

Rabies Prevention *in New York City*

Based on recently-revised recommendations by the Advisory Committee on Immunization Practices (ACIP),¹ the National Association of State Public Health Veterinarians,² and the New York State Department of Health,^{3,4,5} this issue addresses some of the most frequent questions the Health Department has received from physicians since New York City became enzootic for rabies in 1992. **The answers incorporate new recommendations (these are highlighted) regarding exposure to bats, observation periods for biting ferrets, and the administration of rabies immune globulin.** A "Decision Tree" is featured to help physicians rapidly evaluate the need for postexposure prophylaxis (PEP).

Q: *My patient found a bat in his room when he woke up this morning. I don't see any bite or scratch marks anywhere on him. Is postexposure prophylaxis recommended?*

If the bat is not available for testing, PEP should be initiated immediately. If the bat is available, it should be safely collected and immediately tested for rabies; if laboratory results are negative, PEP will not be necessary.

Immediate rabies postexposure prophylaxis should be provided for all persons with bite, scratch, or mucous membrane exposure to a bat (*unless the bat is available for testing—see Decision Tree*). In addition, PEP may sometimes be appropriate even in the absence of a demonstrable exposure. While most human rabies infections—20 out of 22 acquired in the United States since 1990—have been due to bat variants of the rabies virus, a bite history could be documented in only one of the bat-associated cases.^{6,7} **Because recent epidemiologic data suggest that transmission of rabies can occur even from minor, seemingly unimportant, or unrecognized bat bites,^{8,9} new guidelines recommend that PEP be considered even if a bite, scratch, or mucous membrane exposure is not apparent if there is a reasonable probability that such an exposure occurred (see Table 1).**¹ Most bats do not have rabies (on average, only about 4% of bats tested in New York State are positive for the disease),⁴ and many unnecessary bat-related postexposure treatments could be avoided if the bats were safely captured and immediately tested. (*Call the Health Department for recommendations on how to capture a bat—see Table 4.*)

Q: *My patient was bitten by a ferret. Is postexposure prophylaxis recommended? Does the ferret have to be euthanized and tested for rabies?*

PEP need not be initiated if the ferret is healthy and available for confinement and observation for signs suggestive of rabies. (It does not have to be euthanized.)

Recent studies¹⁰ have demonstrated that ferrets only shed virus in saliva immediately prior to and concomitant with obvious clinical signs of rabies. Therefore, if a biting ferret held for 10 days does not show signs suggestive of rabies, it can be concluded that the animal was not infectious at the time of the bite. **On the basis of this new information, guidelines for postexposure prophylaxis now put ferrets in a category with cats and dogs (rather than with wild terrestrial carnivores such as raccoons, skunks, and foxes).**¹

Q: *What about rats?*

Rabbits and small rodents like rats, mice, and squirrels are rarely found to be infected with rabies and have not been known to transmit rabies to humans. Because of this, postexposure prophylaxis is almost never necessary following a bite from these animals, and should not be initiated without consultation with the Health Department.

Only 4 rabbits and small rodents were counted among the 8,509 animals confirmed with rabies in the United States in 1997 (the last year for which national data are available); these included 3 rabbits and 1 squirrel.⁶ No rabbits or small rodents were confirmed with rabies in New York State in 1998,¹¹ and none have ever been found with rabies in New York City.

A Decision Tree for Rabies Postexposure Prophylaxis (PEP)*

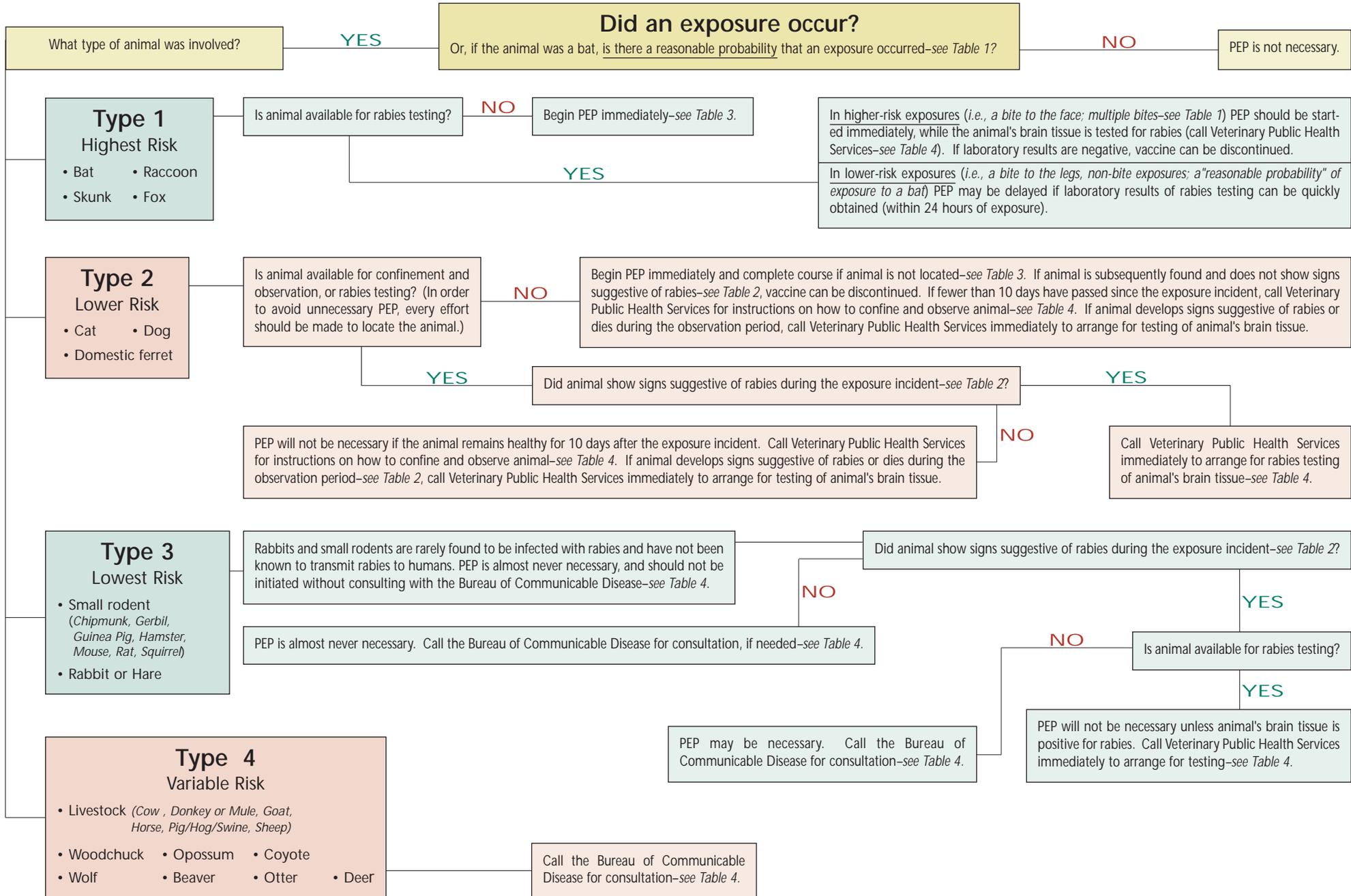


Table 1.–Definition of Exposure

1.1 Exposure

Rabies is transmitted by introducing the virus into open cuts or wounds in skin or by contact with mucous membranes.

There are 2 main types:

Bite (higher-risk).—Any penetration of skin by an animal's teeth. Bites to the face and hand and multiple bites carry the highest risk.

Non-bite (lower-risk).—Scratches or abrasions received from an animal, or the contamination of open cuts or wounds with an animal's saliva or brain and other neural tissue. Non-bite transmission of rabies is rare.

1.2 Non-Exposure

Other contact by itself, such as petting or handling an animal, or coming into contact with the blood, urine, or feces of an animal, does not constitute exposure, and, therefore, does not require rabies postexposure prophylaxis.

1.3 Possible Exposure to a Bat

Contact with a bat as defined in 1.1 constitutes exposure, just as it does for other species. In addition, because people have developed rabies after inapparent bat exposures, PEP may be appropriate even in the absence of demonstrable bite, scratch, or mucous membrane exposure in situations in which there is a reasonable probability that such an exposure occurred.

Examples of situations in which exposure may be a reasonable probability:

- Bat is found in the same room with someone who might be unaware that an exposure has occurred, for example, a sleeping person, an unattended child, or a mentally-disabled or intoxicated person
- Child touches a bat
- Bat flies into someone, touching bare skin
- Someone with bare feet steps on a bat
- Person puts hand in firewood or brush, feels pain, then sees a bat

Examples of situations in which exposure is unlikely:

- Bats are heard or seen in walls or attic of a house
- Bat guano is found in sleeping quarters
- Teenager or adult touches a bat, but is certain they were not bitten or scratched
- Bat swoops by a teenager or adult who does not feel it touch
- Person has contact with a completely dried-up carcass of a bat

For consultation on what constitutes exposure, call the Bureau of Communicable Disease (see Table 4).

Table 2.–Signs of Rabies in an Animal ¹⁵

- Behavior changes, including erratic conduct (a friendly dog becomes withdrawn or belligerent; an aloof animal becomes suddenly affectionate); depraved appetite (eating wood, soil, stones, plants, or other foreign objects), and unusual aggression (cats may arch and attack with unusual speed and ferocity)
- Increased salivation, drooling, or foaming at the mouth, with head held characteristically downward
- Tail gripped tightly between rear legs
- Hoarse, throaty bark or snarl ("rabies yowl")
- Muscular tremors (especially in cats)
- Dilated pupils, vacant stare
- Varying degrees of paralysis, frequently beginning at the head and neck, causing jaws to hang open
- Impaired locomotion

Table 3.–Rabies Postexposure Prophylaxis (PEP) Schedule ¹

Vaccination Status	Treatment	Regimen [▲]
All exposures	Local wound treatment	Immediate and thorough washing of all bite wounds and scratches with soap and water is an important measure in preventing rabies. If available, a virucidal agent such as povidone-iodine solution should be used to irrigate the wounds. Tetanus prophylaxis and measures to control bacterial infection should be given as indicated.
Not previously vaccinated	Rabies immune globulin (RIG)	Administer 20 IU/kg of body weight on day 0. If anatomically feasible, the full dose should be infiltrated into and around the wounds. Any remaining volume should be administered IM at an anatomical site distant from vaccine administration. RIG should be given only once, as promptly as possible after exposure. RIG should not be administered in the same syringe as vaccine. Because RIG may partially suppress active production of antibody, no more than the recommended dose should be given.
	Vaccine	1.0 mL of human diploid cell vaccine (HDCV), rabies vaccine adsorbed (RVA), or purified chick embryo cell culture (PCEC) vaccine administered IM in the deltoid area [●] on days 0, 3, 7, 14, and 28.
Previously vaccinated [◆]	RIG	RIG should not be administered.
	Vaccine	1.0 mL of HDCV, RVA, or PCEC administered IM in the deltoid area [●] on days 0 and 3.

■ All hospitals should stock an adequate supply of rabies vaccine and RIG. HDCV (Imovax®) can be obtained from Pasteur-Merieux Connaught (800) VACCINE (822-2463); RVA from BioPort Corporation (517) 327-1500, and PCEC (RabAvert™) (newly-licensed in 1997) from Chiron Corporation (800) CHIRON8 (244-7668). RIG can be obtained from Pasteur-Merieux Connaught (Imogam® Rabies-HT) (800) VACCINE (822-2463), and from Bayer Corporation Pharmaceutical Division (BayRab™) (800) 288-8370.

▲ For additional clinical information, see References 1 and 3. These regimens are applicable for all age groups, including children. **Pregnancy is not a contraindication for PEP.** When PEP is administered to persons who are immunosuppressed by disease or medications, a serum sample should be tested 2 to 4 weeks after completion of treatment to ensure an adequate antibody response (≥ 0.5 IU on a neutralization test for rabies antibody). (For information on serologic testing, call the New York State Department of Health Wadsworth Center Rabies Laboratory—see Table 4.) Once initiated, PEP should not be interrupted or discontinued because of mild adverse reactions. Serious systemic reactions are rare; even if one occurs, advice and assistance in management should be sought before discontinuing vaccination—see Table 4.

● The deltoid area is the only acceptable site of vaccination for adults and older children. For younger children, the outer aspect of the thigh may be used. **Vaccine should never be administered in the gluteal area.**

◆ Defined as a person with a history of complete and on-schedule preexposure or postexposure vaccination with HDCV, RVA, or PCEC. Persons who have received any other type of rabies vaccine, or whose prior postexposure treatments were either discontinued or completed according to an altered schedule should be treated as not previously vaccinated unless there is a documented history of antibody response to the prior vaccination.

Table 4.–Information and Consultation

- New York City Department of Health**
Bureau of Communicable Disease(212) 788-9830
On human rabies prophylaxis. Business hours.
- Veterinary Public Health Services**(212) 676-2483
On animals, including confinement and observation and laboratory testing for rabies. Business hours.
- New York City Poison Control Center** ..(212) POISONS
 (212) 764-7667
During non-business hours (nights, weekends, holidays).
- New York State Department of Health**
Wadsworth Center Rabies Laboratory..(518) 869-4527
 www.wadsworth.org/rabies/
On serologic testing.

Table 5.–References

1. Centers for Disease Control and Prevention. Human rabies prevention—United States, 1999: recommendations of the advisory committee on immunization practices (ACIP). *MMWR*. 1999;48(No. RR-1):1-21.
2. National Association of State Public Health Veterinarians, Inc. Compendium of animal rabies control, 1998. *J Am Vet Med Assoc*. 1998;212:213-217.
3. New York State Department of Health. Rabies policies and procedures: guidelines regarding human rabies exposure and treatment decisions. February 1999.
4. New York State Department of Health. Rabies policies and procedures: guidelines for managing bats and risk of rabies transmission. February 1999.
5. New York State Department of Health. Rabies policies and procedures: model state program for management of livestock in rabies enzootic areas. September 1998.
6. Krebs JW, Smith JS, Rupprecht CE, Childs JE. Rabies surveillance in the United States during 1997. *J Am Vet Med Assoc*. 1998;213:1713-1728.
7. Centers for Disease Control and Prevention. Human rabies—Virginia, 1998. *MMWR*. 1999;48:95-97.
8. Centers for Disease Control and Prevention. Human rabies—Montana and Washington, 1997. *MMWR*. 1997;46:770-774.
9. Centers for Disease Control and Prevention. Human rabies—Texas and New Jersey, 1997. *MMWR*. 1998;47:1-5.
10. Niezgodza M, Briggs DJ, Shaddock J, Dreesen DW, Rupprecht CE. Pathogenesis of experimentally induced rabies in domestic ferrets. *Am J Vet Res*. 1997;58:1327-1331.
11. New York State Department of Health. 1998 Rabies Annual Summary, Wadsworth Center Rabies Laboratory.
12. Wilde H, Sirikawin S, Sabcharoen A, et al. Failure of postexposure treatment of rabies in children. *Clin Infect Dis*. 1996;22:228-232.
13. New York City Department of Health. Rabies alert: New York City is now endemic for the disease. CITY HEALTH INFORMATION. 1992;11,2:1-4.
14. New York City Department of Health. Rabies update. CITY HEALTH INFORMATION. 1992;11,4:1-2.
15. Beran GW. Rabies and infections by rabies-related viruses. In: Beran GW, Steele JF, eds. *Handbook of Zoonoses: Section B: Viral*. 2nd Edition. Boca Raton, FL: CRC Press, Inc;1994:307-357.

* These guidelines update previous recommendations by the New York City Department of Health.^{13,14} Based on recommendations by the Advisory Committee on Immunization Practices (ACIP),¹ the National Association of State Public Health Veterinarians,² and the New York State Department of Health,^{3,4,5} this information is offered to help physicians rapidly evaluate potential rabies exposures in New York City, an enzootic area for rabies since March of 1992. These recommendations are not meant to substitute for consultation with the New York City Department of Health or the best judgment of individual physicians. The use of trade names and commercial sources is for identification only and does not imply endorsement. Always consult manufacturers' product information whenever rabies biologics are used. For information about exposures outside New York City or outside the United States, call the New York City Department of Health—see Table 4.

Q: *My patient just told me he was bitten by a raccoon more than 6 months ago. Is it too late to begin postexposure prophylaxis?*

No. Begin PEP immediately.

Although the rabies incubation period in humans averages 2 to 3 months, it has been known to vary from 10 days to 6 years. When a likely exposure has occurred, PEP is indicated regardless of the length of the delay—even years later—provided that clinical signs of rabies are not present. (Once a person develops symptoms, treatment will not be effective.) Remember that rabies immune globulin should always be given to previously unvaccinated persons with the first dose of vaccine, no matter how much time has passed between exposure and initiation of treatment.

Q: *I forgot to give human rabies immune globulin (RIG) with the first dose of vaccine. What do I do now?*

If RIG was not administered when postexposure prophylaxis was begun, it can be given through the seventh day after the first dose of vaccine.

Rabies immune globulin should be administered only once, at the beginning of prophylaxis, to previously unvaccinated persons to provide immediate antibodies until the patient responds to vaccine. Beyond the seventh day, RIG is not indicated since an antibody response to cell culture vaccine is presumed to have occurred. **Based on reports of rare treatment failures when smaller amounts than the recommended dose were infiltrated at the exposure site,¹² it is now recommended that, if anatomically feasible, the full dose of RIG be thoroughly infiltrated into and around the wounds. Any remaining volume should be administered intramuscularly at a site distant from the vaccine inoculation.¹**

Q: *I have an HIV-infected patient who needs rabies prophylaxis. Any special instructions?*

To ensure an adequate antibody response in persons who are immunosuppressed by disease or medications, a serum sample should be tested 2 to 4 weeks after completion of treatment.

The titer should be ≥ 0.5 IU on a neutralization test for rabies antibody. For information on serologic testing, call the New York State Department of Health Wadsworth Center Rabies Laboratory (see Table 4). If an adequate antibody response is not achieved, call the New York City Department of Health for consultation.

Q: *What do I do about a patient who showed up 2 days late for her second dose of vaccine?*

Resume treatment. While there is little information on the efficacy of altered prophylaxis schedules, and they should be adhered to as closely as possible, a 2-day variation is not likely to be clinically significant.

If a patient is off-schedule, and the deviation is minor—2 or 3 days off within the first 14 days—maintain the dates as per the original schedule, if possible, but under no circumstances give vaccine doses any closer than 3 days apart and always maintain the 14-day interval between doses 4 and 5. If the deviation is greater than 2 or 3 days or not within the first 14 days, resume the series, maintaining the recommended spacing between doses (e.g., 2 weeks between doses 4 and 5). If there is significant deviation from the schedule, antibody titers should be verified on a serum sample collected 2 to 4 weeks after the last vaccination.³

Acknowledgment.—Manuel C. Vargas, D.V.M., M.P.H., Research Scientist, and Marcelle Layton, M.D., Assistant Commissioner, Bureau of Communicable Disease, New York City Department of Health.