highest during the summer, with July–September accounting for 68% of all identified bats tested. The majority of bats (82%) were submitted from counties west of the Cascade Mountains.

**Risk assessment for suspected animal exposures**

All suspected human rabies exposures must be immediately reported to the local health jurisdiction. This includes reporting of all persons to whom rabies post-exposure prophylaxis is administered. The decision for rabies virus testing in an animal and PEP is based on the species involved in the exposure, its geographic origin, its symptoms and behavior, its vaccination status, and the nature of the exposure (see assessment document in Resources).

Bat exposures warrant special considerations. An exposure assessment is necessary when a bat is found in a room with a person who cannot say that exposure did not occur (e.g., unattended infant or child, intoxicated adult, sleeping person). Bat bites and scratches may not leave visible marks.

In general, rabid-acting mammals (see Resources) in areas with endemic rabies should be considered rabid unless proven otherwise. Insectivorous bats with disorientation, ataxia, lethargy, paralysis, unexplained wounds, aggression, biting, inability to fly, described as ill, or found dead are significantly more likely to test positive for rabies, but bats that appear healthy may also be rabid.
Rabies virus testing in animals

Animal rabies testing related to known or possible human exposure is provided free of charge at the Washington State Public Health Laboratories (PHL) as determined by the risk assessment. Results are usually available within 24 hours. Rabies testing of animals with no confirmed or possible human exposures is performed at Oregon State University at the submitter's expense. Animals submitted for rabies testing should be appropriately packed before shipment (see Resources). Bats should be safely captured and humanely euthanized before shipping (see Resources).

Prevention

Rabies vaccine provides complete protection and pre-exposure vaccination is recommended for workers with frequent contact with animals (e.g., veterinarians, bat rehabilitation workers, and wildlife biologists). Rabies vaccination for dogs and cats is mandatory in Washington and is one of the most effective ways of reducing the risk of dog and cat-mediated human rabies.

Post-exposure prophylaxis involves washing the wound for at least 20 minutes with running water and soap (rabies virus is highly susceptible to soap), infiltrating the wound with rabies immunoglobulin (if not previously vaccinated), and administering a vaccine series.

Through timely assessment and treatment by healthcare providers and prompt public health actions, rabies in humans can be prevented.

Resources

Washington pet vaccination requirements
https://www.doh.wa.gov/YouandYourFamily/ILLnessandDisease/Rabies/PetVaccinationRequirement

Washington guideline for suspected rabies exposure

Washington assessment of rabies exposures

Bat capture

Shipping animals to Washington State Public Health Laboratories

Treatment of human rabies
https://academic.oup.com/cid/article/36/1/60/283656