

PUBLIC HEALTH REFERENCE SHEET

Rabies, Human



Name	Lyssaviruses
Reservoir & Transmission	Mammals; primarily: dogs, cats, bats, foxes, coyotes, wolves, jackals, raccoons, skunks Virus-laden saliva from rabid animal introduced through bite or scratch
Incubation Period	Usually 3–8 weeks, and very rarely as short as a few days
Common Symptoms	General weakness or discomfort, fever or headache then acute encephalomyelitis that almost always progresses to coma or death within 10 days after the first symptom
Gold Standard Diagnostic Test	PCR; DFA
Risk Groups	Persons exposed to rabid animals, veterinarians, animal control staff, wildlife researchers, travelers to rabies-endemic areas
Geographic Significance	Worldwide

What is rabies?

Rabies is an acute viral zoonotic disease that causes a progressive viral encephalomyelitis and is nearly always fatal. Rabies virus is part of the family *Rhabdoviridae* in the genus *Lyssavirus*.

What is the occurrence of rabies?

Genus *Lyssavirus* currently contains 14 species and is divided into 3 phylogroups. Only one of the species, classical rabies virus, is currently present in the Americas, and it causes 99.9% of all human rabies cases worldwide. Annual country-level assessment information is available from the CDC at <https://www.cdc.gov/rabies/resources/countries-risk.html>.

How is rabies transmitted?

All species of mammals are susceptible to rabies virus infection, but only a few species are important as reservoirs for the disease. In the U.S., distinct strains of rabies virus have been identified in raccoons, skunks, foxes, and coyotes. Several species of insectivorous bats are also reservoirs for strains of the rabies virus.

Rabies virus is transmitted through direct contact (such as through broken skin or mucous membranes in the eyes, nose, or mouth) with saliva or brain/nervous system tissue from an infected animal. People usually get rabies from the bite of a rabid animal. It is also possible, but rare, for people to get rabies from non-bite exposures, which can include scratches, abrasions, or open wounds that are exposed to saliva or other potentially infectious material from a rabid animal. Transmission has been rarely documented via inhalation of aerosolized rabies virus as in a laboratory environment, or through corneal or solid organ transplants.

Rabies virus becomes noninfectious when it dries out and when it is exposed to sunlight.

Who is at risk for rabies?

Individuals are at risk when traveling in certain areas of the world, including but not limited to parts of Africa, Asia, and Central and South America, where rabies in dogs is still a major problem and access to preventive treatment may be difficult to obtain. Occupational exposure is a risk for those who work with or may come into contact with potentially rabid animals. Less than 20 cases of human survival from clinical rabies have been documented. Only a few survivors had no history of pre- or postexposure prophylaxis.

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What are the signs and symptoms of rabies?

In humans, the first symptoms of rabies may be very similar to those of the flu including general weakness or discomfort, fever, or headache. There may be also discomfort or a prickling or itching sensation at the site of bite. The acute period of disease typically ends after 2 to 10 days. Symptoms then progress to cerebral dysfunction, anxiety, confusion, and agitation. As the disease progresses, the person may experience delirium, abnormal behavior, hallucinations, hydrophobia (fear of water), and insomnia.

In animals, the signs, symptoms, and outcomes of rabies can vary. Symptoms in animals are often similar to those in humans and may include early nonspecific symptoms, acute neurologic symptoms, and ultimately death.

What are potential complications of rabies?

Once clinical signs of rabies appear, the disease is nearly always fatal, and treatment is typically supportive.

How is rabies diagnosed?

In animals, rabies is diagnosed using the direct fluorescent antibody (DFA) test for the presence of rabies virus antigens in brain tissue.

Rapid and accurate laboratory diagnosis of rabies in humans and other animals is essential for timely administration of postexposure prophylaxis. Within a few hours, a diagnostic laboratory can determine whether an animal is rabid and inform the responsible medical personnel. The laboratory results may save a patient from unnecessary physical and psychological trauma and financial burdens if the animal is not rabid. Because of the hazards associated with handling specimens, testing is only done with prior consultation.

Contact the state health department regarding any sample submissions, including suspected human rabies cases. If it is deemed necessary to send human samples for testing to the Rabies Laboratory at the CDC, the Rabies Duty Officer can answer questions regarding likelihood of a case, sampling techniques, and shipping at **404-639-1050**. Refer to the CDC's specimen submission guidelines: <https://www.cdc.gov/rabies/resources/specimen-submission-guidelines.html>.

In humans, several tests are necessary to diagnose rabies ante-mortem (before death); no single test is sufficient. Tests are performed on samples of saliva, serum, spinal fluid, and skin biopsies of hair follicles at the nape of the neck. Saliva can be tested by virus isolation in culture or reverse transcription followed by polymerase chain reaction (RT-PCR). Serum and spinal fluid are tested for antibodies to rabies virus. Skin biopsy specimens are examined for Lyssavirus antigen in the cutaneous nerves at the base of hair follicles.

How is rabies treated?

Rabies is a medical urgency. Decisions should not be delayed. Wash any wounds immediately with soap and water. Bite wounds can cause serious injury such as nerve or tendon laceration and local and system infection.

Post-exposure prophylaxis (PEP) regimens depend on vaccination history. The CDC guidelines are available at: <https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5902a1.htm>.

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People who have been previously vaccinated or are receiving pre-exposure vaccination for rabies should receive only rabies vaccine. Previously vaccinated persons are those who have received one of the Advisory Committee on Immunization Practices (ACIP)-recommended pre- or postexposure prophylaxis regimens (with cell-culture vaccines) or those who received another vaccine regimen (or vaccines other than cell-culture vaccine) and had a documented adequate rabies virus-neutralizing antibody response. Previously vaccinated persons, as defined above, should receive two vaccine doses (1.0 mL each in the deltoid), the first dose immediately and the second dose 3 days later.

For people who have never been vaccinated against rabies, PEP should include administration of both passive antibody and a series of rabies vaccine doses. The combination of human rabies immune globulin (HRIG) and vaccine is recommended for both bite and non-bite exposures, regardless of the interval between exposure and initiation of treatment. Rabies PEP consists of a dose of HRIG and rabies vaccine given on the day of the exposure, and then a dose of vaccine given again on days 3, 7, and 14.

If feasible, the animal should be captured. If the animal is declared healthy after an appropriated observation period or tests negative for rabies, the vaccine series can be stopped.

Service members returning from deployment may not have a completed postexposure prophylaxis regimen documented in their medical records. PEP is still effective if given weeks, months, or even years after a potential exposure. For questions or concerns about intentional or unintentional deviation from this rabies vaccine schedule, call the DHA Immunization Healthcare Division (IHD) at 877-438-8222 (GETVACC), Option 1.

How can rabies be prevented?

In 2022, ACIP published an update for the use of a modified pre-exposure prophylaxis vaccination schedule to prevent human rabies, <https://www.cdc.gov/mmwr/volumes/71/wr/mm7118a2.htm>. The major source of rabies in humans can be eliminated through ensuring adequate animal vaccination and control, educating those at risk, pre-exposure vaccination for those at risk, and enhancing access of those bitten to post-exposure medical care. Avoid feral or stray cats and dogs, as well as non-domestic mammals acting abnormally, appearing sick or injured, or showing no or little fear of humans.

What are some public health considerations?

- Specify the implicated animal species if known.
- Document the circumstances under which the case patient was exposed including duty exposure, occupational activities, environmental exposures, or other high-risk activities.
- Note the patient's rabies immunization history. Check the electronic health record system for vaccination templates.

References

Defense Health Agency. 2022. *Armed Forces Reportable Medical Events: Guidelines and Case Definitions*.

<https://www.health.mil/Reference-Center/Publications/2022/11/01/Armed-Forces-Reportable-Medical-Events-Guidelines>

Heymann, David L. ed. 2022. *Control of Communicable Diseases Manual*. 21st Edition. Washington, DC: APHA Press.

"Rabies," Centers for Disease Control and Prevention (CDC), last reviewed December 8, 2022. <https://www.cdc.gov/rabies>

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