RABIES RESOURCE MANUAL

Prepared by:
Iowa Department of Agriculture and Land Stewardship
Iowa Department of Public Health
Iowa Veterinary Medical Association

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Contributors:

- Dr. Ann Garvey, State Public Health Veterinarian, Iowa Department of Public Health
- Dr. David Schmitt, State Veterinarian, Iowa Department of Agriculture and Land Stewardship
- Dr. Randy Wheeler, Executive Director, Iowa Veterinary Medical Association

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(Source: IDPH Epi Manual)

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, for example dogs may present with paralysis of the lower jaw and their tongue may be hanging out. While these behaviors are commonly reported, an animal's behavior alone is *not* a reliable indicator of whether it has rabies. Rabies should be considered in mammals with signs or symptoms of encephalitis or myelitis, including autonomic instability, dysphagia, hydrophobia, paresis, and paresthesia.

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, the illness is almost always fatal.

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.

C. Reservoirs

All species of mammals are susceptible to rabies infection.

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) has occurred. 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 nonlaboratory-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. Some animals, such as dogs and cats, have been studied extensively. The incubation period of their disease is commonly three to five weeks.

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) to as many as 7 years. Less than 1 percent 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 depends on exposure severity (more virus 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 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; drying and sunlight rapidly deactivate rabies virus. 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. Over the last 100 years, rabies in the United States has changed dramatically. More than 90% of all reported animal cases, now occur in wildlife; before 1960 the majority were in domestic animals. The principal rabies hosts today are wild carnivores and bats.

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. The number of rabies-related human deaths in the United States has declined from more than 100 annually at the turn of the century to one or two per year in the 1990's. Modern day prophylaxis has proven nearly 100% successful. 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.

ASSESSING THE NEED FOR HUMAN POST-EXPOSURE PROPHYLAXIS (PEP)

Assessing the need to provide Post-Exposure Prophylaxis to humans exposed to animals suspected to have rabies should be determined by asking a series of questions. Each question needs to be answered to determine if POST EXPOSURE PROPHYLAXIS needs to be initiated. The questions to ask include:

1) Is the animal species known to carry rabies?

2) Did an actual exposure occur?
3) Can the animal be tested or quarantined?

Question 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 are known to 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 Iowa and may include large rodents such as beaver, muskrat, and woodchuck.
- Low-risk animals are those that almost never carry rabies when they are demonstrating normal behavior. These include small rodents, squirrels, opossum, and lagomorphs (rabbits). If these species **are** acting abnormally you should consider them potentially rabid.

Dogs, Cats, Ferrets, Horses and Livestock:

Dogs, cats, ferrets, horses, and livestock periodically test positive for rabies each year in Iowa.

Other Species:

Contact the Iowa Department of Public Health (IDPH) for consultation. Call 800-362-2736 during business hours or 515-323-4360 after hours.

Question 1 Interpretation:

If it has been determined that the animal involved is a potential carrier of rabies, the clinician should move to the second question. (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.)

Question 2. Did an exposure actually occur?

Rabies is primarily transmitted through saliva or neural tissue contact to open wounds (including through bites) or mucous membranes. The virus will not cross intact skin. Review the following lists to determine if a rabies exposure has occurred.

Salivary exposures could include:

- Bites
- Saliva contact to mucous membranes
- Saliva contamination of an open wound

Non-salivary exposures could include:

- Neural tissue contact to an open wound or mucous membrane (ie. if a person shoots an animal in the head and is splattered with brain material in eyes, nose, or mouth)
- Organ transplants from patients who died of undiagnosed rabies infection
- Exposure to large amounts of aerosolized rabies virus (e.g., explorers of caves colonized by rabid bats).

Situations that are not considered rabies exposures and do not indicate Post Exposure Prophylaxis:

- Petting a rabid animal
- Contact with blood, urine, scent of skunks, and feces

Bats pose a unique problem. The bite of a bat can be so small that it may be undetected. In addition to the exposures listed above, review the following lists to determine if a rabies exposure has occurred.

Additional situations that are also considered potential exposures include:

- People that awaken from sleep to find a bat in the room they are sleeping in
- A bat is found in a room with children or incapacitated individuals without supervision

- If a person has direct physical contact with a bat and cannot definitely say they were not bitten (i.e. a bat flies into a person's arm)

A situation that is not considered an exposure includes:

- People that are awake and find themselves in a room with a bat and can state that they were not bitten by the bat

Question 2 Interpretation:

If it has been determined that a potential exposure occurred, the clinician should move to the third question to determine if the animal involved can be tested or quarantined.

Question 3. Can the animal be tested or quarantined?

Bats

If available, the bat should be tested for rabies. If the bat is unavailable for testing, Post Exposure Prophylaxis is recommended.

Wild Animals

High risk animals should be euthanized and submitted for rabies testing. In cases in which the animals are unavailable for testing, they should be assumed rabid and Post Exposure Prophylaxis is recommended.

All medium-risk animals and any low-risk animal behaving abnormally. If the animal is available, it should be submitted for testing. If the animal is not available, Post Exposure Prophylaxis should be considered and the exposed person should consult with their personal physician to make the determination.

Dogs, Cats or Ferrets

Dogs, cats and ferrets that have bitten or exposed a human to their saliva 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 the dog, cat, or ferret 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 saliva 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 is recommended. If capture of the dog, cat, or ferret is likely in the near future, Post Exposure Prophylaxis may be delayed up to 72 hours. If the animal is not located within 72 hours Post Exposure Prophylaxis should be initiated.

Other Animal Species

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

HUMAN POST-EXPOSURE PROPHYLAXIS PROTOCOL

Severe Bites above the Shoulder

If a patient is bitten above the shoulder, IDPH recommends that healthcare providers 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:
   1) Congenital immunodeficiency
   2) Leukemia
   3) Lymphoma
   4) Generalized malignancy
   5) Therapy with alkylating agents, antimetabolites, radiation, or large amounts of corticosteroids.
   6) Antimalarial medications

B. Persons with HIV infection
   Both symptomatic and asymptomatic patients with HIV infection

C. Persons with conditions that cause limited immune deficits

Examples include but are not limited to:

1) Renal failure
2) Diabetes (uncontrolled)
3) Alcoholic cirrhosis
4) Asplenia

When rabies pre- or postexposure prophylaxis is administered to an immunosuppressed person, one or more serum samples should be tested 1—2 weeks after vaccination 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 (complete neutralization of virus at a 1:5 serum dilution is considered acceptable) 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

Contact isolation 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 Post Exposure Prophylaxis 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.

Precautions and Contraindications to Rabies Prophylaxis

For information on contraindications and precautions see the Human Rabies Prevention Recommendations of the Advisory Committee on Immunization Practices available on the CDC Web site: http://www.cdc.gov/mmwr/PDF/rr/rr5703.pdf .

RECOMMENDATIONS FOR DOMESTIC ANIMALS EXPOSED TO RABID OR POTENTIALLY RABID ANIMALS

This section refers to any animal exposed to a confirmed or suspected rabid animal. Wild mammalian carnivores or bats that are not available or suitable for testing should be regarded as rabid animals.

Dogs, Cats, or Ferrets

Unvaccinated Dogs, Cats and Ferrets

Dogs, cats, and ferrets that have never received rabies vaccine should be euthanized immediately. There are currently no USDA-licensed biologics for Post Exposure Prophylaxis of previously unvaccinated domestic animals, and there is evidence that the use of vaccine alone will not reliably prevent the disease in these animals.

If the owner is unwilling to have the animal euthanized, rabies vaccine should be administered within 96 hours of the exposure and the animal should be placed in strict quarantine for 4 (dogs and cats) or 6 (ferrets) months. Strict quarantine in this context refers to confinement in an enclosure that precludes direct contact with people and other animals.

If rabies vaccination is delayed beyond 96 hours from the time of exposure, the recommended quarantine period for dogs and cats increases to 6 months.

Dogs and Cats that are Overdue for Rabies Vaccine with Appropriate Documentation of Previous Vaccination

Dogs and cats that are overdue for rabies vaccine and that have appropriate documentation of having received a USDA-licensed rabies vaccine at least once previously should immediately receive veterinary medical care for assessment and wound cleansing. A rabies vaccine should be administered within 96 hours of the exposure and the animal should be kept under the owner's control and observed for 45 days.

If rabies vaccination is delayed beyond 96 hours from the time of exposure, the dog or cat should be placed in strict quarantine for 6 months.

Dogs and Cats that are Overdue for Rabies Vaccine without Appropriate Documentation of Previous Vaccination

Dogs and cats that are overdue for rabies vaccine and do not have appropriate documentation of having received a USDA-licensed rabies vaccine at least once previously should immediately receive veterinary medical care for assessment and wound cleansing. A rabies vaccine should be administered within 96 hours of the exposure and the animal should be placed in strict quarantine for 4 (dogs and cats) or 6 (ferrets) months. Strict quarantine in this context refers to confinement in an enclosure that precludes direct contact with people and other animals.

If rabies vaccination is delayed beyond 96 hours from the time of exposure, the recommended quarantine period for dogs and cats increases to 6 months.

Alternatively to quarantine, prior to booster vaccination, the attending veterinarian may conduct prospective serologic monitoring. Such monitoring would entail collecting paired blood samples to document prior vaccination by providing evidence of an anamnestic response to booster vaccination. See Appendix 1 for the Prospective Serologic Monitoring Protocol for Dogs and Cats.

If an adequate anamnestic response is documented, the animal can be considered to be overdue for booster vaccination with appropriate documentation of rabies vaccination. The recommendations outlined above in **Dogs and Cats Overdue for Rabies Vaccine with Appropriate Documentation of Previous Vaccination** should be followed.

If there is inadequate evidence of an anamnestic response, the animal is considered to have never been vaccinated. The recommendations outlined above in **Unvaccinated** should be followed.

Ferrets that are Overdue for Rabies Vaccine

Ferrets that are overdue for rabies vaccine should be considered unvaccinated. If the owner is unwilling to have the animal euthanized, the animal should be placed in strict quarantine for 6 months. Strict quarantine in this context refers to confinement in an enclosure that precludes direct contact with people and other animals. A rabies vaccine should be administered at the time of entry into quarantine.

Dogs, Cats, and Ferrets that are Current on Rabies Vaccine

Dogs, cats, and ferrets that are current on rabies vaccination should immediately receive veterinary medical care for assessment, wound cleansing, and rabies vaccination. The animal should be kept under the owner's control and observed for 45 days.

Livestock

All species of livestock are susceptible to rabies; cattle and horses are the most frequently reported infected species.

Livestock that are Current on Rabies Vaccine

Livestock exposed to a rabid animal and currently vaccinated with a vaccine approved by USDA for that species should be revaccinated immediately and observed for 45 days.

Unvaccinated Livestock

Unvaccinated livestock should be euthanized immediately. If the animal is not euthanized it should be kept under close observation for 6 months. Any illness in an animal under observation should be reported immediately to the State Veterinarian. If signs suggestive of rabies develop, the animal should be humanely euthanized and the head removed by a licensed veterinarian and transported for rabies testing.

Multiple rabid animals in a herd or herbivore-to-herbivore transmission are uncommon; therefore, restricting the rest of the herd if a single animal has been exposed to or infected by rabies is usually not necessary.

Rabies virus is widely distributed in the tissues of rabid animals. Tissues and products from a rabid animal should not be used for human or animal consumption or transplantation. However, pasteurization and cooking will inactivate rabies virus. Therefore, inadvertently drinking pasteurized milk or eating thoroughly cooked animal products does not constitute a rabies exposure.

Handling and consumption of uncooked tissues from exposed animals might carry a risk for rabies transmission. Persons handling exposed animals, carcasses, and tissues should use appropriate barrier precautions. State and local public health authorities, state meat inspectors, and the USDA Food Safety and Inspection Service should be notified if exposures occur in animals intended for commercial use. Animals should not be presented for slaughter in a USDA-regulated establishment if such animals originate from a quarantine area and have not been approved for release by the proper authority. If an exposed animal is to be custom slaughtered or home slaughtered for consumption, it should be slaughtered immediately after exposure, and all tissues should be cooked thoroughly. If an exposed animal is custom slaughtered, the custom slaughter facility should be notified of the exposure. Custom slaughter facilities may decline processing of livestock exposed to rabies.

Other Animals

Other mammals exposed to a rabid animal should be euthanized immediately. Animals maintained in USDA-licensed research facilities or accredited zoological parks should be evaluated on a case-by-case basis.

Source: The Compendium of Animal Rabies Prevention and Control, 2016: National Association of State Public Health Veterinarians, Inc. (NASPHV) http://www.nasphv.org/documentsCompendia.html

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. In Iowa, all dogs over 6 months of age are required to be vaccinated against rabies by a licensed veterinarian. The state department of agriculture and land stewardship recognizes the standards set forth in the Compendium of Animal Rabies Prevention and Control Guidelines. Currently, there are approved rabies vaccines for use in dogs and other animals that are as young as 3 months of age. Rabies vaccination is strongly encouraged in all companion animals (including horses) and valuable livestock.

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. *Note: Some cities and counties legally require vaccination of cats.*
- 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 POST EXPOSURE PROPHYLAXIS.
- 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 http://www.cdc.gov/travel

HUMAN 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:

- 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 unapparent 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 the list of laboratories performing the serologic test below. 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 rehabilitators**, 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.

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 (either 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: http://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: http://www.atlantahealth.net/

INDIGENT PATIENT PROGRAMS

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 1-800-589-0837. Instructions and request forms are also available at the Rx for Hope website https://www.rxhope.com/PAP/info/PAPList.aspx?drugid=319&fieldType=drugid .

II. Animal Rabies Testing Resources in Iowa

There are two laboratories in Iowa that provide animal rabies testing services: State Hygienic Laboratory at the University of Iowa 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 UHL 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: 1-800-421-4692
ISU VDL: 1-515-294-1950

III. Quarantine Authority and Enforcement

Authority to mandate that an animal be placed in quarantine:

(Dogs, cats, and ferrets are the only animals that can be quarantined according to national recommendations.)

State of Iowa Law:

351.39 Confinement .

If a local board of health receives information that an animal has bitten a person or that a dog or animal is suspected of having rabies, the board shall order the owner to confine such animal in the manner it directs. If the owner fails to confine such animal in the manner directed, the animal shall be apprehended and impounded by such board, and after ten days the board may humanely destroy the animal. If such animal is returned to its owner, the owner shall pay the cost of impoundment. This section shall not apply if a police service dog or a horse used by a law enforcement agency and acting in the performance of its duties has bitten a person.
[C66, 71, 73, 75, 77, 79, 81, §351.39]
2001 Acts, ch 19, §1; 2001 Acts, ch 176, §68

351.36 Enforcement.

Local health and law enforcement officials shall enforce the provisions of sections 351.33 to 351.43 relating to vaccination and impoundment of dogs. Such public officials shall not be responsible for any accident or disease of a dog resulting from the enforcement of the provisions of said sections.
[C66, 71, 73, 75, 77, 79, 81, §351.36]

Quarantine Enforcement

The Iowa Department of Public Health has surveyed counties to get a better understanding of how they respond to potential rabies exposure cases. While some counties had extremely detailed protocols for addressing rabies exposure situations, others did not.

Most counties responded that animal bites were addressed by one the following entities:

- Local public health
- Local environmental health
- County sheriff's department
- Local law enforcement
- Local animal control

In addition, most counties responded that depending upon the circumstances of the exposures, they may allow animal owners to conduct in-home quarantines but also mandate out-of-the-home quarantines as well. Some of the factors they use to determine which type of quarantine to mandate include:

In-Home Quarantine:

- Animal's rabies vaccinations are current
- Owners are cooperative and seem trustworthy
- Owners have the ability to confine animal to the property to prevent escape or exposure to other humans or animals. Such as leash control or fenced yard.

Many counties also have processes in place to follow-up with the owner at the end of 10 days:

- Some counties require the owner to schedule a veterinary visit at the end of 10 days so that the veterinarian can verify that the animal is alive and is not showing symptoms that could be consistent with rabies.
- In other counties, public health, environmental health, or law enforcement will visit the home to make sure the animal is still alive and is not showing clinical symptoms.

- Several counties also indicated that they call the owner at the end of the 10 days to verify verbally that the animal is alive and not showing clinical signs.

Out-of-the-Home Quarantine:

- Not current on rabies vaccinations
- Owners are not cooperative
- Owners do not have the ability to satisfactorily confine the animal

Most counties responded that when they mandate out-of-the-home quarantines, the animals are typically housed in one of the following:

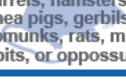
- A local animal shelter or humane society, with which the county holds a contract for service.
- A local veterinary clinic, with which the county holds a contract for service.

Most counties responded that expenses related to the quarantine and / or testing of owned animals were the responsibility of the animal owner. Expenses accrued during the quarantine and / or testing of stray animals were the responsibility of the local board of health in most counties.

IV. Exposure flow charts (all mammals and bats)

Recommendations for Managing Human Rabies Exposure*

For Bat Exposures see *Rabies Exposure Management for Bat-related Incidents Flow Chart*, available at **www.idph.state.ia.us/adper/common/pdf/cade/rabies_exposure_bats.pdf**

Animal Species	Situation	Rabies Post Exposure Prophylaxis (PEP) Recommendations
Dogs, cats, ferrets 	Animal available for testing or 10 day confinement and observation	If the animal is exhibiting symptoms consistent with rabies, immediately euthanize and test. If the animal is not exhibiting symptoms, a 10 day confinement period can be instituted. If the animal exhibits signs of rabies during the 10 day confinement period, it should be euthanized immediately and tested. If results are positive, unsuitable or indeterminate administer PEP immediately. If the animal does not exhibit clinical signs during the 10 day confinement period, PEP is not recommended, since the animal was not excreting virus at the time of the bite or saliva exposure.
	Animal unavailable (waiting up to 72 hours to capture the animal may be reseasonable, asssuming the correct animal can be identified)	If the animal is not available for confinement or testing, administer PEP. (If the animal is captured later contact IDPH at 800-362-2736.)
Horses or other farm animals 	If the animal exhibits signs of rabies or dies suddenly, test the animal for rabies.	Defer administration of PEP until outcome of testing. If results are positive, unsuitable or indeterminate, administer PEP.
	All other cases, contact IDPH for guidance.	Contact IDPH at 800-362-2736 during business hours or 515-323-4360 after hours.
Skunk, raccoon, fox, coyote 	Euthanize and test animal	Defer administration of PEP until outcome of testing. If results are positive, unsuitable or indeterminate, administer PEP.
	Animal unavailable for testing	Administer PEP immediately.
Large rodents: such as beavers, muskrats, or groundhogs 	Euthanize and test animal	Defer administration of PEP until outcome of testing. If results are positive, unsuitable or indeterminate administer PEP.
	Animal unavailable for testing	Contact IDPH for consultation at 800-362-2736 during business hours or 515-323-4360 after hours.
Small rodent: such as squirrels, hamsters, guinea pigs, gerbils, chipmunks, rats, mice, rabbits, or oppossum 	Provoked bite and animal behaving normal	No PEP is recommended, as these species almost never carry rabies.
	Unprovoked bite or animal behaving abnormal	Contact IDPH for consultation at 800-362-2736 during business hours or 515-323-4360 after hours.

* Exposure: a bite or saliva/nervous tissue contact to an open wound or mucous membrane

NOTE: If the patient was **bitten above the shoulders**, IDPH recommends that the health care provider consider starting PEP immediately. PEP can be discontinued if the animal tests negative for rabies or is healthy at the end of the quarantine period.

Thoroughly wash all wounds with soap and water and, if available, flush with povidone iodine solution (or other virucidal solution). Evaulate tetanus vaccination status, update if needed.

(Updated 6/18/2010)

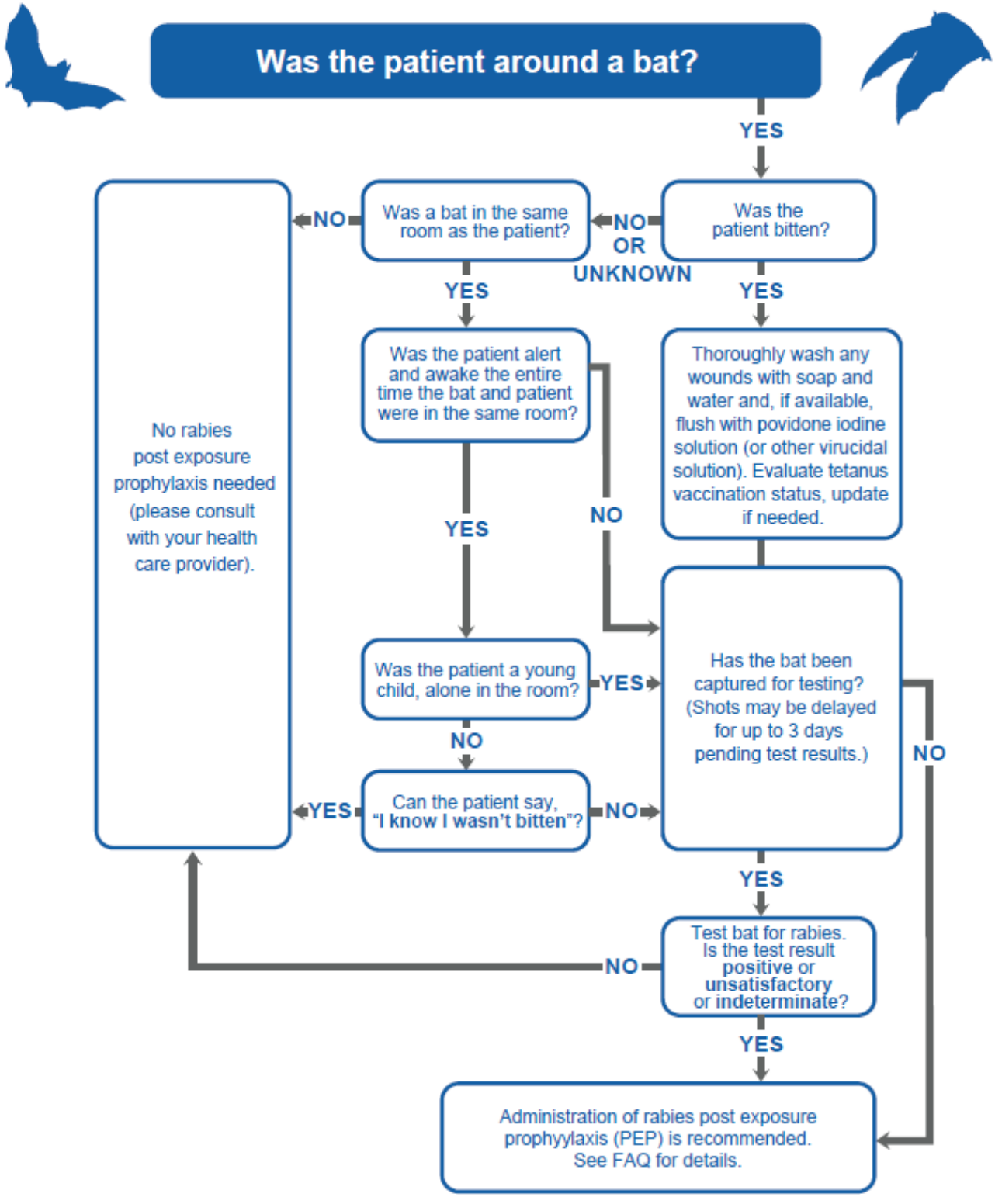
If questions arise on any of the above information or circumstances related to the exposure are unusual, please contact IDPH for consultation at:

During business hours: **800-362-2736**
After hours: **515-323-4360**

Iowa Department of Public Health,
Center for Acute Disease Epidemiology (CADE)
http://www.idph.state.ia.us/CADE/DiseaseIndex.aspx?disease=Rabies
http://www.cdc.gov/rabies

the Center for Food Security & Public Health
http://www.cfsph.iastate.edu

Rabies Exposure Management for Bat-related Incidents



For further questions call:
During business hours: **800-362-2736**
After hours: **515-323-4360**

Iowa Department of Public Health,
Center for Acute Disease Epidemiology (CADE)
http://www.idph.state.ia.us/CADE/DiseaseIndex.aspx?disease=Rabies
http://www.cdc.gov/rabies

the Center for Food Security & Public Health
http://www.cfsph.iastate.edu

VI. Rabies in Iowa

In 2015, 12 cases of animal rabies were reported in Iowa. Rabies was identified most frequently in wildlife species including 7 bats and 1 skunk. Three cases were diagnosed in dogs and one case was diagnosed in a cat.

Table 1: Positive Rabies Cases 2004-2014

Species	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Total
Bat	60	28	13	11	11	10	12	17	6	10	7	**185**
Skunk	33	13	5	7	13	13	7	9	4	2	1	**107**
Cat	5	7	7	9	3	1	3	1	0	1	1	**38**
Cow	7	4	0	1	5	1	3	4	2	2	0	**29**
Dog	2	2	5	1	2	1	0	0	0	0	3	**16**
Horse	1	3	1	0	0	0	0	0	0	0	0	**5**
Fox	0	0	0	0	0	1	0	0	0	0	0	**1**
Squirrel	0	0	0	0	1	0	0	0	0	0	0	**1**
Badger	0	0	0	0	0	0	0	0	0	0	0	**0**
Total	**108**	**57**	**31**	**29**	**35**	**27**	**25**	**31**	**12**	**15**	**12**	**382**

During 2015, 1389 animals in Iowa were tested for rabies and 12 were confirmed positive (0.87%). The percent positive varies greatly by species, see the Table 2 below. It is important to note that this data is greatly influenced by the number of animals tested. Many animals are tested because they have contact with humans or domestic animals and they exhibit unusual behavior or clinical signs making them more likely to be infected with the rabies virus. For these reasons, the percentages should not be considered representative of the true distribution of disease within the animal population in Iowa.

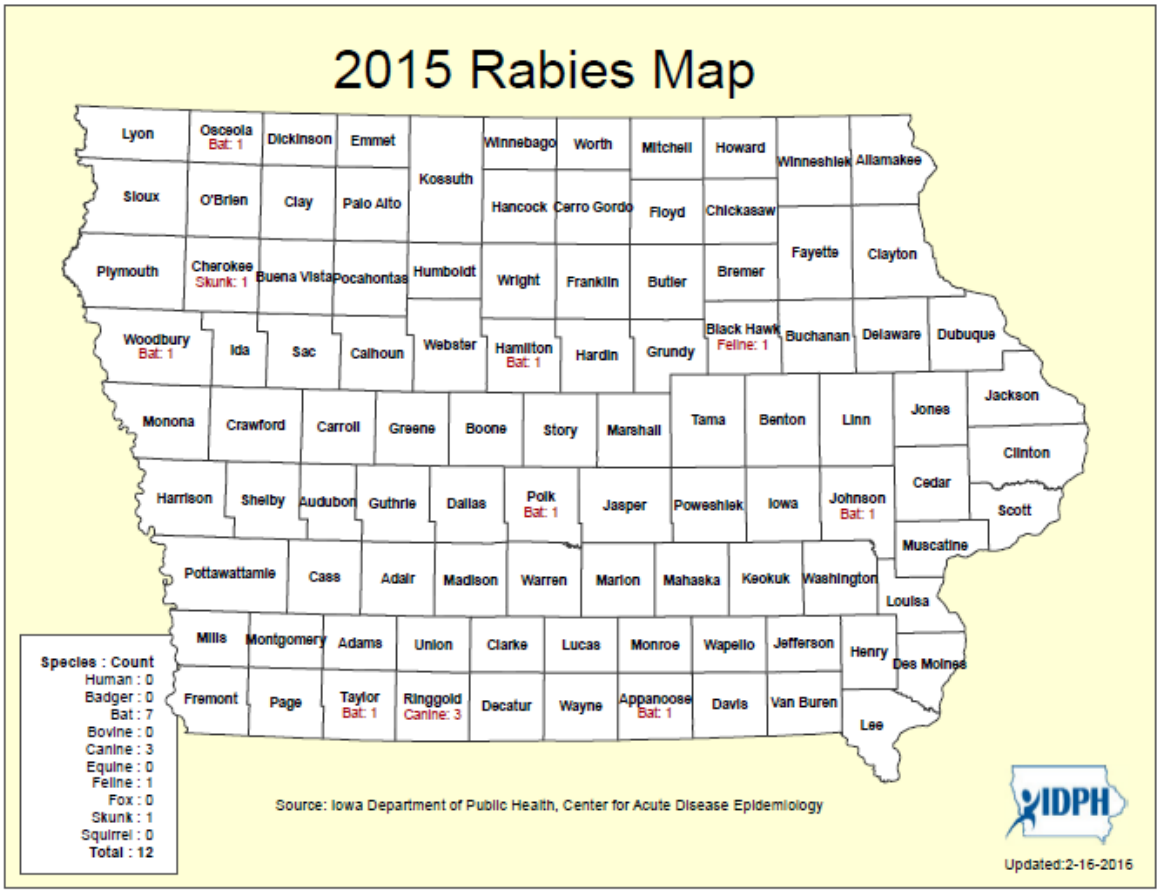
Table 2: Percent Positive by Species in 2015

Species	Positive	Total Tested	% Positive
Skunk	1	15	6.67%
Bat	7	449	1.56%
Dog	3	310	0.97%
Cat	1	371	0.32%

In Iowa, the most common bat species submitted for testing are the Big Brown bat and Little Brown bat; however other bat species are occasionally tested.

Table 3: Bat Species Tested and Positive for Rabies Infection

Species	Positive	Total Tested
Eptesicus fuscus (Big Brown bat)	7	403
Myotis lucifugus (Little Brown Bat)	0	27
Lasiurus borealis (Eastern Red Bat)	0	4
Myotis sodalis (Indiana Bat)	0	4
Rousettus aegyptiacus	0	1
Unknown	0	10
Total	**7**	**449**


2015 Rabies Map
Lyon
Osceola
Bat: 1
Dickinson
Emmet
Kossuth
Winnebago
Worth
Mitchell
Howard
Winneshiek
Allamakee
Sioux
O'Brien
Clay
Palo Alto
Hancock
Cerro Gordo
Floyd
Chickasaw
Fayette
Clayton
Plymouth
Cherokee
Skunk: 1
Buena Vista
Pocahontas
Humboldt
Wright
Franklin
Butler
Bremer
Woodbury
Bat: 1
Ida
Sac
Calhoun
Webster
Hamilton
Bat: 1
Hardin
Grundy
Black Hawk
Feline: 1
Buchanan
Delaware
Dubuque
Monona
Crawford
Carroll
Greene
Boone
Story
Marshall
Tama
Benton
Linn
Jones
Jackson
Clinton
Harrison
Shelby
Audubon
Guthrie
Dallas
Polk
Bat: 1
Jasper
Poweshiek
Iowa
Johnson
Bat: 1
Cedar
Scott
Muscatine
Pottawattamie
Cass
Adair
Madison
Warren
Marion
Mahaska
Keokuk
Washington
Louisa
Mills
Montgomery
Adams
Union
Clarke
Lucas
Monroe
Wapello
Jefferson
Henry
Des Moines
Fremont
Page
Taylor
Bat: 1
Ringgold
Canine: 3
Decatur
Wayne
Appanoose
Bat: 1
Davis
Van Buren
Lee
Species : Count
Human : 0
Badger : 0
Bat : 7
Bovine : 0
Canine : 3
Equine : 0
Feline : 1
Fox : 0
Skunk : 1
Squirrel : 0
Total : 12
Source: Iowa Department of Public Health, Center for Acute Disease Epidemiology
IDPH
Updated:2-16-2016

Appendix 1: Prospective Serologic Monitoring Protocol for Dogs and Cats

PROSPECTIVE SEROLOGIC MONITORING PROTOCOL: NASPHV COMPENDIUM OF ANIMAL RABIES PREVENTION AND CONTROL, 2016

This guidance on prospective serologic monitoring is for use with dogs and cats as referred to in Part I B.5(4b) of the NASPHV Compendium of Animal Rabies Prevention and Control, 2016.

NOTE: This guidance will be updated as needed. Please check the National Association of State Public Health Veterinarians website at www.nasphv.org for the most current guidance prior to any sample collection.

This protocol applies only to a dog or cat;

- that has been exposed to a confirmed or suspected rabid animal (as defined in Part I A.2 of the Compendium), and;
- that has been, or very likely has been, previously vaccinated with a USDA-licensed rabies vaccine, but for which there is no valid documentation, e.g. a rabies vaccination certificate, and;
- whose owner or guardian wants to avoid euthanasia or strict quarantine, and;
- that can immediately be managed by a veterinarian who can collect serum specimens as described below and administer a rabies vaccine.

The justification for this recommendation relies on the information presented in the following peer-reviewed publication:
Moore MC, Davis RD, Kang Q, et al. Comparison of anamnestic responses to rabies vaccination in dogs and cats with current and out-of-date vaccination status. J Am Vet Med Assoc 2015;246(2):205–211.

Dogs and cats that have previously received a USDA-licensed rabies vaccine which was administered in compliance with the manufacturers label insert, will mount a strong anamnestic (or secondary immune) response within days following the administration of a booster USDA-licensed rabies vaccine. The paper provides evidence that this is true regardless of the number of vaccines received (even a single vaccine) or the amount of time that has elapsed since the last vaccine was administered.

Recommended protocol for jurisdictions choosing to permit the use of prospective serologic monitoring for decision-making regarding 4 month quarantine versus 45 day observation (see also Figure 1)

The dog or cat must be seen by a veterinarian immediately following an exposure to a confirmed or suspected rabid animal. The veterinarian must report the case to public health authorities or whatever entity which serves as the local Rabies Control Authority (RCA). A RCA is the government agency or official at the state or local level, legally authorized and responsible for enforcement of rabies laws, regulations, and ordinances in a specific jurisdiction. RCAs vary by jurisdiction but are most frequently public health, animal health, or animal control officials. The RCA should be provided all relevant details on what is known about

the animal's vaccination history and the specifics of the current rabies exposure. The RCA will determine whether prospective serologic monitoring is indicated and permitted in their jurisdiction.

The RCA will work with the veterinarian and the owner to define a timeline during which the protocol must be implemented. The test, submission and all associated fees will be assumed by the animal owner and submitting veterinarian. The veterinary visit in which the first serum is collected and the rabies vaccine is administered must occur as soon as possible following the exposure and should not exceed 96 hours post exposure. The date of this visit will be counted as Day 0.

On Day 0:

1. Collect 1-2 mL of serum;
2. Label and keep the serum specimen refrigerated until the second specimen is collected. Serum held for more than 7 days may need to be frozen. Follow the instructions provided by the laboratory that will be performing the tests;
3. Administer a USDA-licensed rabies vaccine labeled for use in that species; and
4. Schedule a follow up appointment to ensure the pet will return in 5-7.

On Day 5 (but no later than day 7):

1. Collect a second (paired) serum specimen (1-2 mL).
2. Label and store the specimen appropriately according to the instructions from the laboratory where it will be submitted;
3. Submit the paired serum specimens to an approved Rabies Laboratory for Rapid Fluorescent Foci Inhibition Test (RFFIT) testing with the appropriate forms completed and **carefully following shipping instructions provided by the laboratory**; and
4. Contact the RCA to document submission of the specimens.

The paired serum specimens must be delivered to an approved Rabies Laboratory. At this time, the laboratories approved and available to perform the testing are:

- Atlanta Health Associates, Inc.;
- Kansas State University Rabies Laboratory (KSU-RL); and
- Wadsworth Rabies Laboratory (for New York State residents only).

The Centers for Disease Control and Prevention (CDC) may occasionally provide testing services by special arrangement only. The definition of an approved laboratory is one that is currently licensed by CLIA or NYSDOH and has been approved to participate in this Prospective Serological Monitoring Protocol by NASPHV's Rabies Compendium Committee.

The submission form for the appropriate laboratory must be complete, accurate, and accompany **properly labelled paired specimens** to avoid delays in testing. The submitting veterinarian is responsible for ensuring the accuracy of all specimen collection, submission form completion and shipping. Turn around time for results are dependent upon the laboratory and their current testing volume. The submitting veterinarian is responsible for

immediately contacting the RCA with the results to finalize recommendations for the animal.

The dog or cat shall remain in strict quarantine during the testing process unless and until otherwise approved by the RCA.

Interpretation of the results must be done in conjunction with the laboratory performing the testing as the determination of a statistically significant change in titer is determined by analysis of the laboratory's own data regarding testing performance. The test results will be used to determine whether the animal has evidence to suggest a previous rabies vaccine. Based on data analysis from the approved Rabies Laboratories, in general, the paired serum specimens must show both a statistically significant (usually defined as greater than two-fold at the currently approved Rabies Laboratories) rise in titer between the first and second specimens and the second titer must be above 0.5 IU/mL. If either of these conditions is not met, the animal must be treated as previously unvaccinated for the purposes of rabies control decisions.

Serology test results do not pre-empt the authority of the RCA to order continued strict quarantine of the animal if it judges such actions to be in the best interest of protecting the public's health. Nor do these recommendations supersede any applicable state laws and regulations or local ordinances.

FREQUENTLY ASKED QUESTIONS:

1. **What if the dog or cat did not receive care immediately (within 96 hours) after the exposure?**
   Such cases should be discussed with the RCA and managed on a case by case basis. Factors to consider include the number of days that have elapsed since the exposure, the severity of the exposure, number of previous vaccinations, the health of the animal and the local rabies epidemiology.

2. **What if the dog or cat cannot return to the veterinarian for collection of the second specimen on DAY 5?**
   The second specimens must be collected by Day 7. Delaying collection of the specimen prevents accurate interpretation of the test results as any increase in rabies antibody titer might be due to the rabies exposure itself or the booster vaccination rather than an anamnestic response to a previous vaccination.

3. **What test will be used to test the serum specimens?**
   The laboratory will test the specimens using a Rapid Fluorescent Focus Inhibition Test (RFFIT). It is a serum neutralization (inhibition) test, which means it measures the ability of rabies specific antibodies to neutralize rabies virus and prevent the virus from infecting cells. These antibodies are called rabies virus neutralizing antibodies (RVNA).

4. **What values will be used to determine if the dog or cat has evidence of a prior rabies vaccination and an acceptable anamnestic response?**
   A greater than two-fold rise in the titer values of the paired specimens, as well as a RVNA titer equal to or above 0.5 IU/mL for the second specimen, provides evidence of a robust anamnestic immune response after rabies vaccination.
   Considerable variability exists as to any individual's response to vaccination and the RCA should consult the laboratory for help in interpreting results that fall outside these guidelines.

   If an anamnestic response is demonstrated, the animal should be issued a vaccine certificate with an expiration date consistent with the vaccine label. If there is no evidence of an anamnestic response, the vaccine is considered the initial dose and the animal should be boostered in one year, consistent with the vaccine label.

5. **If the titer is equal to or above 0.5 IU/mL and there is evidence of an anamnestic response, is it impossible for the animal to go on to develop rabies?**
   A specific value equal to or above 0.5 IU/mL and evidence of an anamnestic response suggests the animal will be protected. However, there have been rare instances in which vaccinated animals have gone on to develop rabies. Contributing factors may include other immunological factors involved in the protection from rabies infection, or the location, viral dose, and severity of the wound. Because of this uncertainty, confinement with observation or quarantine is warranted regardless of the presence of antibodies.

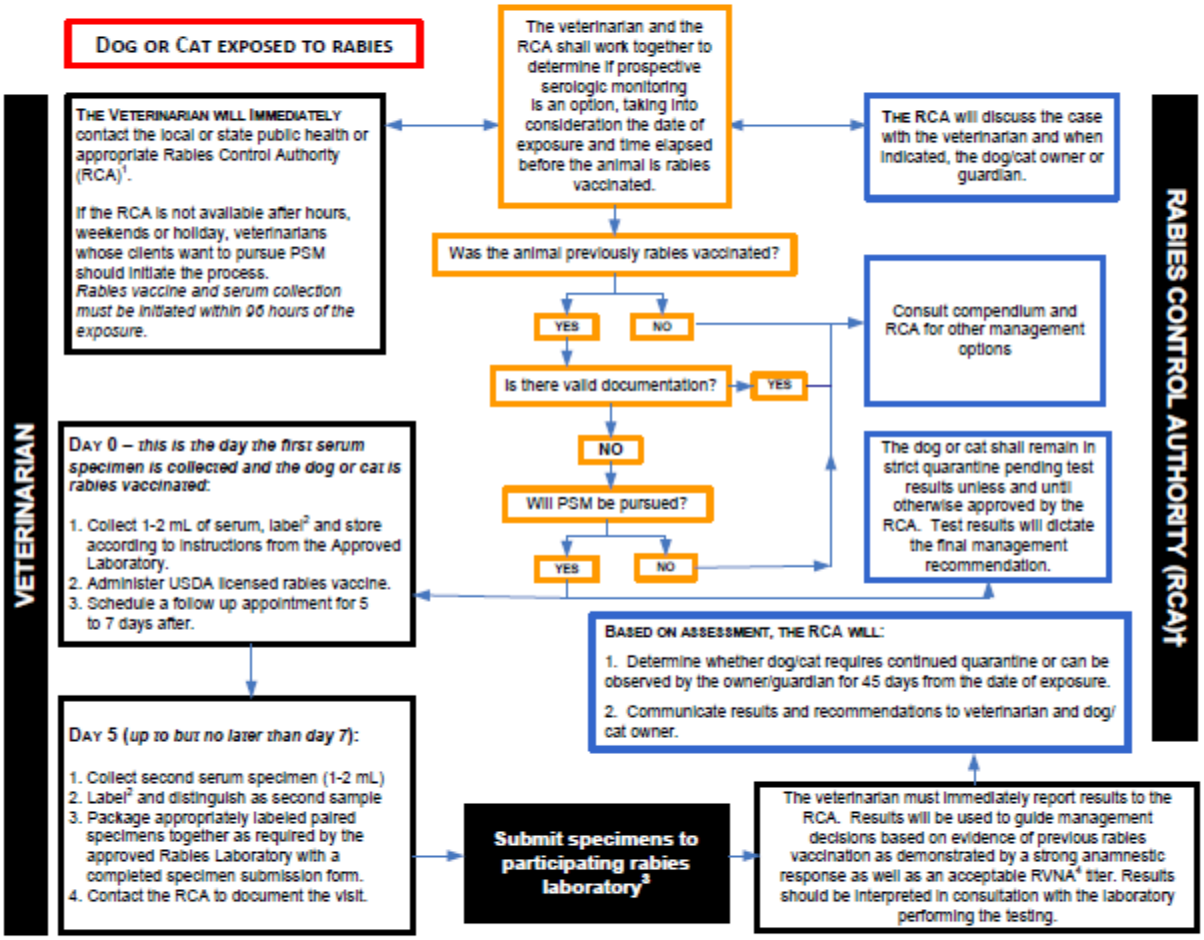
6. **Where can I find the appropriate submission forms and shipping instructions?**
   - Atlanta Health Associates, Inc.: http://www.atlantahealth.net/
   - Kansas State University Rabies Laboratory: http://www.ksvdl.org/rabies-laboratory/rffit-test/rffit-submission-forms.html
   - New York State Wadsworth Center (New York residents only): http://www.wadsworth.org/programs/id/rabies

7. **Can this protocol be used for animals other than dogs or cats such as ferrets?**
   No. At this time, data regarding anamnestic responses following revaccination with rabies vaccine are available only for dogs and cats.

FIGURE 1: ALGORITHM FOR THE PROSPECTIVE SEROLOGIC MONITORING (PSM) PROTOCOL ON MANAGING DOGS AND CATS EXPOSED TO RABIES WITH A HISTORY OF RABIES VACCINATION, BUT NO DOCUMENTATION

Please Note, this protocol is intended only to apply to a dog or cat;
- that has been exposed to a confirmed or suspect rabid animal (as defined in Part I A.2 of the Compendium), and;
- that has been, or very likely has been, previously vaccinated with a USDA licensed rabies vaccine but for which there is no valid documentation, e.g. a rabies vaccination certificate, and;
- whose owner or guardian wants to avoid euthanasia or strict quarantine, and;
- that can immediately be managed by a veterinarian to collect serum specimens as described below and administer a rabies vaccine.

It is imperative that the veterinarian and the Rabies Control Authority (RCA) notify one another of rabies exposure cases in order to ensure appropriate follow up in a coordinated manner. Immediately following an exposure to a confirmed or suspect rabid animal, the dog or cat must be seen by a veterinarian.



[1]RCA = Rabies Control Authority. This is typically a government agency at the State or Local level that is legally authorized and responsible for enforcement of rabies ordinances. Often it is the Local or State Health Department, but may also be the Local or State Department of Agriculture.

[2]LABEL INFORMATION
Please include the following information on each specimen tube being submitted:
1. Animal's Name; 2. Date of collection

[3]PARTICIPATING RABIES LABORATORIES
1. Atlanta Health Associates, Inc. http://www.atlantahealth.net/
2. Kansas State University Rabies Laboratory http://www.ksvdl.org/rabies-laboratory/rfit-test/rfit-submission-forms.html
3. Wadsworth Rabies Laboratory for New York State residents only http://www.wadsworth.org/programs/id/rabies

[4]RVNA = Rabies virus neutralizing antibodies

Appendix 2:
SAMPLE: Rabies Exposure Investigation Protocol

In ***County/City X*** potential rabies exposures of humans, including those reported by the general public, health care providers, or veterinarians should be referred to:

Agency/Name: _____
Contact Information: _____
(For example: County Public Health/County Environmental Health/Sheriff's Department/Local Animal Control)

This entity serves as the **primary point of contact** for potential rabies exposures of humans. This primary point of contact will assess each potential rabies exposure individually. If the animal which potentially exposed the human is a dog, cat, or ferret, the primary point of contact will determine whether the animal should be quarantined in accordance with the *Compendium of Animal Rabies Prevention and Control, 2016*.

If it is determined that the animal should be quarantined, the primary point of contact will decide whether an in-home or out-of-the-home quarantine is most appropriate. The decision will be based upon several factors, including but not limited to the following.

In-Home Quarantines may be allowed under the following circumstances:

- If the animal is current its rabies vaccinations
- If the owners are cooperative and seem trustworthy
- If the owners have the ability to confine animal to the property.

Out-of-the-Home Quarantines may be required under the following circumstances:

- If the animal is not current on rabies vaccinations
- If the owners are not cooperative
- If the owners do not have the ability to satisfactorily confine the animal

At end of an in-home quarantine period, the primary point of contact will confirm that the animal is still alive and not showing symptoms of rabies infection by _____ *(veterinary confirmation is recommended).*

County/City X has an agreement with ***X veterinary clinic/ humane society/shelter*** to provide out-of-the-home quarantine services for ***stray and / or owned*** animals.

It is the responsibility of the animal owner to pay for any fees associated with animal quarantines and/or testing.

Expenses related to quarantine and/or testing of stray animals are the responsibility of _____ .

SAMPLE: RABIES EXPOSURE REPORTING FORM

REPORT:

Caller Name: _____
Caller Phone Number: _____
Relationship to Exposed Patient: _____

Completed by: _____
Date of Report: _____

PERSON EXPOSED:

First Name: _____
Last Name: _____
Age: _____ **Male:** ☐ **Female:** ☐
Street: _____
City: _____ State: _____
Zip: _____
Home Phone: _____
Alternate Phone: _____

Patient's Physician: _____
Clinic/Hospital: _____
Phone: _____
Is patient hospitalized? Y ☐ / N ☐
Other information: _____

Guardian: _____

DESCRIPTION OF EXPOSURE:

Exposure date: _____Time: _____
Street: _____
City: _____
County:_____ State: _____
Summary:_____
_____
_____
_____

Bite: Y☐ / N ☐
Bite Location: _____
Explain the Non-bite Exposure:_____
_____
_____
Were others exposed? Y ☐ / N ☐
- If yes, please list:_____

ANIMAL:

Species: _____
Wild ☐ **Stray** ☐ **Owned** ☐
If Applicable:
Breed: _____
Age: _____ Sex: _____
Current Rabies Vaccine: Y☐/N☐
Animal Owner Name:_____
Address: _____
City: _____
County: _____ State: _____
Owner Phone: _____

Owner's Veterinarian: _____
Clinic Name: _____
Clinic Address: _____
Clinic City: _____County:_____
Clinic Phone: _____

Is the animal available for testing? Y☐ / N☐
Is animal available for observation? Y☐ / N☐
Where is the animal now? _____

RECOMMENDATIONS:

Nothing- no exposure occurred ☐

Owner must confine animal in the home for 10 days (dogs, cats, ferrets only). If symptomatic euthanize and test, administer PEP based upon results ☐

Animal will be confined in the veterinary clinic/shelter for 10 days (dogs, cats, ferrets only). If symptomatic euthanize and test, administer PEP based upon results ☐
Shelter/clinic name and location _____

Euthanize animal and test immediately. Administer PEP based upon results ☐

Recommended patient consult their healthcare provider ☐

Bite above shoulders, give PEP immediately, discontinue if tests negative ☐

Recommended bat proofing ☐

Other: _____

Iowa Department of Public Health Rabies Consultation:
800-362-2736 or 515-323-4360 after hours

SAMPLE: Veterinary Certification Form

On (*date)*, I examined the following animal. Upon physical examination, the animal was not exhibiting clinical symptoms consistent with rabies virus infection.

Animal Name: _____

Species: _____

Owners Name: _____

Address: _____

City/State/Zip: _____

Phone: _____

Veterinarians Name: _____
Clinic Address: _____
Phone: _____
Signature: _____

Template developed by the Iowa Department of Public Health and the Iowa Veterinary Medical Association

Appendix 3: Clarification of Rabies Revaccination Requirements

Iowa law requires all dogs over six months of age to have a current rabies vaccination with a USDA-approved rabies vaccine. Canine rabies vaccination must be administered by a licensed veterinarian and the veterinarian is required to issue a tag and a certificate of vaccination. The tag is required to be attached to the collar of the dog. Iowa law also adds this exception "dogs kept in kennels and not allowed to run at large shall not be subject to the vaccination requirement."

Iowa law does not require rabies vaccination for cats. **Important note:** Local county and city ordinances may require vaccinations for cats and other animals. Local law takes precedence if it is more restrictive than state law. Rabies vaccination may be administered to cats, ferrets, livestock and other domestic animals for which there is an approved vaccine by non-veterinarians. Rabies vaccines administered by an Iowa licensed veterinarian are considered official vaccinates. Only a licensed veterinarian can issue and sign a rabies certificate.

Iowa law requires rabies vaccine frequency and procedure follow the recommendations from the Compendium of Animal Control prepared by the National Association of State Public Health Veterinarians.

Rabies revaccination
Iowa law directs veterinarians to follow vaccine manufacturers' USDA-approved label recommendations for rabies vaccine administration.

An initial rabies vaccine should be boostered within one year. If a 3-years rabies vaccine is administered as the booster vaccination, the animal should be re-vaccinated prior to the 3-year vaccine's expiration date.

If an animal is overdue for a rabies vaccination, the rabies vaccine that is administered should always be boostered within one year (regardless of the rabies vaccine that is administered).

Link to the Compendium for Animal Rabies Control:
http://www.nasphv.org/Documents/NASPHVRabiesCompendium.pdf

Appendix 4: Rabies Considerations with Animals in Public Settings

Source: Compendium of Measures to Prevent Disease Associated with Animals in Public Settings, 2013 (*JAVMA, VOL 243, No. 9, November 1, 2013)*

Exposure to Rabies

Certain venues encourage or permit the public to be in contact with animals, resulting in millions of human-animal interactions each year. These settings include county or state fairs, petting zoos, animal swap meets, pet stores, zoologic institutions, circuses, carnivals, educational farms, livestock birthing exhibits, educational exhibits at schools and child-care facilities, and wildlife photo opportunities. Although human-animal contact has many benefits, many human health problems are associated with these settings, including infectious diseases, exposure to rabies, and injuries. Although no human rabies deaths caused by animal contact in public settings have been reported, multiple rabies exposures have occurred, requiring extensive public health investigations and medical follow-up.

For example, thousands of persons have received rabies postexposure prophylaxis after being exposed to rabid or potentially rabid animals, including bats, cats, goats, bears, sheep, horses, and dogs, at various venues: a pet store in New Hampshire, a county fair in New York State, petting zoos in Iowa, and Texas, school and rodeo events in Wyoming, a horse show in Tennessee, and summer camps in New York. Substantial public health and medical care challenges associated with potential mass rabies exposures include difficulty in identifying and contacting persons, correctly assessing exposure risks, and providing timely medical prophylaxis. Prompt assessment and treatment are critical to prevent this disease, which is almost always fatal.

Recommendations:

Rabies: All animals should be housed to reduce potential exposure to wild animal rabies reservoirs. Mammals should also be up-to-date on rabies vaccinations. These steps are particularly critical in areas where rabies is endemic and in venues where animal contact is encouraged (e.g., petting zoos). Because of the extended incubation period for rabies, unvaccinated mammals should be vaccinated at least 1 month before they have contact with the public.

If no licensed rabies vaccine exists for a particular species (e.g., goats, swine, llamas, and camels) that is used in a setting where public contact occurs, consultation with a veterinarian regarding off-label use of rabies vaccine is recommended. Use of off-label vaccine does not provide the same level of assurance as vaccine labeled for use in a particular species; however, off-label use of vaccine might provide protection for certain animals and thus decrease the probability of rabies transmission. Vaccinating slaughter-class animals before displaying them at fairs might not be feasible because of the vaccine withdrawal period that occurs as a result of antibiotics used as preservatives in certain vaccines. Mammals that are too young to be vaccinated should be used in exhibit settings only if additional restrictive measures are available to reduce risks (e.g., using only animals that were born to vaccinated mothers and housed to avoid rabies exposure). In animal contact settings, rabies testing should be considered for animals that die suddenly.