

Report human
cases immediately

RABIES

(Human and Animal)

Also known as: Hydrophobia and Lyssa

Responsibilities:

Hospital: Report human cases immediately by phone

Infection Preventionist: Assess in-house exposures to hospitalized human cases

Lab: Report all human cases immediately by phone, animal positive cases report by phone or mail

Physician: Report human cases immediately by phone

Local Public Health Agency (LPHA): Assess case exposures and other potential human exposures

Iowa Department of Public Health

Disease Reporting Hotline: (800) 362-2736

Secure Fax: (515) 281-5698

1) THE DISEASE AND ITS EPIDEMIOLOGY

A. Agent

The virus that causes rabies is a rhabdovirus of the genus *Lyssavirus*.

B. Clinical Description

Animal Rabies

Rabies is primarily a disease of the central nervous system. Animals with rabies can appear normal, meek ("dumb rabies"), or may be aggressive ("furious rabies"). Animals with furious rabies often exhibit aggressive or unusually excited behavior; they may excessively salivate and attack other animals or humans. Dumb rabies may be more difficult to detect; animals may seem tame, wounded, or dazed. These animals have been described as acting disoriented or suffering from some paralysis. While these behaviors are commonly reported, an animal's behavior is *not* a reliable indicator of whether it has rabies.

Human Rabies

Rabies is a fatal infection, which usually progresses over 2 – 21 days. A prodromal phase, lasting 2 – 10 days, is characterized by pain and numbness/tingling at the site of the bite (present in 50% – 80% of cases), and nonspecific complaints such as fatigue, headache and fever. Behavioral changes may also be apparent, including apprehension, anxiety, agitation, irritability, insomnia and depression. The prodromal phase is quickly followed by the neurologic phase, during which the patient may suffer disorientation and hallucinations; paralysis; episodes of terror and excitement; hydrophobia; hyperventilation; hypersalivation; and seizures. These symptoms are invariably followed by coma and death. Once symptoms have begun, there is usually no treatment or cure; prevention is the only tool.

Rabies should be considered in patients with signs or symptoms of encephalitis or myelitis, including autonomic instability, dysphagia, hydrophobia, paresis, and paresthesia, particularly if a nonspecific prodrome preceded the onset of these signs by three to four days. Progressive worsening of neurologic signs is characteristic of rabies and should be considered as a positive indicator for rabies. Laboratory tests to rule out common encephalitides (herpes, enteroviruses, arboviruses) should be performed. Negative results of these tests would increase the likelihood of rabies as the diagnosis. If

a patient presents with symptoms similar to the ones described above, but the neurologic status does not change and the illness continues for longer than three weeks, rabies is unlikely as the diagnosis.

Positive Indicators for Rabies

- Nonspecific prodrome prior to onset of neurologic signs
- Neurologic signs consistent with encephalitis or myelitis
 - dysphagia
 - hydrophobia
 - paresis
- Progression of neurologic signs
- Negative test results for other etiologies of encephalitis

Negative Indicators for Rabies

- Improvement or no change in neurologic status
- Illness with ≥ 2 to 3 week duration

C. Reservoirs

All species of mammals are susceptible to rabies infection. In 2014, 15 cases of animal rabies were reported in Iowa, which is slightly higher than the number in 2013. Rabies was identified most frequently in wildlife species, including 10 bats and 2 skunks. Two cases were diagnosed in cows and one in a cat. This data reflects only the tested animals that might have exposed humans or other domestic animals to rabies, and does not represent all rabid animals in Iowa. See www.idph.state.ia.us/Rabies/Resources.aspx for more information.

D. Modes of Transmission

Rabies is spread via the virus-laden saliva of an infected animal through a bite or saliva contact with mucous membranes or a fresh break in the skin. Breaks in the skin or mucous membrane exposure to nervous tissue (brain, spinal cord) of an infected animal also pose a transmission threat. Bites of some animals, such as bats, can inflict injury so minor that it goes undetected. Airborne spread (for example, in a cave with many bats, or in a laboratory through rabies virus or specimens) is rare, but has been reported. Rabies is not transmitted through contact with blood, urine, skunk spray, or feces of an infected animal.

Person-to-person spread has been documented after organs and corneas were transplanted from rabies infected individuals. Two non-laboratory-confirmed cases of person-to-person rabies transmission in Ethiopia have been described; the reported route of exposure in both cases was direct saliva contact (a bite and a kiss).

E. Incubation period

Animal Rabies

Depending on the animal, the incubation period may vary from a few weeks to a few years, but is typically 1 - 3 months.

Human Rabies

The incubation period is usually 3 - 8 weeks, but can rarely range from as few as 9 days (although 9-day incubation periods have not been documented in the U.S. with native strains of rabies) to as many as 7 years. Less than 1% of human cases have an incubation period longer than 6 months. The incubation period is typically related to the site of exposure; *e.g.*, the incubation period is usually shorter if the virus is inoculated closer to the central nervous system or in a highly innervated area. The incubation period also typically depends on exposure severity (more virus exposure results in a shorter incubation period) and the age of the exposed person (younger age generally results in a shorter incubation period).

F. Period of Communicability or Infectious Period

Animal Rabies

Animals are not infectious until virus is present in their saliva, which happens around the time of clinical onset of illness. Dogs, cats and ferrets may shed virus in their saliva for 3 – 7 days before the onset of clinical signs, and continue to shed virus until death. The shedding/communicability period for most wild animals has not been determined, although it appears that skunks may shed virus up to 18 days before death. Carcasses of animals with rabies may contain infectious virus, depending on temperature and environmental conditions. Rabies virus may persist in a frozen carcass for many weeks; however drying and sunlight rapidly deactivate rabies virus. A dried carcass or dried saliva does not contain live rabies virus.

Human Rabies

The period during which a patient is potentially infectious may begin up to 1 week before symptom onset and last until death. Saliva is considered potentially infectious, as are cerebrospinal fluid and organs (although viral concentrations in humans are 3 – 4 times lower than in dogs).

G. Epidemiology

Animal rabies

Animal rabies exists in most parts of the world. In the United States, Hawaii is the only state that has never reported an indigenously-acquired rabies case in humans or animals. In 2010, wild animals accounted for approximately 92% of reported cases of animal rabies in the U.S. Nationally, raccoons continue to be the most frequently reported rabid wildlife species (36.5% of all animal cases in 2010), followed by skunks (23.5%), bats (23.2%), foxes (6.6%), and other wild animals including rodents and lagomorphs (1.9%).

In the U.S., domestic species accounted for 8% of all rabid animals reported in 2010. The number of reported rabid domestic animals increased among cats and decreased among dogs, horses, sheep, and goats during 2010. In 2010, cases of rabies in cats increased 1.0% compared with the number reported in 2009. The number of rabies cases reported in cats is routinely 3-4 times that of rabies reported in cattle or dogs. In 2010 approximately 1.1% of cats and 0.3% of dogs tested for rabies were found positive.

Human Rabies

Worldwide an estimated 35,000–40,000 human rabies deaths occur each year. The vast majority of these deaths occur in developing countries. In the United States from 1995 through 2008, there were 49 human cases, of which 48 were fatal. Four cases were the result of solid tissue organ transplantation; 30 cases were associated with bat variants; one was associated with the raccoon variant; one was associated with the fox variant; and eight were associated with the canine variant. The most recent human cases of rabies in Iowa occurred in 1951 and 2002. The 2002 case was caused by the bat strain of rabies virus.

2) DISEASE REPORTING AND CASE INVESTIGATION

A. Purpose of Surveillance and Reporting

- To understand the rabies risk to people bitten or exposed to animal saliva or infectious materials
- To provide information on proper post exposure treatment for humans exposed

B. Laboratory and Healthcare Provider Reporting Requirements

Iowa Administrative Code 641-1.3(139) stipulates that the laboratory and the healthcare provider must report human rabies immediately, and animal rabies within 3 days to IDPH Center for Acute Disease Epidemiology (CADE) is (800) 362-2736; fax number (515) 281-5698, mailing address:

IDPH, CADE
Lucas State Office Building, 5th Floor
321 E. 12th St.
Des Moines, IA 50319-0075

Reporting forms are available free of charge from the clearinghouse.
Call ((319) 398-5133) to request a supply. Orders can also be processed online at
healthclearhouse.drugfreeinfo.org/cart.php?target=category&category_id=295

C. Local Public Health Agency Follow-up Responsibilities

- a. **The most important thing a local county health department can do if it learns of a suspected or confirmed case of human rabies is to immediately call IDPH, any time of the day or night.** The 24-hour phone number for the Center for Acute Disease Epidemiology is (800) 362-2736.
- b. Case investigation of human rabies in Iowa residents will be directed by IDPH Center for Acute Disease Epidemiology.
- c. Following immediate notification of IDPH, the LPHA may be asked to assist in investigating cases living within its community, including gathering the following information:
 - 1) The case's name, age, address, phone number, status (hospitalized, at home, deceased), and parent/guardian information, if applicable.
 - 2) The name and phone number of the hospital where the case is or was hospitalized.
 - 3) The name and phone number of the case's attending physician.
 - 4) The name and phone number of the infection preventionist at the hospital.
 - 5) The names and phone numbers of all healthcare providers and hospitals that cared for the patient.
- d. Institution of disease control measures is an integral part of case investigation. The LPHA is responsible for understanding and, if necessary, instituting the control guidelines listed in Section 3), Controlling Further Spread.

3) CONTROLLING FURTHER SPREAD

A. Human Isolation and Quarantine Requirements

Minimum Period of Isolation of Patient

Standard Precautions for the duration of illness (e.g., until death).

Minimum Period of Quarantine of Contacts

None for humans.

B. Protection of Contacts of a Case

1. Protection of Humans Exposed to Animals

Under Iowa Code Chapter 351.39, Local Boards of Health are responsible for collecting human exposure reports and enforcing animal confinement.

The need for post-exposure rabies prophylaxis should be evaluated in three steps and can be phrased in the form of three questions:

- 1) is the animal species known to carry rabies?
- 2) did an actual exposure occur? and
- 3) can the animal be tested?

Step 1. Is the animal species known to carry rabies?

Wild Animals:

In wild animals the rabies risk varies by species:

- High-risk animals are those that commonly carry rabies. In Iowa, these include skunks, bats, raccoons, foxes, and coyotes.
- Medium-risk animals have very rarely been found to carry rabies in the US (extremely rare in Iowa) large rodents such as beaver, muskrat, groundhog, and woodchuck.
- Low-risk animals that almost never carry rabies include small rodents, opossum, and lagomorphs. This includes mice, squirrels, chipmunks, and rabbits.

Dogs, Cats, Ferrets, Horses and Livestock:

These animals can be infected with rabies virus. Exposures to dogs, cats, horses, and livestock need to be carefully evaluated, since a potential exists for these animals to harbor the virus.

Other Species:

CADE is available for consultation call 800-362-2736 during business hours or 515-323-4360 after hours.

Once it has been determined that the animal involved is a potential carrier of rabies, the clinician should move to the second step. (Whether or not an animal has been vaccinated is immaterial to assessment because, though vaccination decreases the risk of the animal being rabid, it is not a guarantee).

Step 2. Did an exposure actually occur?

Rabies is transmitted by introducing the virus into open cuts or wounds in skin or via mucous membranes. The virus will not cross intact skin. Since the virus is present in saliva, actual exposures to the virus require bites, saliva contact to mucous membranes, or contamination of fresh, open cuts, wounds, or abrasions with saliva.

Other nonsalivary exposures to rabies virus rarely occur, and include exposure to large amounts of aerosolized rabies virus (e.g. explorers of caves colonized by rabid bats); infected organs (e.g., corneas) transplanted from patients who died of unrecognized rabies; and exposure of open wounds or mucous membranes to other potentially infectious material (nervous tissue) from a rabid animal. If the material containing the virus is dry, the virus can be considered noninfectious. Other contact, such as petting a rabid animal or contact with the blood, urine, skunk spray, or feces, does not constitute an exposure and is not an indication for prophylaxis.

Bats pose a unique problem. The bite of a bat can be so small that it may be undetected. People found in rooms with bats, who are unable to state, "I know I was not bitten," should be considered potentially exposed. For example persons that awaken to find a bat in the room or children alone with a bat in a room should be considered exposed to rabies.

Once it has been determined that a potential exposure occurred, the clinician should move to the third step. (Can the animal be tested?).

Step 3. Can the animal be tested?

Bats

If available, the bat should be tested for rabies. If the bat is unavailable for testing, PEP should be considered.

Wild Animals

High risk animals should be euthanized and submitted for rabies testing. Since viral shedding periods are not known for these animals, quarantine is not appropriate. In cases in which the animals are unavailable for testing, they should be assumed rabid.

Medium-risk animals have rarely been found to carry rabies in the US and have very rarely if ever been found to be rabid in Iowa. If the animal is available, it should be submitted for testing. If the animal is not available, the exposed person should consult with their personal physician to determine whether prophylaxis is warranted.

Lower-risk animal exposures almost never require human rabies PEP, unless the circumstances surrounding the exposure were unusual (such as an unprovoked bite by an animal acting strangely).

Dogs, Cats or Ferrets

Dogs, cats and ferrets that have bitten or otherwise exposed a human and appear healthy may be quarantined for 10 days in lieu of euthanasia and testing. If at any time during the quarantine period, a dog, cat, or ferret shows signs of rabies the animal should be immediately euthanized and tested.

Dogs, cats and ferrets that are incubating rabies will begin to exhibit signs of the disease very soon after they begin shedding virus in saliva. If an animal remains healthy during the 10-day quarantine, it could not have been shedding rabies virus in its saliva at the time of the bite or exposure. This does not guarantee that the animal is not incubating rabies; it only indicates that the animal was not infectious at the time in which the human was exposed.

A dog, cat, or ferret that is not available for observation or testing should be considered potentially rabid and post-exposure prophylaxis should be initiated. If capture of the dog, cat, or ferret is likely in the near future, prophylaxis may be delayed up to 72 hours. If the animal is not located within 72 hours PEP should be initiated.

Livestock

Recommendations for livestock that expose humans are determined on a case-by-case basis. Contact IDPH (800) 362-2736 for consultation.

Other Animal Species

For exposure to other animal species, recommendations are made on a case-by-case basis. Contact IDPH (800) 362-2736 for consultation.

Note: If a patient is bitten above the shoulder, IDPH recommends that the health care provider consider starting Post Exposure Prophylaxis immediately, as opposed to waiting and observing the animal for 10 days. The closer the point of exposure is to the brain, the shorter the distance in which the virus must travel, potentially resulting in a shorter incubation period. If the animal subsequently tests negative for rabies, or if the animal is quarantined and is healthy at the end of 10 days (quarantines can only be conducted in dogs, cats, and ferrets) Post Exposure Prophylaxis can be discontinued at that time. If Post Exposure Prophylaxis is discontinued before the series is completed and the patient is exposed again in the future, the entire Post Exposure Prophylaxis series should be administered. If the Post Exposure Prophylaxis series is completed and the patient is exposed again in the future, only two doses of rabies vaccine on days 0 and 3 should be administered.

Laboratory Submission of Animal Specimens

Rabies testing requires examination of the animal's brain, so the animal should be euthanized without damage to the head. Samples should be refrigerated prior to submission to the laboratory, and freezing should be avoided. Samples determined to be unsuitable for testing or indeterminate should be assumed positive and PEP should be administered accordingly.

There are two laboratories in Iowa that provide animal rabies testing services: State Hygienic Laboratory and Iowa State University Veterinary Diagnostic Laboratory.

State Hygienic Laboratory (SHL):

SHL is the designated state public health laboratory in Iowa. SHL receives state funding enabling them to provide free testing services for diseases of public health concern. Therefore, SHL will test

potentially rabid animals that have exposed humans free of charge. SHL does not provide testing for animal to animal exposures; therefore those samples should be submitted to Iowa State University Veterinary Diagnostic Laboratory.

Iowa State University Veterinary Diagnostic Laboratory (ISU VDL):

ISU VDL has historically provided animal rabies testing as a service to veterinarians who may be ruling out rabies as one of several differential diagnosis. However, in recent years ISU VDL has received an increasing number of requests for rabies testing of domestic, livestock, and wildlife species where the submitter is only requesting rabies testing without additional diagnostics. While ISU VDL is willing and able to provide that service to the public, healthcare, and veterinary communities, they do not receive any state or federal funding to support testing. Therefore, ISU VDL must charge for the testing to cover their operating expenses. ISU VDL will provide rabies testing for cases of animal and/or human exposure.

Specimen Submission and Transportation:

Specimen Preservation:

- If the specimen will not be submitted for testing immediately, it should be refrigerated until transported or shipped.
- **DO NOT FREEZE THE SPECIMEN**

Specimen Transport:

- **Private vehicle is the fastest and preferred way to get the specimen to the laboratory.**
 - Double bag the specimen
 - Place the specimen in a hard sided container, such as a Styrofoam cooler
 - Place ice packs around the double bagged specimen to keep it cool during transport
 - Include the appropriate Rabies Test Request Form from SHL or ISU
 - Call the appropriate laboratory before departure
- **Commercial courier service, such as FedEx, can also be used.**
 - Double bag the specimen
 - Place the double bagged specimen in a hard sided container, such as a Styrofoam cooler.
 - Place ice packs around the double bagged specimen to keep it cool -DO NOT FREEZE.
 - Place the completed Rabies Test Request Form in a separate plastic bag to prevent it from becoming wet or contaminated. Place the bagged Rabies Test Request Form in the hard sided container.
 - Firmly secure the lid of the hard sided container.
 - Package (place in a box) the hard sided container and ship.
 - Ship via **overnight courier**.

NOTE: Improper packaging and/or delayed delivery may compromise the integrity of the brain material rendering the specimen unsatisfactory for testing.

Specimen submission guidelines:

- **Large/medium animals-** If only requesting rabies testing, a veterinarian needs to remove the head and only the head should be submitted for testing*.
- **Bats-** Try not to crush the skull of the bat. Submit the entire animal.
- **Small animals (mice, squirrels, etc):** Submitting the entire animal is preferred.

***If a veterinarian is requesting other diagnostics from ISU VDL all appropriate samples should also be included. In some cases, this may mean that the entire animal should be submitted.**

Laboratory Contact Information:

SHL:

319-335-4500 or 800-421-4692 (answered all hours)

ISU VDL:

During business hours call 515-294-1950 – after hours call 515-290-1969

2. Protection of Domestic Animals Exposed to a Rabid or Potentially Rabid Animal

Longer quarantine periods are required for domestic animals exposed to a rabid or potentially rabid animal (without human exposure). Quarantines may range from 45 days to 6 months depending on the animal's vaccination status. Euthanasia may sometimes be recommended. The latest recommendations and requirements concerning the quarantine of animals exposed to a rabid or potentially rabid animal can be obtained from the Compendium of Animal Rabies Prevention and Control, 2008 National Association of State Public Health Veterinarians, Inc. (NASPHV) www.nasphv.org/Documents/RabiesCompendium.pdf

3. Protection of Humans Exposed to a Rabid or Potentially Rabid Animal or Human

Severe Bites above the Shoulder

If a patient is bitten above the shoulder, IDPH recommends the health care provider consider starting post exposure prophylaxis immediately. The closer the point of exposure is to the brain, the shorter the distance in which the virus must travel, therefore potentially resulting in a shorter disease incubation period.

If the animal subsequently tests negative for rabies, or if the animal is quarantined and is healthy at the end of 10 days (quarantines can only be conducted in dogs, cats, and ferrets) Post Exposure Prophylaxis can be discontinued at that time. If Post Exposure Prophylaxis is discontinued before the series is completed and the patient is exposed again in the future, the entire Post Exposure Prophylaxis series should be administered. If the Post Exposure Prophylaxis series is completed and the patient is exposed again in the future, only two doses of rabies vaccine on days 0 and 3 should be administered.

Human Post Exposure Prophylaxis

- Immediately and thoroughly wash all bite wounds and scratches with soap and water. Simple wound cleaning has been shown to markedly reduce the risk of rabies.
 - Tetanus prophylaxis should be considered
 - Risk of bacterial infections should be assessed and addressed.
1. Treatment of persons who have **not previously received rabies vaccine or have not previously received rabies post-exposure treatment.**
 - a. **Immunocompetent patients:**
 - **Four** 1-mL vaccine doses of HDCV or PCECV should be administered intramuscularly to previously unvaccinated persons as soon as possible after exposure on days 0, 3, 7, and 14 (day 0 is the day the post exposure prophylaxis is started).
 - One dose of rabies immunoglobulin (HRIG), 20 IU/kg, should also be administered on day 0.
 - If anatomically feasible, the full dose of HRIG should be thoroughly infiltrated in the area around the wound. The rest should be administered intramuscularly at a different site than the vaccine.
 - If HRIG is not given with the first post-exposure dose of vaccine, it must be given within eight days after the first dose of vaccine.

b. Immunocompromised patients:

- **Five** 1-mL vaccine doses of HDCV or PCECV should be administered intramuscularly to previously unvaccinated persons as soon as possible after exposure on days 0, 3, 7, 14, and 28.
- One dose of rabies immunoglobulin (HRIG), 20 IU/kg, should also be administered on day 0.
 - If anatomically feasible, the full dose of HRIG should be thoroughly infiltrated in the area around the wound. The rest should be administered intramuscularly at a different site than the vaccine.
 - If HRIG is not given with the first post-exposure dose of vaccine, it must be given within eight days after the first dose of vaccine.

How is immunocompromised defined in terms of rabies vaccination?

The decision of whether individuals are immunocompromised should be determined by a physician. However, to assist with this determination, persons with the below conditions may need to receive **five** doses of rabies vaccine (consult with their healthcare provider).

- A. Persons with immunocompromising conditions or on specific medications (non-HIV)
 - Examples include but are not limited to:
 - A. Congenital immunodeficiency
 - B. Leukemia
 - C. Lymphoma
 - D. Generalized malignancy
 - E. Therapy with alkylating agents, antimetabolites, radiation, or large amounts of corticosteroids.
 - F. Antimalarial medications
- B. Persons with HIV infection
 - A. Both symptomatic and asymptomatic patients with HIV infection
- C. Persons with conditions that cause limited immune deficits
 - A. Examples include but are not limited to:
 - A. Renal failure
 - B. Diabetes (uncontrolled)
 - C. Alcoholic cirrhosis
 - D. Asplenia

When rabies pre- or postexposure prophylaxis is administered to an immunosuppressed person, one or more serum samples should be tested for rabies virus-neutralizing antibody by the RFFIT test to ensure that an acceptable antibody response has developed after completing the series.

If no acceptable antibody response is detected after the final dose in the pre- or postexposure prophylaxis series, the patient should be managed in consultation with their physician and appropriate public health officials.

- 2. Treatment of persons who have either received pre-exposure vaccination or have previously received rabies post-exposure treatment (according to the current protocols and with approved products, if unsure contact CADE for consultation):
 - a. Two IM doses (1.0 ml each) of vaccine should be administered on days 0 and 3. Human Rabies Immune Globulin should NOT be administered.

Exposure to a Human Potentially Infected with Rabies

Standard Precautions for respiratory secretions should be in place for persons suspected or confirmed to have rabies. Articles soiled with saliva should be disinfected. Attending personnel should be protected (gloves, gowns, face protection) against any exposure to saliva. If a patient who has rabies (or is suspected of having rabies) exposes another person to saliva (through a

bite or via infectious material exposure to an open wound or mucous membrane), rabies PEP of the contact should be started. Other people from the patient's home, social, and work environment should be contacted to review their potential exposure.

4. Precautions and Contraindications to Rabies Prophylaxis

- a. *Immunosuppression.* Corticosteroids, other immunosuppressive agents, or immunosuppressive illness can interfere with the development of active immunity and predispose the patient to developing rabies. Immunosuppressive agents should not be administered during post-exposure therapy, unless essential for the treatment of other conditions.
- b. *Pregnancy.* Because of the potential consequences of inadequately treated rabies exposure, pregnancy is not considered a contraindication to post-exposure prophylaxis. Several studies have shown no indication of increased incidence of abortion, premature births or fetal abnormalities associated with rabies vaccination. Rabies exposure or diagnosis of rabies in the mother is not an indication for pregnancy termination.
- c. *Allergies.* When a patient with a history suggesting hypersensitivity to any rabies vaccine component must be given the vaccine, antihistamines can be used; epinephrine should be readily available to counteract anaphylactic reactions, and the person should be carefully observed in a medical setting during vaccination.

C. Preventive Measures

Environmental Measures

Human rabies control relies on controlling rabies in the animal population, therefore animal quarantine regulations and vaccination laws should be enforced. Under Iowa Code Chapter 351.39, Local Boards of Health are responsible for collecting human exposure reports and enforcing animal confinement. In Iowa, all dogs over 6 months of age are required to be vaccinated against rabies. Rabies vaccination is strongly encouraged in all companion animals (including horses) and valuable livestock.

Pre-Exposure Vaccination

Pre-exposure vaccination is recommended for persons in the following categories:

- Veterinarians
- Animal handlers
- Laboratory workers who handle rabies virus
- Persons living in or visiting countries where rabies is endemic
- Others whose occupations or hobbies bring them into contact with potentially rabid animals

Pre-Exposure Vaccination Protocol:

- Three 1.0 ml injections of vaccine given intramuscularly on each of days 0, 7, and 21 **or** 28.

NOTE: Pre-exposure vaccination does **NOT** eliminate the need for prompt post-exposure prophylaxis. If persons who have completed the pre-exposure vaccination series are subsequently exposed to rabies, the following protocol should be followed (as stated on page 7):

- Two IM doses (1.0 ml each) of vaccine, on days 0 and 3. Human Rabies Immune Globulin should NOT be administered.

Monitoring Pre-Exposure Vaccination Titers:

Persons who work with live rabies virus in research laboratories or vaccine production facilities and are under continuous risk of inapparent rabies virus exposure should have their serum rabies antibody titer measured every 6 months. Acceptable antibody level is 1:5 titer by the rapid fluorescent focus inhibition test (RFFIT) technique. See page 15 for laboratories performing the serologic tests. If the antibody level is less than 1:5, booster doses of vaccines should be

administered to maintain a serum titer corresponding to at least complete neutralization at a 1:5 serum dilution by RFFIT.

Persons who frequently come in contact with potentially rabid animals, such as **veterinarians, veterinary technicians, animals control officers, or wildlife officers**, should have a serum sample tested for rabies antibody every **2 years**. If their antibody level is less than complete neutralization at a 1:5 serum dilution by the RFFIT, the person should receive a single booster dose of vaccine.

Education

Offer the following advice to the public to help prevent rabies:

- Vaccinate pets; dogs are required by law to be vaccinated. Although not required by state law, cat, ferret, horse and valuable livestock vaccinations are recommended.
- Do not feed or handle wild or stray animals. Avoid sick animals or those that act strangely.
- Do not touch or handle dead animals.
- Contact local animal control officer with questions about the capture of an animal or handling of a carcass.
- Cover garbage cans and keep pet food indoors, so wild animals are not attracted.
- Do not keep wild animals as pets, which is often illegal as well as dangerous.
- Never handle bats. A bat bite or scratch may be small and go unnoticed. People who awaken to find a bat in the room or children awake or asleep with a bat in a room may require PEP.
- Recommend that travelers to developing countries with endemic rabies receive pre-exposure prophylaxis if they will be visiting in situations where exposure is likely (e.g., camping, hiking, backpacking, or away from areas where treatment for a bite wound is available). Travelers should be warned to avoid petting or otherwise having contact with stray animals.

Note: For more information about international travel and rabies, contact the CDC Traveler's Health Office at (877) 394-8747 or via the internet at www.cdc.gov/travel

4) ADDITIONAL INFORMATION

The Council of State and Territorial Epidemiologists (CSTE) surveillance case definitions for Rabies can be found at: www.cdc.gov/osels/ph_surveillance/nndss/phs/infdis.htm#top

CSTE case definitions should not affect the investigation or reporting of a case that fulfills the criteria in this chapter. (CSTE case definitions are used by the state health department and the CDC to maintain uniform standards for national reporting.)

Programs for Uninsured and Underinsured Patients

Patient assistance programs that provide medications to uninsured or underinsured patients are available for rabies vaccine and Immune globulin.

Sanofi Pasteur's Patient Assistance Program (providing Imogam® Rabies-HT and Imovax® Rabies as well as other vaccines) is now administered through the Franklin Group. A healthcare professional or patient can either contact the Franklin Group directly, or call the customer service team (1-800-VACCINE) who will transfer them to the Franklin Group. The Franklin Group will review the application against the eligibility criteria. For more information about the program or to request an application, please contact the Sanofi Pasteur, Inc. Patient Assistance Program (Franklin Group) at 1 (866) 801-5655.

Novartis' Patient Assistance Program for RabAvert® is managed through RX for Hope and can be accessed at 800-244-7668. Instructions and request forms are also available at the Rx for Hope website [RabAvert Patient Assistance Program](#).

References

CDC. Human Rabies Prevention—United States, 2008, Recommendations of the Advisory Committee on Immunization Practices (ACIP), *MMWR*. May 23, 2008; 57:RR-03.

Heymann D., ed. *Control of Communicable Diseases Manual, 20th Edition*. Washington, DC: American Public Health Association, 2008.

Compendium of Animal Rabies Control, *MMWR*, April 18, 2008; 57:RR02

Additional Resources

- Iowa Department of Public Health – Rabies Resources:
www.idph.state.ia.us/Rabies/
- CDC Resources: www.cdc.gov/mmwr/preview/mmwrhtml/rr5902a1.htm
www.cdc.gov/mmwr/preview/mmwrhtml/rr57e507a1.htm?s_cid=rr57e507e%0d%0a
- Compendium for animal rabies control: www.nasphv.org/Documents/RabiesCompendium.pdf

CONSULTANTS: Iowa Department of Public Health
During regular business hours call: (800) 362-2736
After hours call: (515) 323-4360

LABORATORIES:
[University of Iowa State Hygienic Laboratory \(SHL\)](http://www.shl.uiowa.edu)
Oakdale Campus
University of Iowa
Iowa City, IA 52242
Tel: (319) 335-4500 or (800) 421-4692
(answered all hours)
www.shl.uiowa.edu/kitsquotesforms/rabiesslip.pdf

[Iowa State University Veterinary Diagnostic Lab \(VDL\)](http://www.vetmed.iastate.edu)
College of Veterinary Medicine
Iowa State University
Ames, IA 50011
Tel: (515) 294-1950 or after hours (515) 290-1969 (Veterinary Teaching Hospital)
<http://vetmed.iastate.edu/sites/default/files/vdl/forms/RabiesForm.pdf>

**Laboratories that perform the Rapid Fluorescent Focus Inhibition Test
(the CDC recognized test for assessing human antibody levels)**

INTERPRETATION: A titer of 1:5 is considered adequate.

SHIPPING INFORMATION: Please send the following information with your specimen:

1. Address of person or institution responsible for receiving the results and billing information.
2. Complete vaccination history if possible.
3. All serum samples that are potentially pathogenic to humans should be labeled or marked with red tape or sticker.

SEND SAMPLES TO (any one of the following):

K-State Rabies Laboratory

Manhattan/K-State Innovation Center
2005 Research Park Circle
Manhattan, KS 66502
Main telephone: (785) 532-4483
Fax: (785) 532-4522 or (785) 532-4474
Email: rabies@vet.k-state.edu
Web address: www.vet.ksu.edu/rabies

Atlanta Health Associates

309 Pirkle Ferry Road, Suite D300
Cumming, GA 30040
(770) 205-9091 or (800) 717-5612
FAX: (770) 204-9021
Web address: www.atlantahealth.net/

Auburn University College of Veterinary Medicine

Note: Only animal specimens tested.

Dept. of Pathobiology, Virology Lab
261 Greene Hall
Auburn University, AL 36849-5519
(334) 844-2659
www.vetmed.auburn.edu/diagnostics

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- Human Rabies Vaccine**
- A) Imovax™ Rabies
Human diploid cell vaccine
Sanofi Pasteur Inc
Box 187 Discovery Dr
Swiftwater, PA 18370-0187
(800) 822-2463
(570) 839-7187
fax: (570) 839-0955
www.sanofipasteur.us
- B) RabAvert™
Purified chick embryo cell culture
Novartis
4560 Horton Street
Emeryville, CA 94608-2916
(800) 244-7668
fax: (510)923-3434
MN # (510) 655-8730
www.rabavert.com
- Human Rabies Immune Globulin (HRIG)**
- A) Hyperrab
Talecris Biotherapeutics Inc
PO Box 110526
4101 Research Commons
79 T. W. Alexander Dr
Research Triangle Park, NC 27709
(800) 243-4153
www.talecrisbiouusa.com
- B) Imogam Rabies
Sanofi Pasteur Inc.
Box 187 Discovery Dr
Swiftwater, PA 18370-0187
(800) 822-2463
(570) 839-7187
fax: (570) 839-0955
www.sanofipasteur.us