

The Rehabilitation of Rabies Vector Species in North Carolina



**Wildlife Rehabilitators of North Carolina
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Rabies, the Disease

What is rabies?

Rabies is a viral infection. The rabies virus infects the central nervous system, causing encephalopathy. It is almost always fatal.

What animals can get rabies?

All warm-blooded mammals are susceptible to infection with rabies.

What is a vector?

A vector is an organism that does not cause disease itself, but that transmits infection by conveying pathogens from one host to another. There are variant strains of the virus that have adapted to certain animal species. These species are reservoirs of the disease and are referred to as rabies vector species (RVS).

What are the rabies vector species in North Carolina?

The rabies vector species in North Carolina are raccoons, skunks, foxes, coyotes and bats.

How is rabies transmitted?

Rabies is transmitted when the virus in saliva is introduced into bite wounds, cuts in the skin or mucous membranes. An animal can be infected without being bitten if saliva from an infected animal is introduced into a wound or cut.

How does the virus spread and affect the infected animal?

The virus moves along peripheral nerves to the spinal chord and the brain. It incubates in the animal's body. During this time the animal has no apparent illness. The virus then moves to salivary glands and is shed in saliva at which time the animal may show signs of the disease.

What are the symptoms?

The animal may exhibit severe behavioral changes and signs of neurological disorder (anxiety, confusion, agitation, delirium, and hallucinations).

How soon do symptoms appear?

The incubation period is influenced by the strain, the dose, species, site of exposure, the age and status of the immune defenses of the infected animal. The incubation period in humans is 2-23 weeks. In dogs it is 2 weeks to 6 months. In cats 2 to 6 weeks. In wildlife it is not well documented.

How is rabies diagnosed?

The direct fluorescent antibody test (dFA) is used to detect rabies. The test requires fresh brain tissue from the animal. The test can only be done after the animal is dead.

RVS Permit

Individuals who hold a wildlife rehabilitation permit are not authorized to care for RVS under that permit alone. A special RVS permit is required to rehabilitate RVS in North Carolina.

Permit Requirements

Rehabilitators who are permitted to care for RVS are required to have:

1. Rabies pre-exposure vaccinations

Rehabilitators who care for RVS must have received a rabies pre-exposure vaccination series (Immunization). A certificate of immunization must be submitted with the permit application.

2. Antibody titers checked

Rehabilitators who care for RVS are required to have antibody titers checked every two years and maintain immunization with vaccine boosters as appropriate.

3. Completed an **RVS specific training** class

Rehabilitators caring for RVS are required to complete the RVS training class held by Wildlife Rehabilitators of North Carolina (WRNC). Dates and information on the class can be found on WRNC's website (www.ncwildliferehab.org).

4. **Appropriate caging**

Rehabilitators who care for RVS must have **appropriate caging** in place for the species in their care. Rehabilitators must possess appropriate caging for one RVS species to be issued a permit.

5. **Veterinarian support**

Rehabilitators who care for RVS must maintain the support of a licensed veterinarian who agrees to euthanize animals upon request. A signed copy of the veterinarian support form (page xx in appendix) must be submitted with an RVS permit application.

6. **Wildlife Rehabilitation Experience**

Rehabilitators are required to have at least one full year of wildlife rehabilitation experience, prior to submitting an application for an RVS permit.

7. **No Wildlife Violations**

Rehabilitators of RVS must have no record of wildlife violations.

See the North Carolina Wildlife Resources Commissions website (www.ncwildlife.org) for instructions on submitting the RVS permit application.

Vaccination

Rabies Vaccine Products

Two types of vaccine are available in the U.S. They are prepared in different ways. Both are made from inactivated, or killed virus. Both types are considered safe and effective. The vaccine does not cause rabies. The two types are:

Human Diploid Cell Vaccine (HDCV) called Imovax
Rabies Vaccine Adsorbed (RVA)

The vaccine is available to health care providers from medical biologics distributors or from the 3 manufacturers (" Imovax," Pasteur Merieux/Connaught Laboratories, 1-800-822-2463, " RabAvert," Chiron Corporation, 1-800-244-7668, and Smith-Kline, 1-800-366-8900). (Confirm provider info is still accurate)

Rabies immune globulin

Rabies immune globulin (RIG) is prepared from plasma from immunized human donors. It contains concentrated rabies neutralizing antibodies. RIG is administered when people, who have not been previously vaccinated, are exposed to rabies. It is given in addition to the vaccine.

Administration

The rabies vaccine is given in the deltoid muscle as a series of 3-5 shots.

Reactions

Mild local reactions such as pain, redness and itching at the injection site sometimes occur. General reactions such as headache, fever, nausea and muscles aches occur less frequently. Serious reactions are rare.

Pre-exposure vaccination

Rehabilitators who care for RVS must have received the rabies pre-exposure vaccination series (Immunization). The pre-exposure series is 3 shots given on days 0, 7 and 21 or 27.

Post-exposure vaccination

When a person, who is exposed to rabies, has previously been vaccinated

The post exposure series is 2 shots.

One 1-ml dose of RabAvert or Imovax IM is administered in the deltoid on day zero. A second 1-ml dose is administered on day three in the deltoid, inter muscular. The immune globulin (RIG) is not administered.

Having been previously vaccinated simplifies the treatment when exposure occurs. It eliminates the need for rabies immune globulin and decreases the number of doses of vaccine needed after the exposure.

*When a person, who is exposed to rabies, has **not** previously been vaccinated*

An exposed person who has never received any rabies vaccine is administered a dose of RIG (a blood product that contains antibodies against rabies), which gives immediate, short-term protection. This shot is given in or near the wound area.

The post exposure treatment also includes five 1-ml doses of rabies vaccine. The first dose is given as soon as possible after the exposure. Additional doses are given on days 3, 7, 14, and 28 after the first shot. These shots are normally given in the deltoid muscle of the arm.

Antibody Titer

The strength of a person's immune response to rabies can be assessed with an antibody titer test. A blood sample is taken and sent to a lab for testing. Rehabilitators who care for RVS are required to have antibody titers checked every two years and maintain immunization with vaccine boosters as appropriate.

Rabies antibody titers can be run at Kansas State University (913/532-5650, <http://www.vet.k-state.edu/rabies>) and Atlanta Health Associates (800/717-5612, <http://www.atlantahealth.net/>).

(check if above locations and numbers are still valid)

Titer Readings

The lab report from a titer test will indicate the titer reading as a ratio. A reading of 1:8 means that the sample gives a positive test at any dilution down to 1:8. If the titer falls below 1:5, then a booster is indicated.

Immunization for Rehabilitators

Rehabilitators may get pre-exposure vaccination administered by

- a. their personal physician *(provide physician instructions info including where doctors can order vaccine and where to ship blood sample in appendix)*
- b. their veterinarian when he gives shots to his staff
- c. the local health department *(provide info on health clinics that will in state that administer vaccinations in appendix)*

Safe Handling of RVS

Caging must prevent contact with people, pets and other wildlife. Double, separated layers of hardware cloth on the cages or protective fencing are required. A double entry system should be used to prevent animals from escaping from cages.

All domestic animals in the household must have current rabies vaccination.

Only vaccinated, permitted rehabilitators may handle RVS animals. Assistants and volunteers may prepare food and clean, but they must not handle the animals.

Litters must be housed separately with separate feeding implements for each litter.

Latex gloves must be worn for all handling including feeding of neonates. RVS must never be held near one's face. The gloves and feeding utensils must not be put close to one's face. Be careful not to put the gloves used for handling RVS in your mouth or to rub your eyes with them.

Only healthy animals are to be released. The release must be within 5 miles of the location where the animal was found. If the site of origin is unknown the animal can be released in a confirmed rabies area. Animals must not be release at any state or county park.

Any animal that is sick or has puncture wounds on intake must be euthanized. Any animal that becomes sick, while under the care of a rehabilitator, must be euthanized. The animal must be sent for testing or disposed of in a manner directed by the local health department. *(Insert manner of disposal here if permit dictates)*

Littermates of an animal that tests positive must be euthanized. Any animal that has been in direct contact with an animal that tests positive must be euthanized and disposed of in a manner directed by the local health department.

All non-releasable animals must be euthanized.

Complete records must be kept of all RVS cases. Intake and release information must be logged. All phone calls from the public must also be logged. The record should include the following:

Date received

Species and number

Name, address and phone number of the person from whom the animal is received

Location found

Reported and possible exposures

Release date and location or disposition date, method, location and reason

RVS rehabilitators are required to submit these records to *(insert name and address here)*.

Housing Requirements

All cages should meet the minimum requirements as specified in the 2003 edition of Minimum Standards for Wildlife Rehabilitation. At least one outside cage meeting these specifications must be completed, prior to issuance of the permit.

Raccoons

Infant: 10-12 gal aquarium

Preweened: 3'x3'x3'

Outside: 6'x8'x6'

30 square feet per animal is required when raccoons are group housed.

Prevent contact with other animals and people/pets with separated, double layers of siding on the outside of the cage or protective fencing around the cage.

The cages can not be used for other animals. (check other rvs)

Skunks

Infant: 20 gal

Preweened: 2'x4'x3'

Outside: 6'x8'x6'

Prevent contact with other animals and people/pets with separated, double layers of siding on the outside of the cage or protective fencing around the cage.

The bottom of the cage must be secure to prevent digging out.

Foxes

Infant: 30 gal

Preweened: 3'x3'x3'

Outside: 4'x4'x4'

Prevent contact with other animals and people/pets with separated, double layers of siding on the outside of the cage or protective fencing around the cage

Bats

Infant: 18"x12"x12"

Preweened: 18"x12"x12"

Outside: 6'x8'x8'

The flight cage must have a double entry system or double enclosure.

Animal Testing Procedures

Rabies testing is performed at the State Laboratory of Public Health located in Raleigh.

The direct fluorescent antibody test (dFA) is used to detect rabies. The test requires fresh brain tissue from the animal. The test can only be done after the animal is dead.

Specimens may be delivered to the State lab. However, it is recommended that animals be taken to the local animal control office to be sent to the lab for testing when possible. They will properly prepare the specimen and ship it via the State Courier Service.

The following submission procedures have been excerpted from North Carolina Manual for Rabies Prevention and Animal Bite Management found at <http://www.rabies.ncdhhs.gov/epi/vet/pdf/2007NCRabiesManual.pdf>.

Deliver specimens as fresh as possible. For large animals, only the animal's head should be submitted. Small animals, no larger than a squirrel, may be submitted whole. For bats, the entire dead animal must be submitted. Animals should be euthanized in a manner that will not destroy the brain.

Complete sections 1 through 7 of form DHHS 1614 (the form is found in the manual) for each body submitted. Seal the form in a separate plastic bag and bring it with the specimen.

Place the specimen in a separate leak-proof plastic bag with absorbent material. Then place the specimen into a secondary container and seal it securely. Place the secondary container into a thick-walled Styrofoam container and enclose refrigerants. Specimens should be kept cold but not frozen. Do not use loose wet ice or dry ice.

Specimens may be brought to the Bath Building, 306 N. Wilmington Street, Raleigh, during working hours (8 AM until 5 PM) Monday through Friday. At all other times specimens should be placed in the specimen drop chute at the back of the building.

Testing is available Monday through Friday (7:30 AM to 4 PM) and Saturday (8 AM to noon) under some circumstances.

Handling the Public

A rehabilitator is often the first one to learn of contact with a RVS. The rehabilitator must assess the situation to determine if there has been exposure to rabies. It is critical to ask questions in a way to elicit truthful and reliable information.

Ask the following questions:

1. What is the name, address and phone number of the caller?
2. Who found the animal?
3. Where was the animal found?
4. What were the circumstances?
5. Was the animal handled? Did someone pick it up? Is the animal in a container? How did they get it into the container? Did they wear gloves?
6. Who else handled the animal? How?
7. How was the animal behaving?
8. Did the animal bite, scratch or lick anyone?
9. Was there any contact with pets or other animals?

If the animal has not been handled, discourage the person from handling or transporting the animal. Make arrangements to have the animal transported by someone authorized to transport RVS.

If someone has been bitten or scratched, the person must be told to contact the local health department or their private physician for further instruction. The rehabilitator must not give any medical advice or make any medical decision for the person. The rehabilitator should follow up by contacting the local health department ([confirm this with NCWRC](#)) to report the incident.

Exposure Situations

1. If the animal is not already contained, contain it, if it can be done without risking contact. If it can't be safely contained, monitor it.
2. Wash any wounds thoroughly with soap and water
3. Notify the local animal control organization (or health department?) to make arrangements to get the animal tested.
4. Seek medical advice

Appendix

Documents

Permit Application *inserted here*

Statement of Veterinarian Support *inserted here*

Certificate of Immunization *inserted here*

Rabies Advisory Notice *inserted here*

Instructions for physicians administering vaccinations:

Put Ordering vaccine [info here](#)

Instructions for getting titer checked [goes here](#)

The blood sample should be sent by the physician to:

Name, address, phone number goes here

Glossary

Antibody – protein found in the blood that neutralizes a particular bacteria or virus

Deltoid muscle – shoulder muscle

Booster – additional vaccination given after a initial vaccination to raise the level of protection

Diploid Cell Vaccine (HDCV) called Imovax – one of the two types of rabies vaccine available in the US

Immune globulin (RIG) – blood product containing rabies antibodies

Direct Immunofluorescence of Nerve Tissue (DFA) – the test used to test for rabies antigen in tissue

Encephalopathy - disorder or disease of the brain

Lysavirus – genus of viruses to which rabies belongs (in the family Rhabdoviridae in the order Mononegavirales)

Rabies Vaccine Adsorbed (RVA) – one of the two types of rabies vaccine available in the US

Titer – measurement of how much antibody an organism has produced, the strength of the immune response

Vector - organism that does not cause disease itself but that transmits infection by conveying pathogens from one host to another

Zoonoses (zoonotic disease) – disease that can be transmitted from animals to humans and vice versa

References

<http://www.vaccineinformation.org/rabies/qandavax.asp>

<http://www.dnr.state.md.us/wildlife/download/RVSTraining2009.pdf>

Compendium of Animal Rabies Prevention and Control, 2008

Procedures and Guidelines for Wildlife Rehabilitators Who are Authorized to handle Rabies-Vector Species, 1999

North Carolina Manual for Rabies Prevention and Animal Bite Management, April 2007