

# RABIES

(Hydrophobia, Lyssa)

## REPORTING INFORMATION

Human

- [Class A\(1\)](#)
- Report immediately by telephone

Animal

- Complete [Rabies Test Submission Report](#) (HEA 2539 rev. 7/97). Report is submitted with animal specimen to ODHL. ODHL reports positive animal rabies cases to the local health department and to the Rabies Program.

## AGENT

Rabies virus, a rhabdovirus of the genus *Lyssavirus*

## CASE DEFINITION

### Rabies, Human

#### Case description

Rabies is an acute encephalomyelitis that almost always progresses to coma or death within 10 days after the first symptom.

#### Laboratory criteria for diagnosis

- Detection by direct fluorescent antibody of viral antigens in a clinical specimen (preferably the brain or the nerves surrounding hair follicles in the nape of the neck), or
- Isolation (in cell culture or in a laboratory animal) of rabies virus from saliva, cerebrospinal fluid (CSF), or central nervous system tissue, or
- Identification of a rabies-neutralizing antibody titer  $\geq 5$  (complete neutralization) in the serum or CSF of an unvaccinated person.

#### Case classification

Confirmed: A clinically compatible case that is laboratory confirmed.

#### Comment

Laboratory confirmation by all of the above methods is strongly recommended.

### Rabies, Animal

#### Laboratory criteria for diagnosis

- A positive direct fluorescent antibody test (preferably performed on central nervous system tissue)
- Isolation of rabies virus (in cell culture or in a laboratory animal)

#### Case classification

Confirmed: a case that is laboratory confirmed.

## SIGNS AND SYMPTOMS

### Humans

Humans infected with the rabies virus have an initial, asymptomatic incubation period. The incubation period can vary from about 10 days to rarely over a year. The average incubation period is 31-90 days. Shorter incubation periods are associated with exposure sites closer to the central nervous system, such as wounds of the head and neck, wounds in highly innervated areas, and in younger persons.

The prodromal period in human rabies usually lasts 2-10 days. Pain and paresthesia are common at the wound site. Non-specific complaints such as general malaise, chills, fever, headache, sore throat, and fever are commonly reported, as are behavioral changes such as apprehension, anxiety,

agitation, irritability, insomnia, and depression.

The acute neurologic period in humans can last 2-21 days. Rabies presents as an encephalitis which is difficult to distinguish from other causes of encephalitis. An excitation or furious phase includes hyperesthesia and extreme sensitivity to light and sound, dilation of pupils, and increase in salivation. Ascending or asymmetric paralysis can occur. Swallowing dysfunction due to muscle spasms is seen in most patients. Some experience laryngopharyngeal contractions when just looking at liquid and stop swallowing their own saliva. This excitation phase can persist until death or change to a generalized paralysis. In some cases paralytic symptoms predominate in the disease course. Patients with furious rabies usually die within a week, while those with paralytic rabies (often seen with bat-strain rabies), can survive up to 30 days.

### **Animals**

Initial symptoms in animals include behavior changes, agitation, and reflex excitability. With the furious form, animals become dangerously aggressive, biting objects, other animals, and humans. Salivation can be profuse and there can be voice changes due to paralysis of the throat muscles. In the dumb form, the excitatory phase is short or absent and paralysis is the predominant sign. There can be paralysis of a limb beginning at the site of exposure.

Dogs - Can show either the furious or dumb form of rabies, with the symptoms described above.

Cats - Generally show the furious type, followed by paralysis two to four days later.

Cattle - Primarily paralysis and incoordination. Cattle have difficulty swallowing, and show abnormal abdominal contractions.

## **DIAGNOSIS**

### **Human**

Neck biopsy specimens may be submitted to CDC for FA testing. Serum or cerebrospinal fluid (CSF) may be collected for indirect immunofluorescence or virus neutralization. At least 0.5 cc of serum or CSF is needed. Saliva may be submitted for detection of rabies RNA or virus isolation. Tracheal aspirates and sputum are not suitable for rabies tests. All specimens are submitted directly to CDC. Specific information for sample collection and shipping are included in Section 4.

### **Animal**

Specific FA staining of brain tissue is conducted at ODHL. Include a completed [Rabies Test Submission Report](#) (HEA 2539, rev. 7/97) with each specimen submitted. If additional testing information is needed, call ODHL (614) 644-4660.

## **EPIDEMIOLOGY**

### **Source**

Virus-laden saliva, or brain and spinal cord fluids of rabid animals.

### **Occurrence**

Rabies occurs worldwide, and although primarily a disease of animals, numerous human cases occur in developing countries. In the United States there are about one human and 5,000 animal cases diagnosed annually. The last human case in Ohio occurred in 1970. Until 1997, animal rabies cases in Ohio remained relatively stable with an average of 11 per year from 1990-1996. The cases were primarily in bats, skunks, and foxes. ODHL confirmed a raccoon-strain rabies case in Mahoning County in 1996. There were 62 raccoon-strain rabies positive animals submitted to ODHL in 1997 (59 raccoons, 2 cats, and 1 skunk) and 26 raccoon-strain rabies positive animals (20 raccoons, 2 cats, 3 skunks, and 1 fox) in 1998. The 1997 and 1998 raccoon-strain rabies positive animals were all from Columbiana (1997 and 1998), Mahoning (1997 and 1998), Trumbull (1997 and 1998), and Ashtabula (1998 only) Counties. Bat rabies cases occur sporadically across the state and skunk rabies cases are primarily from the east central area of Ohio.

**Mode of Transmission**

Primarily by the bite of a rabid animal, or where saliva or other potentially infectious material is introduced into an open wound or mucous membrane.

**Period of Communicability**

In dogs, cats, and ferrets, virus can appear in the saliva three to five days before the onset of symptoms and continue until death. The length of viral shedding in bats and other wildlife has not been determined, therefore no quarantine is recommended.

**Incubation Period**

In humans, 31-90 days. The range is as short as 9 days to as long as a year or more.

**PUBLIC HEALTH MANAGEMENT****Case (Human)**Investigation

In suspected human cases, determine possible exposures to known rabid animals.

Treatment/therapy

Intensive supportive care and rabies immune globulin are the only therapies available.

Isolation

Strict isolation of the case is required. Use universal precautions.

Follow-up specimens

Serum neutralizing antibody is usually not present until 8-10 days after onset of symptoms. If initial specimen was drawn earlier than 10 days from onset of symptoms, a second serum sample should be submitted. If the patient has no history of receiving rabies vaccine or globulin, the presence of rabies virus antibody in the serum is diagnostic. Antibody to rabies virus in the CSF always suggests a rabies virus infection.

**Contacts**

Contact the Division of Communicable Diseases, Ohio Department of Health if there is a question concerning the handling of an animal bite, case of rabies, or human immunization - 1-888-RABIES1 (1-888-722-4371).

Follow the ACIP recommendations for treatment of bite wounds inflicted by a human rabies case, a known animal rabies case, or a potentially rabid animal. Human contacts should also be evaluated for whether or not to treat with rabies post-exposure series. If post-exposure immunization is appropriate, the contacts should receive Rabies Immune Globulin and five doses of Human Diploid Cell Vaccine or Purified Chick Embryo Cell Culture Vaccine. See current ACIP recommendations in *MMWR* Jan. 8, 1999;48(RR-1).

Animals which have bitten a person or caused a non-bite exposure should be appropriately quarantined or sacrificed and tested for rabies. Cases should be handled according to State regulations including [ORC 955.26 and 955.261](#) and [OAC 3701-3-28, 3701-3-29, and 3701-3-30](#). Quarantine recommendations are also stated in the [Compendium of Animal Rabies Control](#).

Pets which have been exposed to potentially rabid animals should be handled according to the [Compendium of Animal Rabies Control](#).

**Prevention and Control**Follow-up specimens

Surveillance for an area will depend on how exposure occurred, species of animal, previous history of animal rabies in the area, and other factors. Preventive measures include stray animal control and

rabies vaccination of pets. The public, especially children, should be taught how to prevent being bitten by animals and to avoid handling wild animals.

If livestock are involved in exposure to a known rabid animal, contact the Ohio Department of Agriculture, Division of Animal Industry, 8995 E. Main St., Reynoldsburg, Ohio 43068, (614) 728-6220 or 1-800-282-1955.

Vaccination

For those individuals at increased risk of being exposed to rabies, such as veterinarians, animal control and wildlife workers, pre-exposure immunization is recommended. See current ACIP recommendations in *MMWR* Jan. 8, 1999;48(RR-1). The ACIP recommendations can also be accessed by internet at: <http://www.cdc.gov/epo/mmwr/preview/mmwrhtml.00041987.htm>