



Rabies Surveillance and Prevention

Recommendations for Peace Officers

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Division of Disease Control
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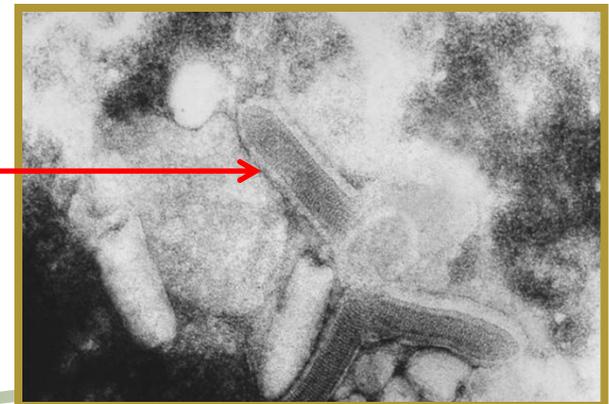
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State Epidemiologist
Division of Disease Control
North Dakota Department of Health





Rabies - Background

- Lyssavirus belonging to the Rhabdoviridae family
 - “bullet-shaped virus”
 - RNA virus
- Rabies is a virus that affects the central nervous system in mammals
 - Virus travels within the nerves
 - Within the brain, virus multiplies rapidly
 - Signs of disease begin to develop





Rabies - Background

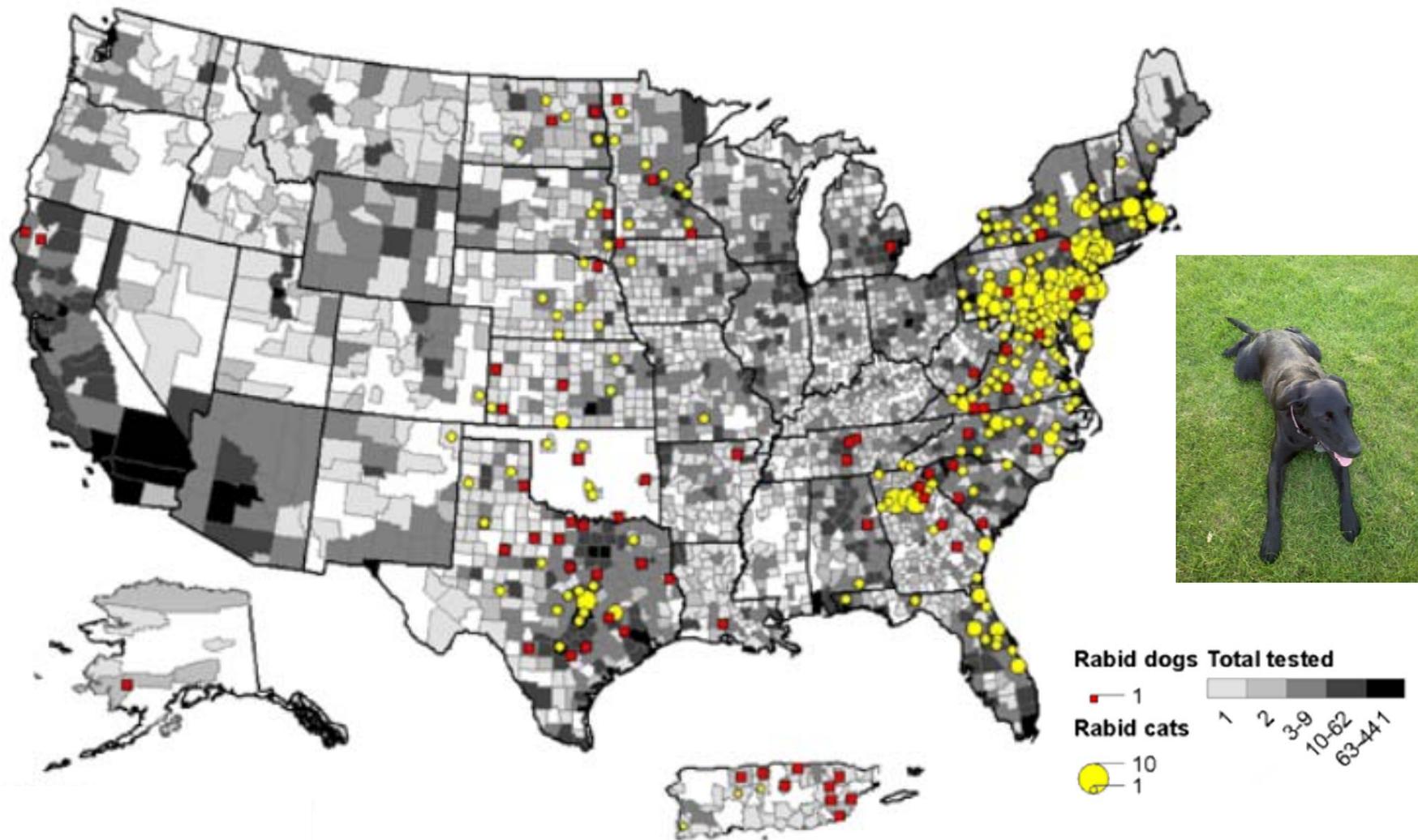
- More than 90 percent of rabies cases reported each year in the United States occur in wildlife
 - 36.5% raccoons
 - 23.5% skunks
 - 23.2% bats
 - 7% foxes
 - 1.8% other species
- Raccoons and skunks are responsible for most reported animal cases in the United States
 - In ND – skunks
- Different variants (bat, skunk, raccoon, etc.)



Terrestrial Rabies Reservoirs(2010)



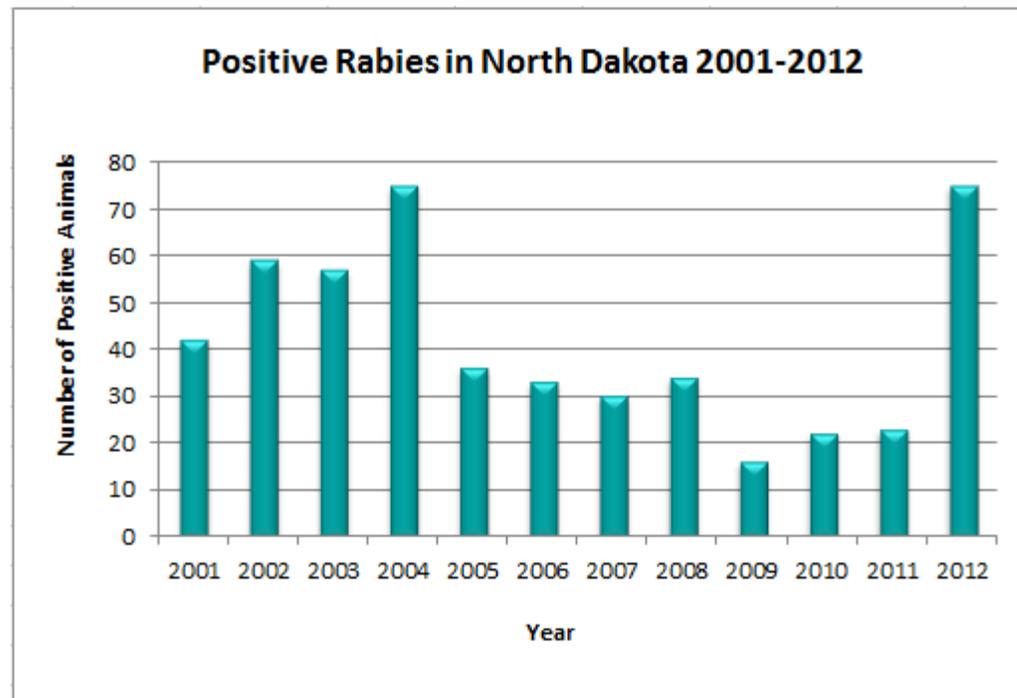
Rabid Cats and Dogs Reported in the U.S. (2010)





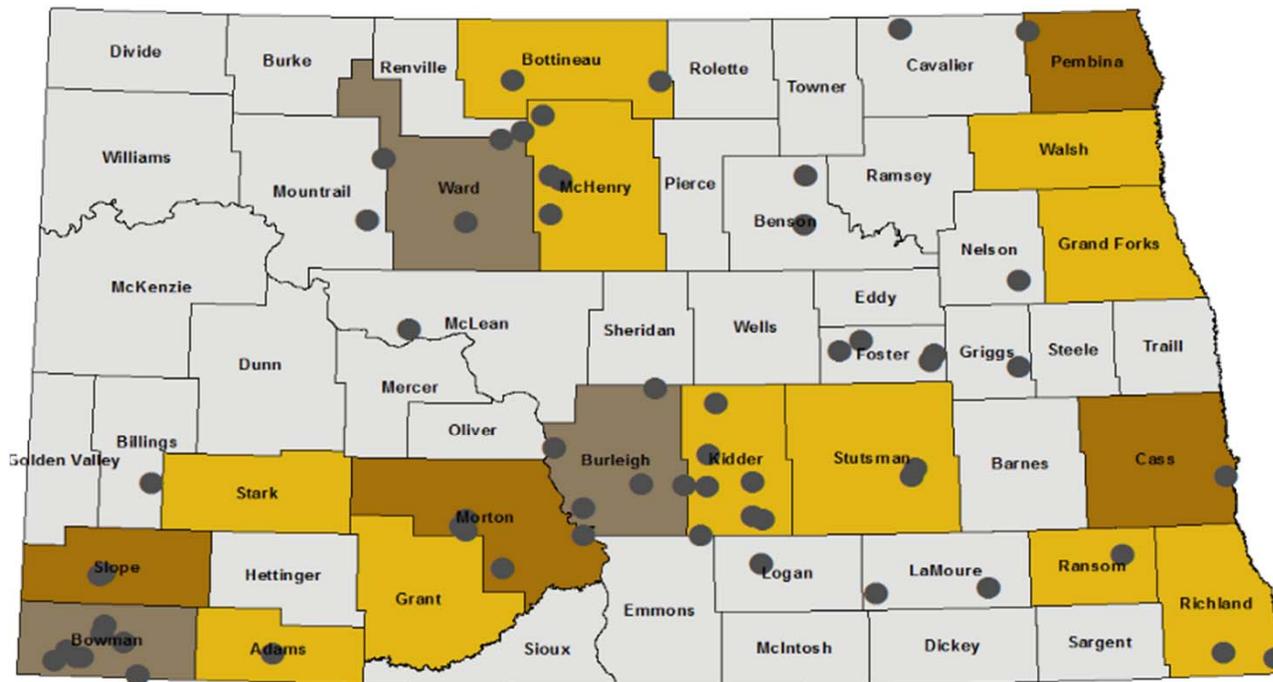
Rabies in North Dakota

- ~ 350 to 450 animals tested per year
 - 729 animals tested in 2012
- ~ 30 positive rabies animals per year
 - 8% positive



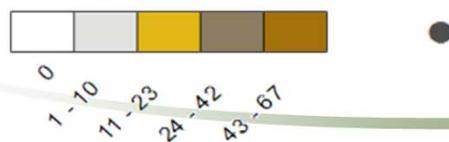
Rabies in North Dakota

- Positive Animals Rabies Cases by County, North Dakota, 2012



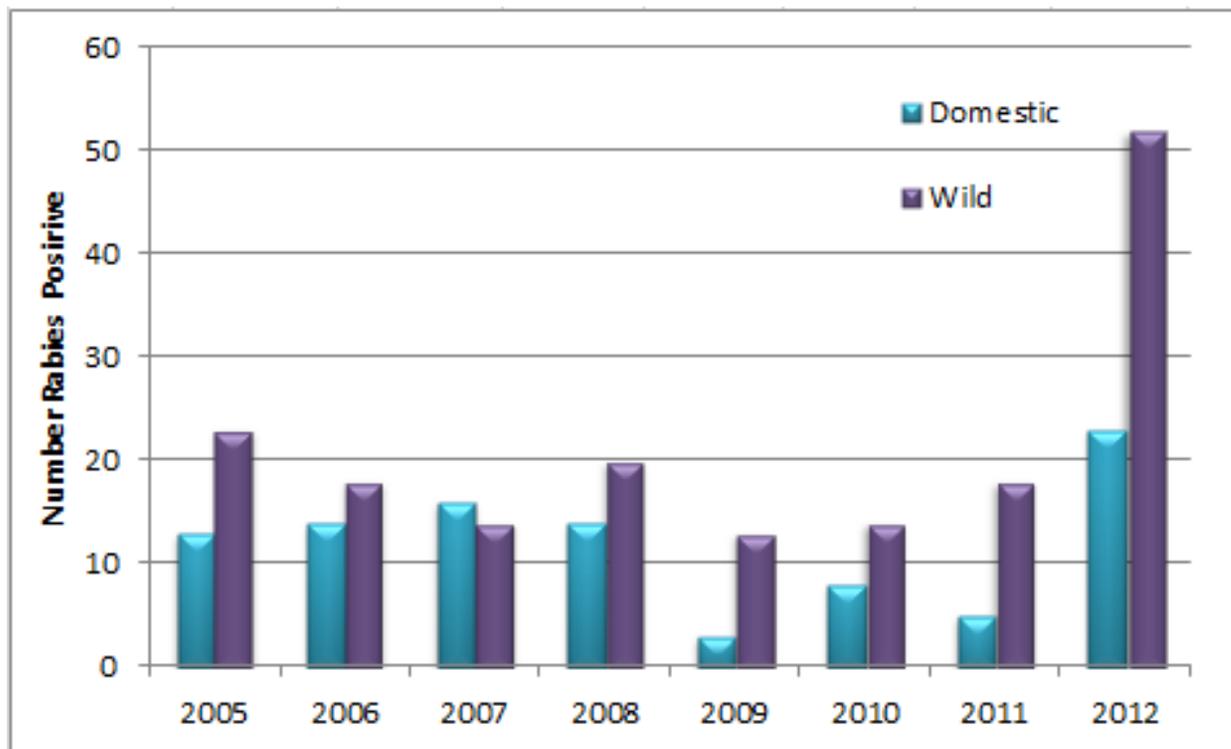
Species	Number Confirmed
Bat	2
Cat	6
Cow	12
Horse	4
Sheep	1
Skunk	50
Total	75

Total Animals Tested Positive Animals





Positive Rabies in Domestic and Wild Animals





Human Rabies Around the World

- Rabies is a global health issue
- Human cases are underreported
 - Most rabies cases occur in countries with inadequate diagnostic facilities and surveillance systems for rabies
- Exposure to rabid dogs is the cause of over 90% of human exposures and over 99% of human rabies deaths¹
- Limited access to healthcare and resources



1- <http://www.cdc.gov/rabies/location/world/index.html>

US soldier dies of rabies after dog bite in Afghanistan

Published May 03, 2012 / NewsCore

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WASHINGTON – A 24-year-old American soldier died of rabies after being bitten by a dog last year in Afghanistan, US health officials said Thursday following an investigation into the rare case.

The otherwise healthy soldier started experiencing symptoms of shoulder and neck pain and tingling sensations in his hands soon after arriving at Fort Drum, N.Y., in mid-August 2011.

His condition escalated to include nausea, vomiting, anxiety and trouble swallowing. By the time he was admitted to an emergency room, he was dehydrated and hydrophobic, meaning he developed an intense fear of drinking liquids because of the painful muscle spasms he experienced while swallowing.

This Week in *MMWR*



Photo/CDC

This issue of *MMWR* includes a report on human rabies diagnosed in a U.S. soldier who reported being bitten by a dog in Afghanistan.



Rabies in the U.S.

- Human cases – 1 to 3 each year
 - 49 human cases since 1995¹
 - Variant Type
 - Bat(35), Dog(11), Fox(1), Raccoon(1), unknown (1)
 - Exposure Type
 - Bite (17), Transplant (4), unknown (28)
- Estimated 25,000 to 35,000 human exposures¹
 - Most from domestic animal exposure
- Cases of human and animal rabies are mandatory reportable conditions to the NDDoH
 - Website - www.ndhealth.gov/disease/Rabies/



1- http://www.cdc.gov/rabies/location/usa/surveillance/human_rabies.html

Exposures and PEP, North Dakota, 2000

- PEP initiated by exposure species

- Dog – 70
- Cat – 27
- Cow – 12
- Horse – 8
- Muskrat - 6
- Skunk – 4
- Skunk/dog – 3
- Bat – 2
- Raccoon, Mink, Unknown – 3

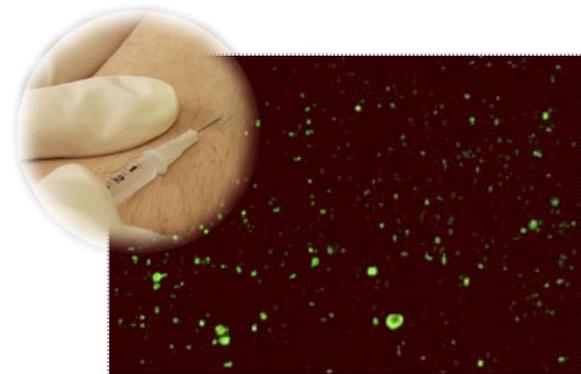


- Cost to fully vaccinate is variable, average of \$2,500¹ to \$5,000
 - Approx. \$506,250 in vaccination costs
 - Est. \$364,000 potentially avoided costs by vaccinating pets, quarantine, etc.



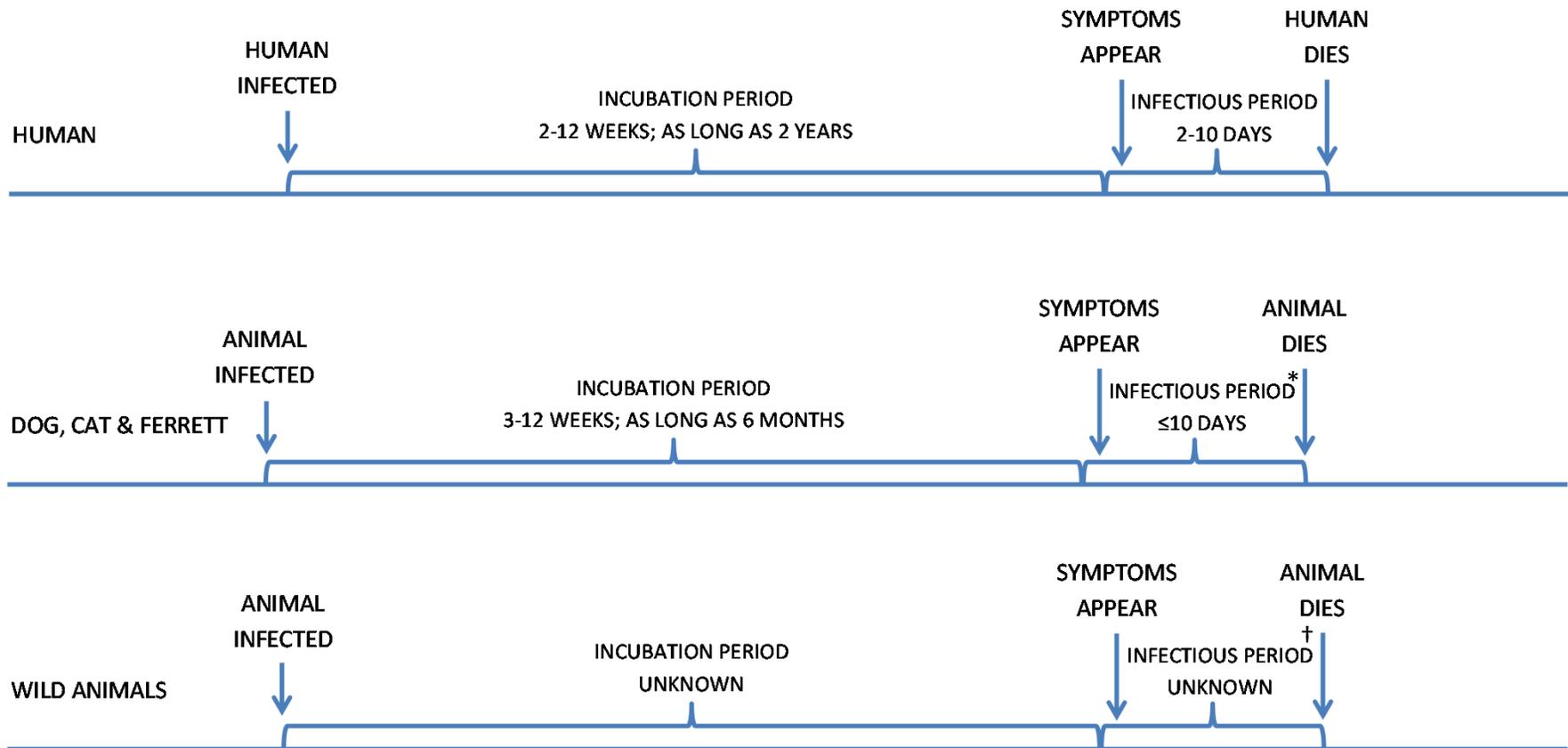
Rabies Exposure

- Definition of rabies exposure
 - Introduction of virus-laden saliva into the body through a bite or contact of the virus-laden saliva or neural tissue with an open wound or the mucous membranes.
 - *Blood is not infectious*
- All animal bites or other possible exposures should be assessed by a healthcare provider!





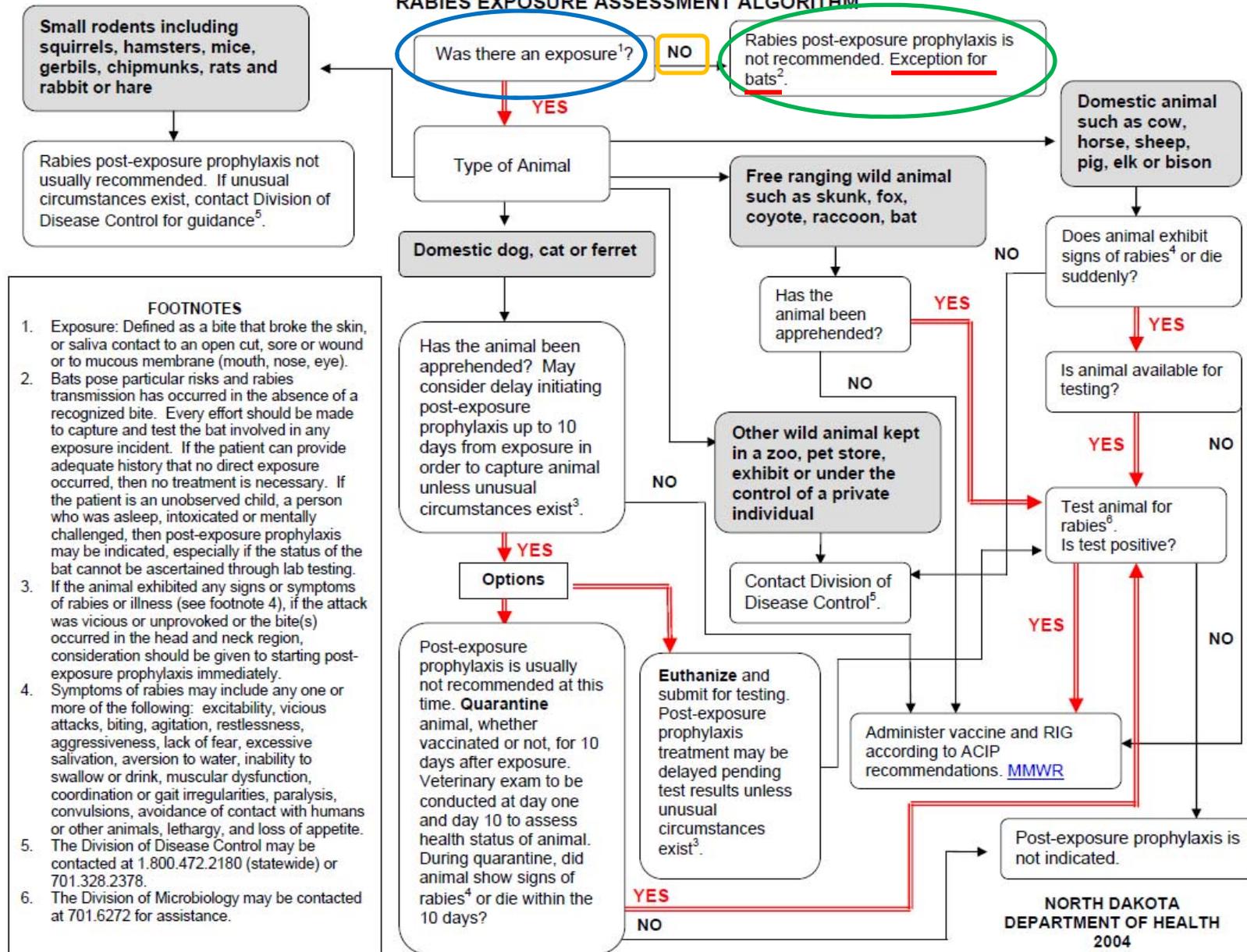
Rabies Exposure Timeline



* May be infectious for a number of days before clinical signs appear. When investigating human exposures, it is recommended to consider the 10 days prior to onset of clinical signs (or date of death if no signs of illness) as part of the animal's infectious period.

† It is unknown as to how long a wild animal can shed rabies virus in its saliva before clinical signs of illness appear. Any exposure to a wild animal that cannot be tested, even if apparently healthy, should be treated as if the animal is rabid.

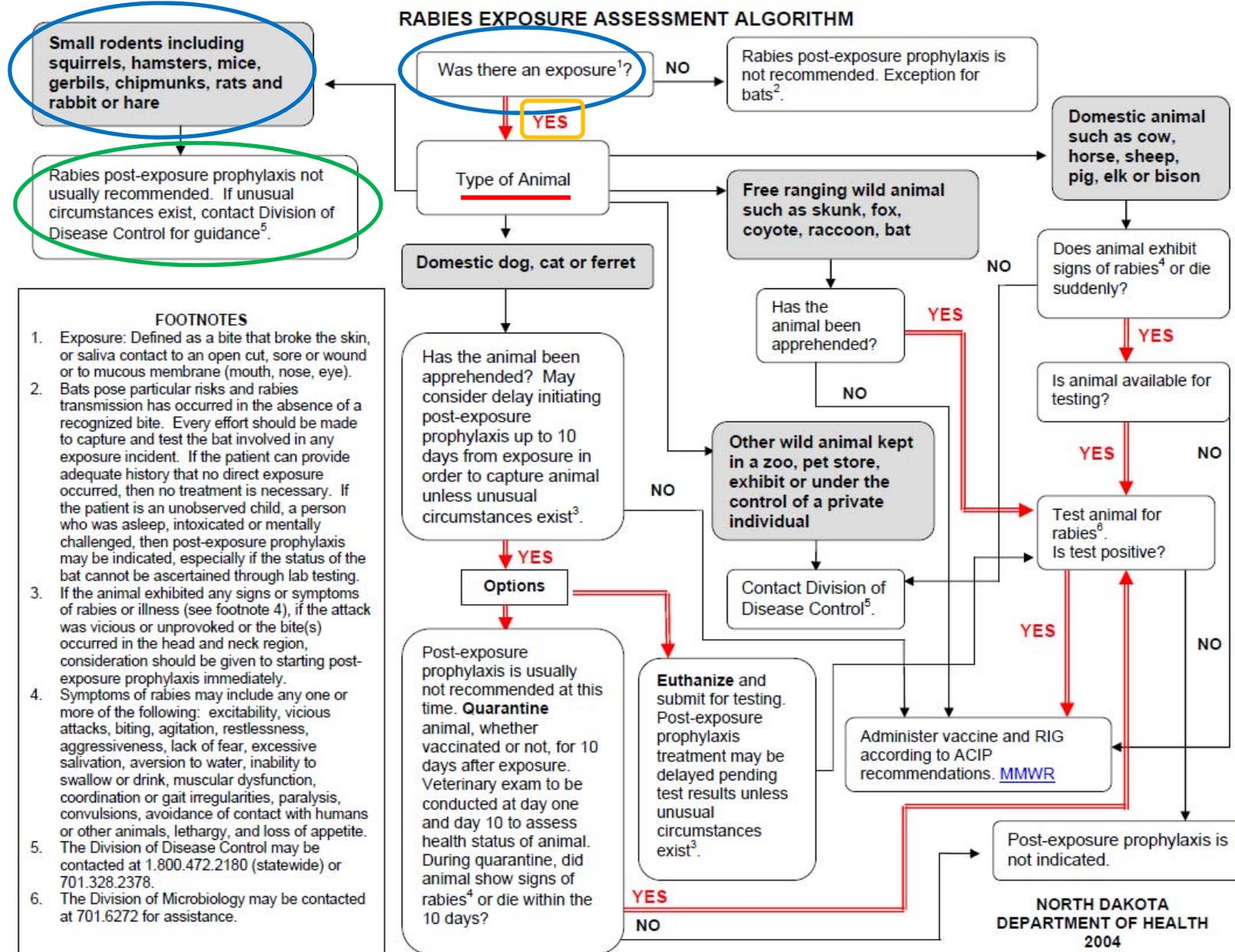
RABIES EXPOSURE ASSESSMENT ALGORITHM



FOOTNOTES

1. Exposure: Defined as a bite that broke the skin, or saliva contact to an open cut, sore or wound or to mucous membrane (mouth, nose, eye).
2. Bats pose particular risks and rabies transmission has occurred in the absence of a recognized bite. Every effort should be made to capture and test the bat involved in any exposure incident. If the patient can provide adequate history that no direct exposure occurred, then no treatment is necessary. If the patient is an unobserved child, a person who was asleep, intoxicated or mentally challenged, then post-exposure prophylaxis may be indicated, especially if the status of the bat cannot be ascertained through lab testing.
3. If the animal exhibited any signs or symptoms of rabies or illness (see footnote 4), if the attack was vicious or unprovoked or the bite(s) occurred in the head and neck region, consideration should be given to starting post-exposure prophylaxis immediately.
4. Symptoms of rabies may include any one or more of the following: excitability, vicious attacks, biting, agitation, restlessness, aggressiveness, lack of fear, excessive salivation, aversion to water, inability to swallow or drink, muscular dysfunction, coordination or gait irregularities, paralysis, convulsions, avoidance of contact with humans or other animals, lethargy, and loss of appetite.
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6. The Division of Microbiology may be contacted at 701.6272 for assistance.

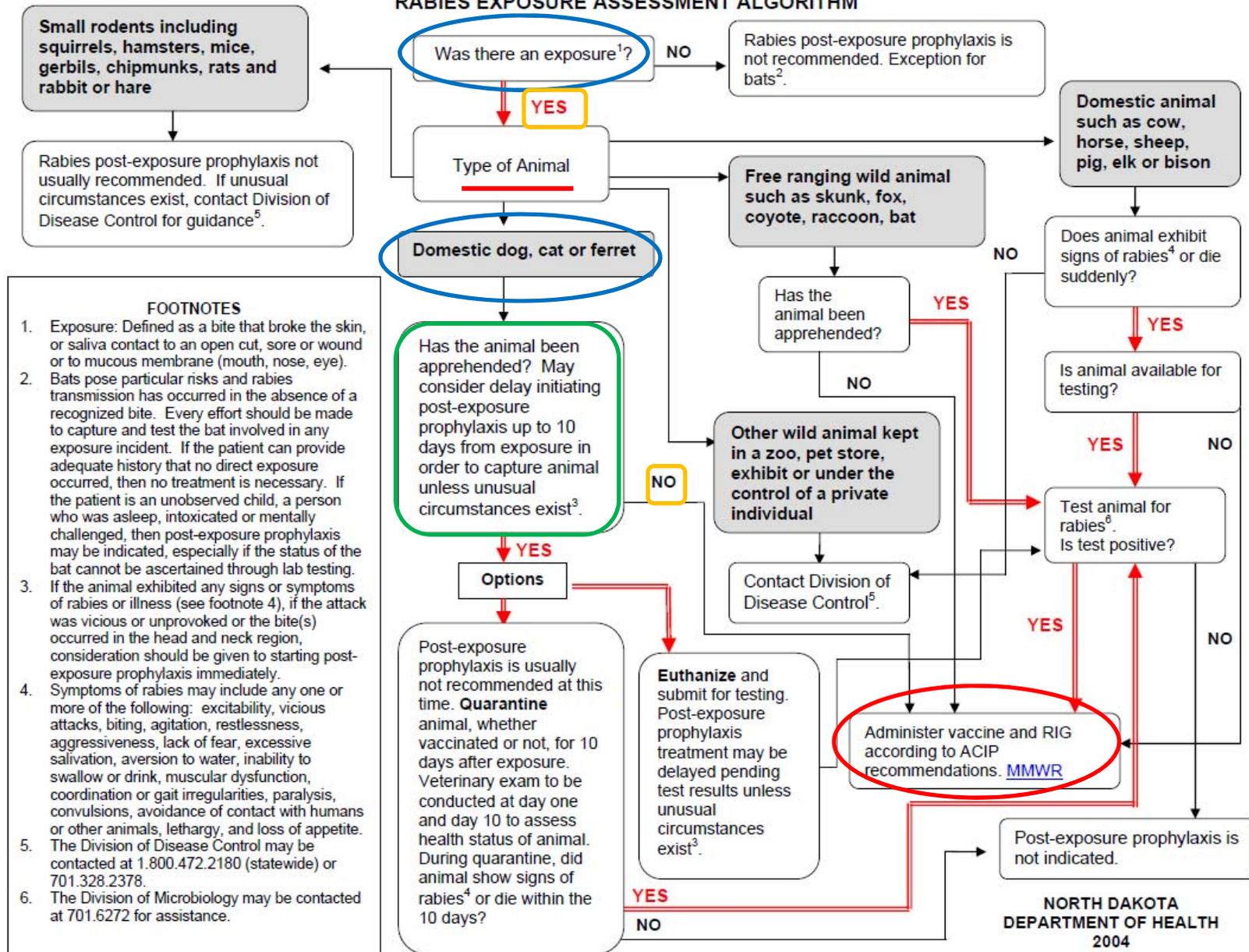
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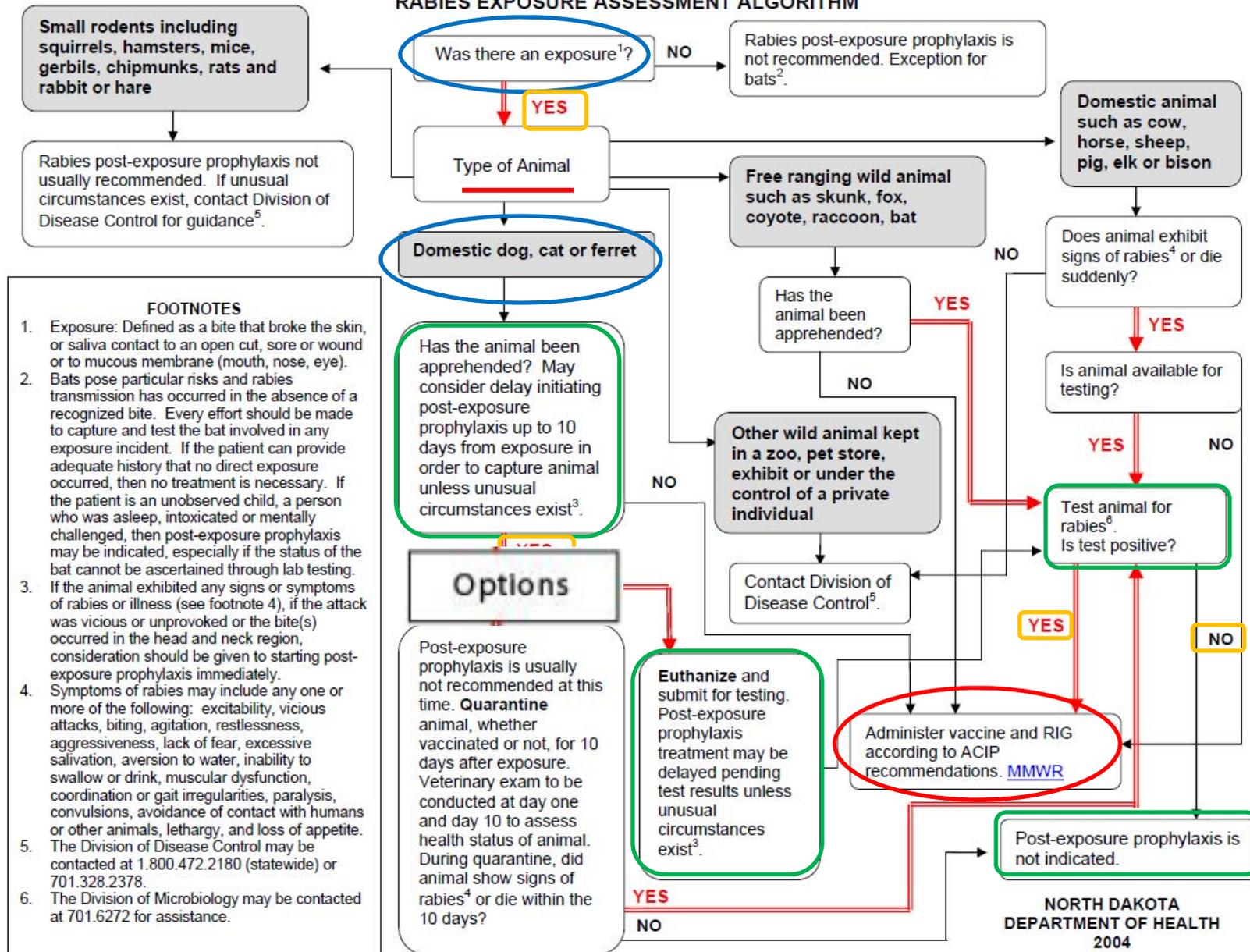
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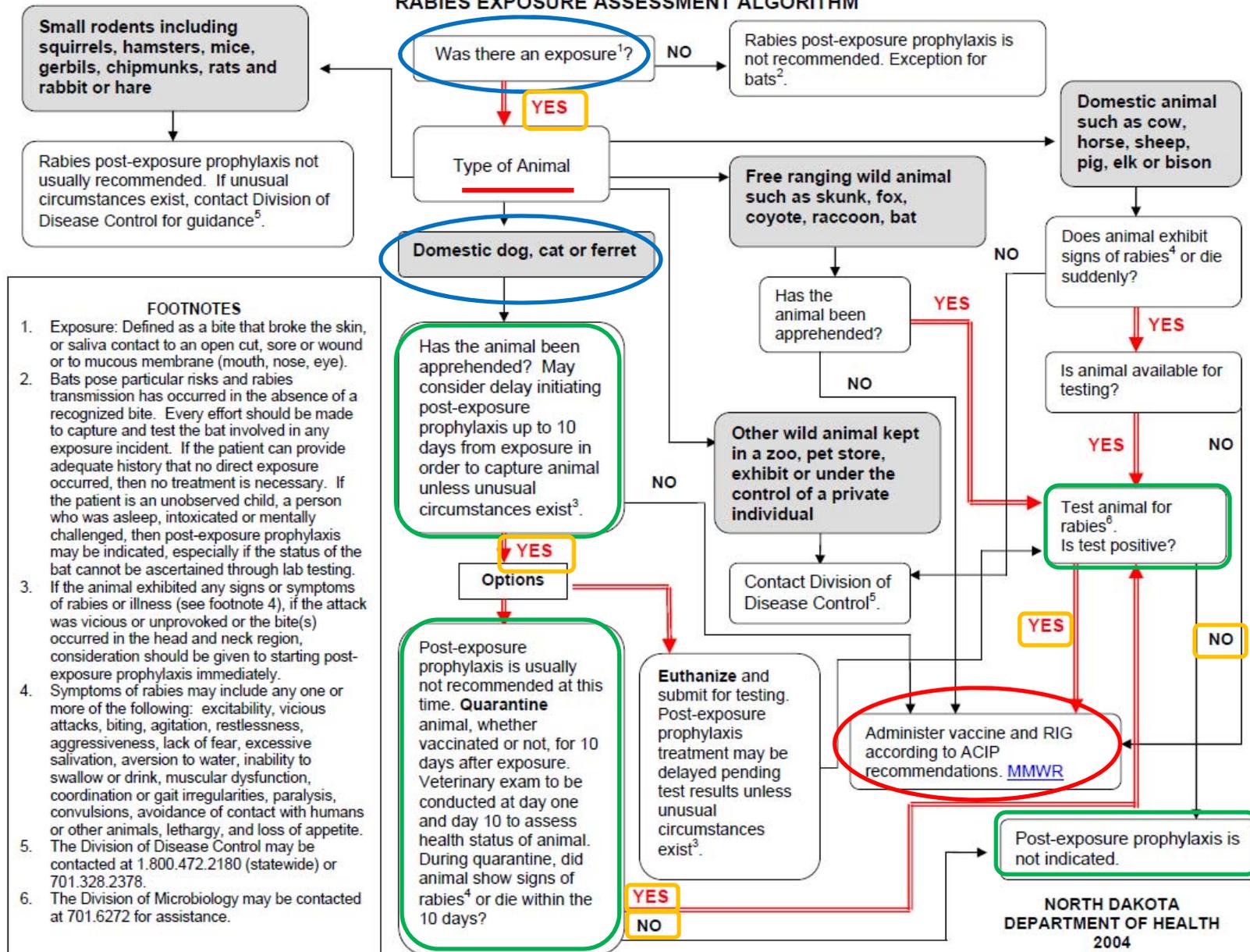
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RABIES EXPOSURE ASSESSMENT ALGORITHM



Small rodents including squirrels, hamsters, mice, gerbils, chipmunks, rats and rabbit or hare

Rabies post-exposure prophylaxis not usually recommended. If unusual circumstances exist, contact Division of Disease Control for guidance⁵.

Was there an exposure?¹

NO
Rabies post-exposure prophylaxis is not recommended. Exception for bats².

Type of Animal

Free ranging wild animal such as skunk, fox, coyote, raccoon, bat

Domestic animal such as cow, horse, sheep, pig, elk or bison

Domestic dog, cat or ferret

Has the animal been apprehended?

Does animal exhibit signs of rabies⁴ or die suddenly?

Has the animal been apprehended? May consider delay initiating post-exposure prophylaxis up to 10 days from exposure in order to capture animal unless unusual circumstances exist³.

Other wild animal kept in a zoo, pet store, exhibit or under the control of a private individual

Is animal available for testing?

Options

Contact Division of Disease Control⁵.

Test animal for rabies⁶. Is test positive?

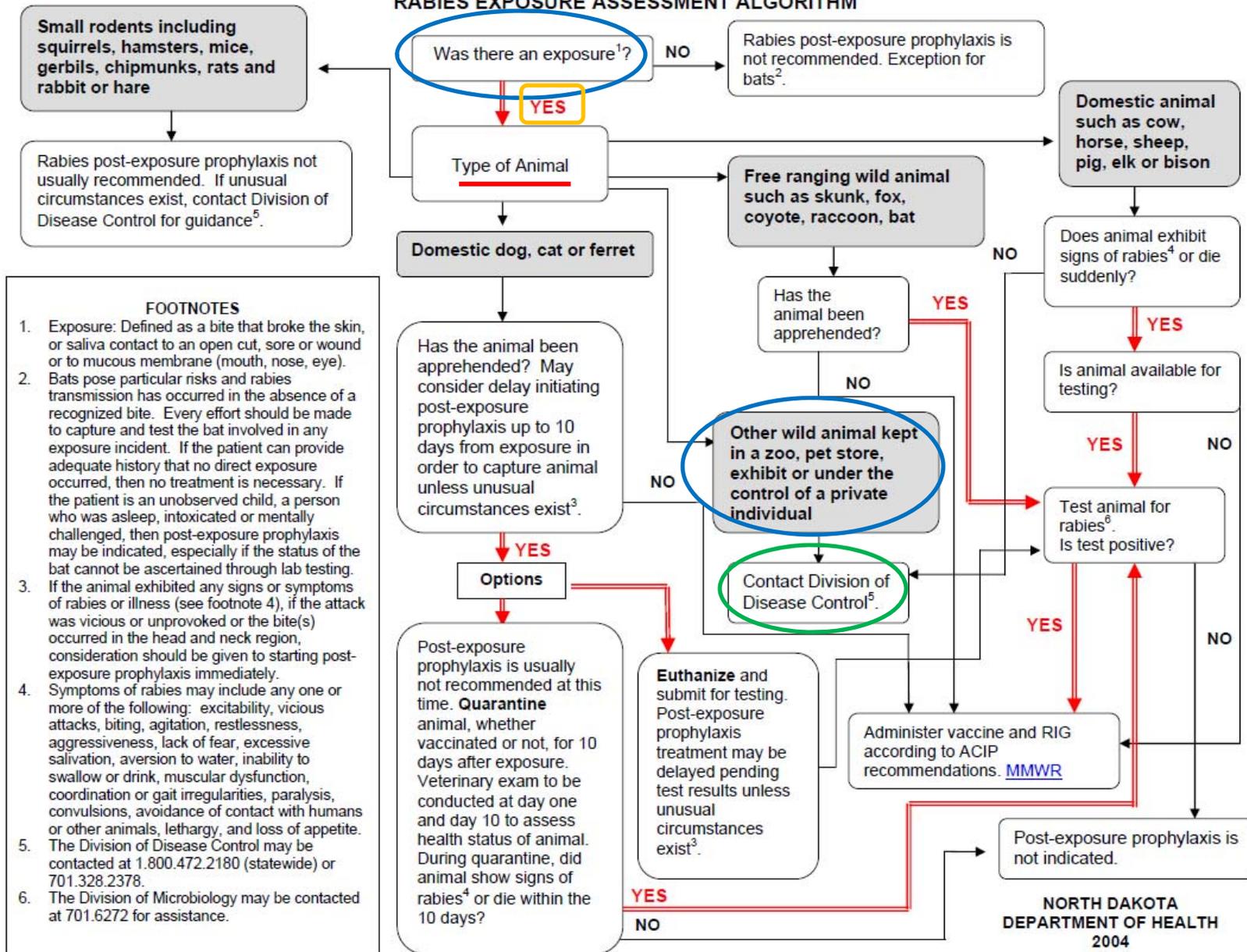
Post-exposure prophylaxis is usually not recommended at this time. **Quarantine** animal, whether vaccinated or not, for 10 days after exposure. Veterinary exam to be conducted at day one and day 10 to assess health status of animal. During quarantine, did animal show signs of rabies⁴ or die within the 10 days?

Euthanize and submit for testing. Post-exposure prophylaxis treatment may be delayed pending test results unless unusual circumstances exist³.

Administer vaccine and RIG according to ACIP recommendations. [MMWR](#)

Post-exposure prophylaxis is not indicated.

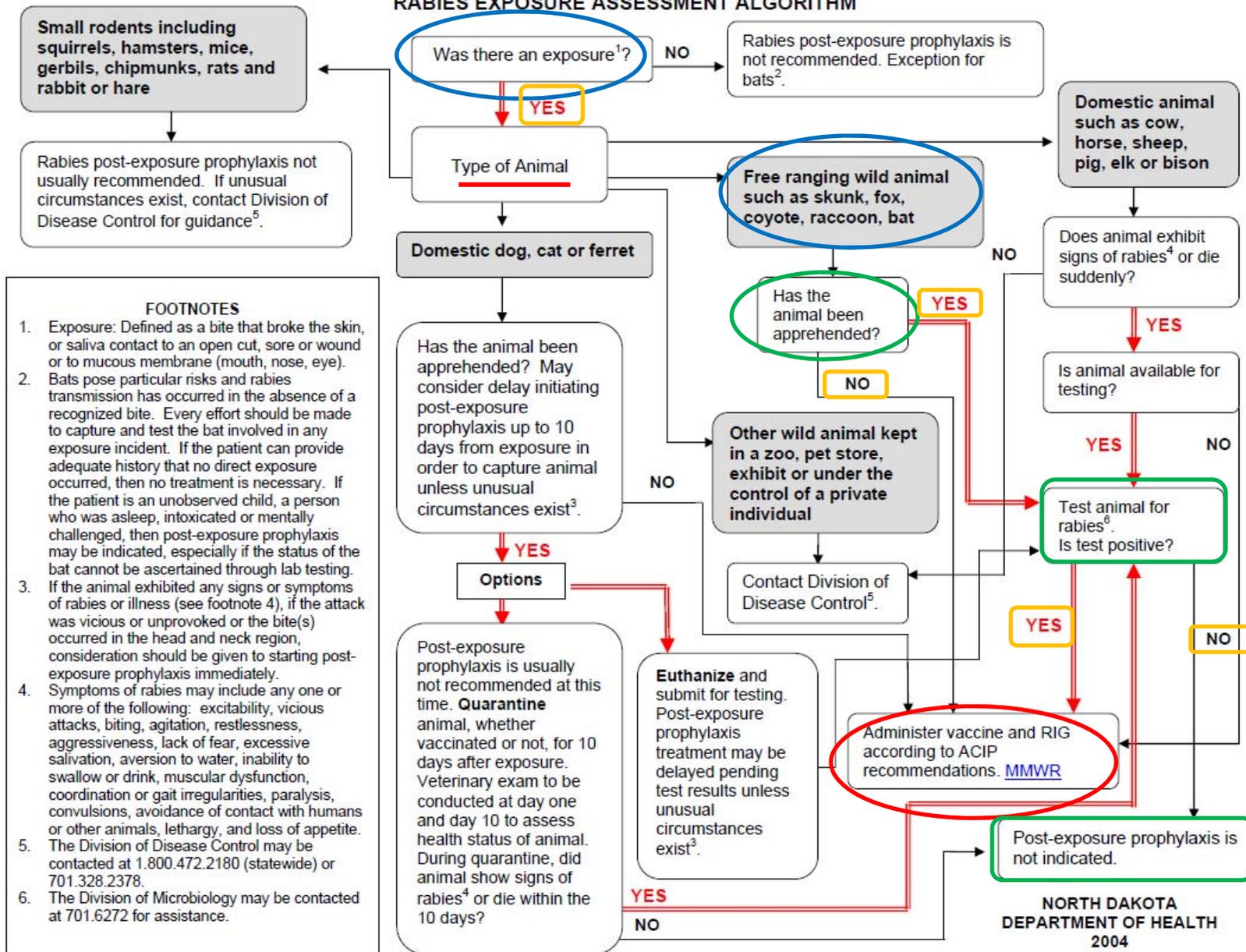
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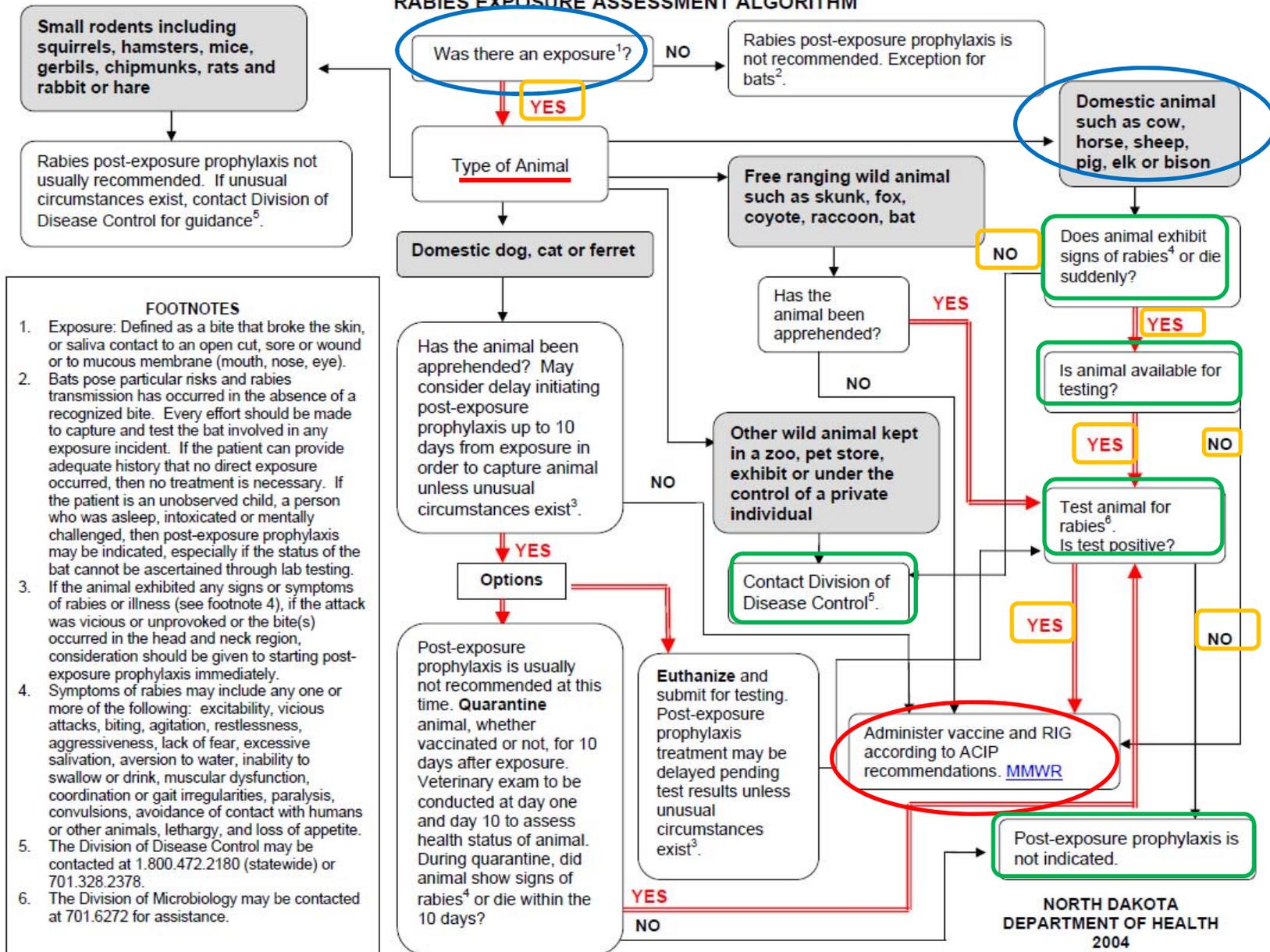
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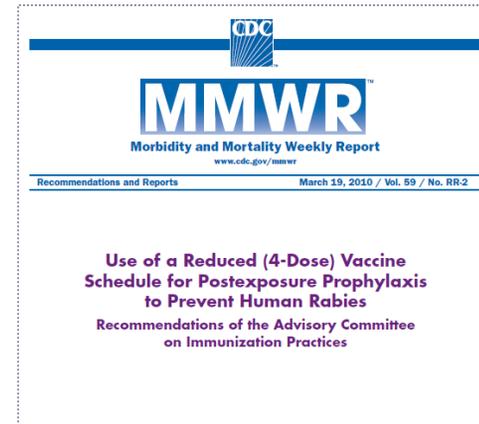


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Treatment of Wounds & Vaccination

- Not-previously vaccinated
 - Wound cleansing
 - Soap & Water, wound irrigation.
 - Rabies immune globulin (RIG)
 - 20 IU/kg body weight
 - If possible, full dose should be infiltrated around the wound site.
 - Remainder in anatomical site distant from vaccination site.
 - Vaccine *
 - 1 mL, IM (deltoid area, or outer thigh for small children).
 - 4-doses: Days 0, 3, 7 & 14.
 - Immunosuppression: 5 doses on days 0, 3, 7, 14 and 28





Treatment of Wounds & Vaccination

- Previously vaccinated
 - Wound cleansing
 - Soap & Water, wound irrigation.
 - Rabies immune globulin (RIG)
 - Should NOT be administered!
 - Vaccine
 - 1 mL, IM (deltoid area, or outer thigh for small children).
 - 2-doses: Days 0 & 3.



Rabies Vaccination

- Pre-exposure vaccination
 - 3-doses of 1 mL, IM (deltoid area, or outer thigh for small children).
 - Days 0,7 & 21 or 28.
 - NO RIG
- Booster doses
 - 1-1mL, IM booster dose if does not have evidence of virus neutralizing antibodies in serum at 1:5 serum dilution by the RFFIT (rapid fluorescent focus inhibition test).



Rabies Exposure Scenario – Case 1

- A man is jogging in his neighborhood and runs past a house where the family dog is leashed to a fence. He gets too close and the dog bites him on the leg.





Rabies Exposure Scenario – Case 1

- The jogger likely provoked the dog by getting too close, causing the dog to bite him.
- Regardless of vaccination status, the dog should be seen by a veterinarian to determine its current health status.
- The dog should then be isolated and observed for a 10-day period.
- The dog should again be seen by a veterinarian at the end of the 10-day period.
 - If the animal does not show any clinical signs of rabies during the observation period and a vet determines that it is healthy, then the jogger does not need PEP.
 - Studies have shown that dogs, cats or ferrets that are infected and contagious for rabies will show clinical signs within 10 days.
 - If these signs occur, the jogger should be given PEP immediately and the dog should be euthanized and sent for confirmatory testing. If the rabies test on the animal is negative, PEP can be stopped.



Rabies Exposure Scenario – Case 2

- A girl is sitting on a park bench with her mother on a warm summer day. All of a sudden, she feels pain in her lower leg and notices that a raccoon has bitten her.





Rabies Exposure Scenario – Case 2

- The girl was a subject of an unprovoked attack by a wild animal. Unless the wild animal is caught, tested and found not have rabies, the girl should be given PEP.



Rabies Exposure Scenario – Case 3

- A woman wakes up at her house one morning and finds a bat flying around her bedroom. She chases it out of her house and mentions it to her neighbor. Her neighbor recalls reading something about “bats and rabies” and suggests that the woman discuss the issue with her family physician.





Rabies Exposure Scenario – Case 3

- Bites and scratches from bats can be very minor and often go undetected if a person is attacked while sleeping.
- It is therefore recommended that any person who finds a bat in his or her bedroom after a period of unattended sleep be given PEP.
- If the bat can be caught and tested for rabies, then PEP can be stopped in the event of a negative test result.



Rabies Exposure Scenario – Case 4

- A 10 week old puppy is attacked by a skunk. The owner of the puppy is able to shoot the skunk and has it tested for rabies. The skunk tests positive for rabies. The owner did not have an exposure to the skunk, but the puppy has not been vaccinated against rabies because he was too young.





Rabies Exposure Scenario – Case 4

- Dogs, cats and ferrets that have never been vaccinated and are exposed to a rabid animal should be euthanized and tested for rabies.
- If the owner is unwilling to euthanize, the animal should be placed in **strict isolation** for six months.
 - The puppy should be in an enclosure where it is unable to have direct contact with people and other animals, other than a designated caregiver.
 - Rabies vaccine should be administered after entry into isolation or up to 28 days before release.



Rabies Exposure Scenario – Case 5

- A woman comes to the ER with an animal bite. Upon questioning, the woman states that the bite came from a raccoon that she was keeping as a pet.



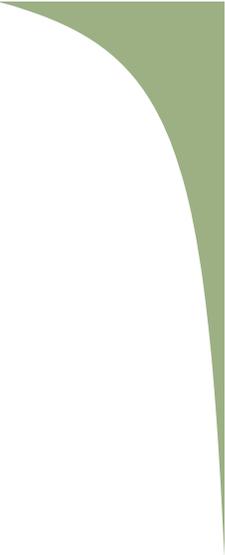


Rabies Exposure Scenario – Case 5

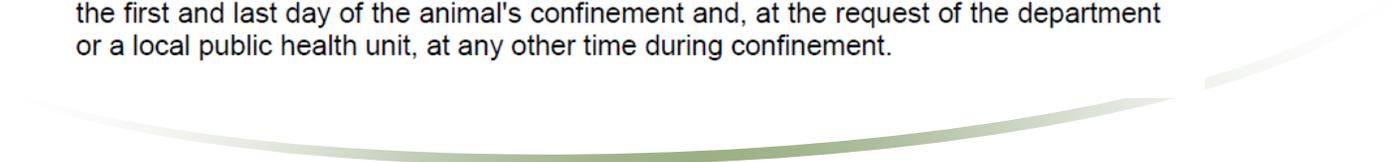
- Title 36 of the North Dakota Century Code **prohibits** ownership of skunks and raccoons.
- The raccoon should be confiscated and be euthanized and tested for rabies.
- If the raccoon is not available for testing, the woman should receive PEP.



North Dakota Rabies Control Act of 1999

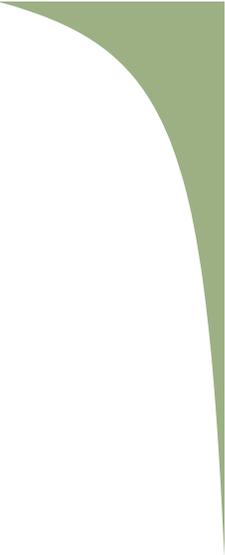


23-36-03. Enforcement authority.

1. The department, or an agency acting on the department's behalf, may promptly seize and humanely kill, impound at the owner's expense, or quarantine any animal if the state health officer, or the state health officer's designee, has probable cause to believe the animal presents clinical symptoms of rabies.
 2. The department, or an agency acting on the department's behalf, may promptly seize and humanely kill, impound at the owner's expense, or quarantine any wild mammal that is not currently vaccinated for rabies by a vaccine approved for use on that species by the national association of state public health veterinarians, inc., or any stray or unwanted domestic animal, if the state health officer, or the state health officer's designee, determines the animal is a threat to human life or safety due to the possible exposure of an individual to rabies.
 3. The department, or an agency acting on the department's behalf, may promptly seize and quarantine, or impound at the owner's expense, any dog, cat, or currently vaccinated ferret for a period of ten days, or any other domestic animal for a period not exceeding six months, if the state health officer, or the state health officer's designee, determines the animal is a threat to human life or safety due to the possible exposure of an individual to rabies.
 4. If an animal is humanely killed under this section, then at the request of the state health officer, or the state health officer's designee, the animal's brain must be tested for rabies by the state microbiology laboratory of the department or by the North Dakota veterinary diagnostic laboratory. The department may conduct a diagnosis of farm animals, domestic animals, and wildlife that are suspected of having rabies and report findings as appropriate.
 5. If an animal that has bitten or otherwise exposed an individual or another animal is not seized for testing, a law enforcement officer with jurisdiction over the place where the animal is located may determine whether to impound or quarantine the animal under subsection 3 and which method of confinement to use.
 6. A licensed veterinarian shall examine, at the owner's expense, a confined animal on the first and last day of the animal's confinement and, at the request of the department or a local public health unit, at any other time during confinement.
- 



North Dakota Rabies Control Act of 1999



23-36-04. Administrative search warrant.

Except in the case of an emergency, the department, or another state or local agency acting on the department's behalf, may seize an animal located on private property only as authorized by an administrative search warrant issued under chapter 29-29.1. A warrant to seize an animal under this section must include a request to quarantine, impound, or humanely kill and test the animal.

23-36-05. Assistance of state and local agencies.

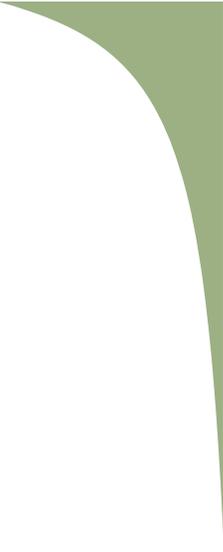
If a warrant is issued under section 23-36-04 and upon written request of the department, the game and fish department, the state veterinarian, or the wildlife services program of the United States department of agriculture animal and plant health inspection service shall provide assistance to the department in any action to seize, impound, quarantine, or test an animal suspected of having rabies or that has possibly exposed an individual to rabies, and shall carry out any other preventive measures the department requests. For purposes of this section, a request from the department means only a request for assistance as to a particular and singular suspicion of exposure to rabies and does not constitute a continuous request for assistance.

The duty of the game and fish department to cooperate and provide assistance under this section is limited to cases involving a wild mammal and is applicable only if no other agency is available for law enforcement or animal control services.





North Dakota Rabies Control Act of 1999



23-36-07. Penalty for violation of order or interference.

A person is guilty of an infraction if the person:

1. Conceals, releases, or removes an animal from the place where the animal is located with intent to impair that animal's availability for seizure under that warrant or order while the person is under the belief that a search warrant or judicial order is pending or is about to be issued for the seizure of an animal;
2. Fails to impound or quarantine an animal for the period and at the place specified after having been ordered to impound or quarantine the animal; or
3. Recklessly hinders any state or local official in any pending or prospective action to seize, impound, quarantine, or test an animal under this chapter.

23-36-09. Owner's responsibility.

1. The owner of an animal is liable for the cost of quarantine and veterinary services, and for the cost of any postexposure treatment received by an individual who is possibly exposed to rabies by the owner's animal, if the animal is not:
 - a. Licensed or registered as required by any state or local law or rule applicable to that species; or
 - b. Confined or vaccinated as required by any state or local law or rule applicable to that species.
 2. This section may not be construed to limit any other liability of an animal owner for injury or damage caused by the owner's animal.
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Housekeeping Items

In order to get credit for this presentation:

1. Take the quiz at this link. You will need to score a 70% on the quiz in order to receive credit. The quiz can be retaken up to three times. <http://www.ndhealth.gov/disease/post/>
2. This presentation will be posted on-line for the remainder of the year. NDDoH will be trying to attain CEU credit through the year as well.



If you have questions about this presentation or recommendations for future webinars please email :

**Alicia Lepp at alepp@nd.gov or
Tracy Miller at tkmiller@nd.gov**

