



# THE EPIDEMIOLOGY OF RABIES IN RHODE ISLAND 2005

March 2007

RI Department of Health

Center for Epidemiology

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## Objectives of this Report

1. Describe the extent of animal rabies in Rhode Island for 2005.
2. Describe the animal rabies distribution in RI for 2005
3. Describe the RI population that received Post-Exposure Prophylaxis (PEP) from Jan 1, 2005 to Dec 31, 2005.

Information for animal rabies comes from the RI Department of Health Laboratories, the agency responsible for the testing of rabies in animals.

Information on human exposures was garnered retrospectively from case reports of individuals who reported an exposure to an animal by contact or proximity, from January 1, 2005 to December 31, 2005. Not all data were available for every case.

## Animal Rabies Distribution RI 2005

Rabies is endemic in certain Rhode Island wildlife. The raccoon adapted strain of the rabies virus is enzootic (endemic) among terrestrial wild animal populations throughout the state. Animals with the greatest susceptibility to this strain are raccoons, with spillover to the skunk, fox and woodchuck populations. Non-immunized pets such as cats, dogs and ferrets and strays can acquire rabies through exposure to wildlife. Cattle, sheep, pigs, horses and other mammals can also develop rabies. Animals such as rodents, rabbits, squirrels and opossums rarely acquire rabies and are considered low-risk species. Bats in RI are also endemic for the bat strain of rabies virus. Animals are tested only if they have exposed a human or a pet so that appropriate public health management responses can be informed by results. These results therefore, do not represent a systematic sample surveillance.

A total of 373 specimens were tested for rabies in 2005. There were 29 rabid animals identified at the Rhode Island Health Laboratory, constituting 7.8% of all animals examined for rabies. Wild animals made up the majority of the total tested, 255 animals or 68% of the total. Domestic animals made up the remainder or 118 (32%) animals. The number of wild animals that tested positive for rabies accounted for 93.1% of the total while only 6.9% of domestic animals (2 cats) tested positive for rabies (Table 1).

**Figures**

1. Animal Reservoirs of Rabies across the US
2. Animals Testing Positive for Rabies 2005
3. Distribution of Rabies compared with RI population by age group
4. PEP by month of exposure
5. Animals Causing Exposures Resulting in PEP
6. Type of Exposure Resulting in PEP
7. PEP Treatment Centers

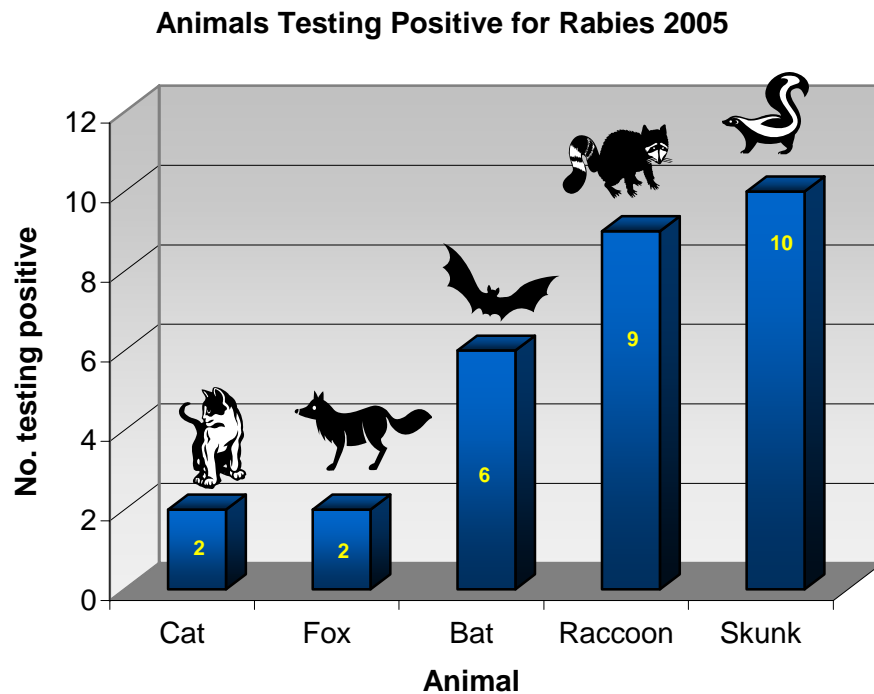
**Contact Us**  
**(401) 222-2577**

Bats, Raccoons, Skunks, Foxes, Woodchucks and Coyotes are **HIGH RISK** animals for carrying Rabies Infection

<b>Table 1. Animals that tested positive for Rabies 2005.</b>				
<b>Animal</b>	<b>Number Tested</b>	<b>% Total Animals Tested</b>	<b>Number Positive</b>	<b>% Positive</b>
Cat	94	25.2	2	0.54
Dog	20	5.4	0	0
Bat	170	45.6	6	1.6
Fox	12	3.2	2	0.5
Woodchuck	1	0.3	0	0
Raccoon	20	5.4	9	2.4
Skunk	46	12.3	10	2.7
Other	10	2.6	0	0
<b>Total</b>	<b>373</b>	<b>100</b>	<b>29</b>	<b>7.8</b>

Skunks, raccoons and bats accounted for 25 of the 29 animals testing positive for rabies (Figure 2).

Figure 2.



**Rabies is transmitted only when the virus is introduced into bite wounds, open cuts in skin, or onto mucous membranes from saliva or other potentially infectious material such as neural tissue.**

**LOWEST RISK**

**Animals for Carrying Rabies**

**Rodents (Mice, Rats)  
Rabbits  
Opossums  
Squirrel  
Chipmunk**

## Human Exposures

During 1980--2004, a total of 56 cases of human rabies were reported in the United States. Among the 55 cases for which rabies-virus variants were obtained, 35 (64%) were associated with insectivorous bats, most commonly the silver-haired and eastern pipistrelle bats. More than half (57%) of these human cases occurred during August--November, coincident with a seasonal increase in prevalence of rabid bats detected in the United States.<sup>1</sup>

Rabies-related human deaths in the U.S. are now mostly among persons who had no definitive history of an animal bite; almost all the recent human cases occurred after an animal exposure that was unrecognized by the patient as carrying a risk for rabies infection.

In Rhode Island, animal bites are required to be reported to the Rhode Island Department of Health immediately upon being brought to the attention of a physician or health care facility. (*Rules and Regulations Pertaining to the Reporting of Communicable, Environmental and Occupational Diseases, 2006*<sup>2</sup>).

Once an animal bite or suspect exposure is reported, Office of Communicable Disease staff provide case-management services including exposure evaluation, confirmation of animal capture and quarantine or confirmation of animal capture and euthanasia, coordination with the laboratory for follow up on animal testing results, notification to the patient of the status of the investigation, rabies risk assessment and risk counseling communication to the patient and release/referral for post exposure prophylaxis (PEP).

Post-exposure prophylaxis (PEP) is recommended to an animal bite victim following a stepwise evaluation that is based on the [RI Department of Health's Management of Human Exposure to a Suspected Rabid Animal](#)<sup>3</sup>. Initially there is an assessment of whether a significant bite or non-bite exposure has occurred, and then there is an assessment of the likelihood that the animal involved was rabid ([Appendix 1](#)). In addition, the 1999 Advisory Committee on Immunization Practices (ACIP) see <http://www.cdc.gov/mmwr/preview/mmwrhtml/00056176.htm><sup>4</sup>, details concerns regarding bat exposures by proximity. On the basis of the available but sometimes conflicting information from the 21 bat-associated cases of human rabies reported since 1980, in 1-2 cases, a bite was reported; in 10-12 cases, apparent contact occurred but no bite was detected; and in 7-10 cases, no exposure to bats was reported, but an undetected or unreported bat bite remains the most plausible hypothesis. Clustering of bat-associated human cases within the same household has never been reported.

Consequently, post exposure prophylaxis should be considered when direct contact between a human and a bat has occurred, unless the exposed person can be certain a bite, scratch, or mucous membrane exposure did not occur. In instances in which a bat is found indoors and there is no history of bat-human contact, the likely effectiveness of post exposure prophylaxis must be balanced against the low risk such exposures appear to present. In this setting, post exposure prophylaxis can be considered for persons who were in the same room as the bat and who might be unaware that a bite or direct contact had occurred (e.g., a sleeping person awakens to find a bat in the room or an adult witnesses a bat in the room with a previously unattended child, mentally disabled person, or intoxicated person) and rabies cannot be ruled out by testing the bat. Post exposure prophylaxis would not be warranted for other household members”.

## PEP Characteristics, RI 2005

**Data suggest that insignificant contact with bats may result in viral transmission.**

**Post exposure prophylaxis for bats is recommended, even in the absence of a bite or scratch. Any suspicion of bat contact, such as finding a bat in a room where someone has been sleeping or any contact with an unattended child, intoxicated person, or mentally disabled person, requires post exposure prophylaxis.**

### Number of Persons Receiving PEP 2005

During 2005 there were 1687 reported cases of animal bites. After assessing for risk according to the RI algorithm (Appendix 1), PEP was recommended for 395 individuals (23%). Forty-seven (47) of the 395 people who were recommended to receive PEP refused treatment. Thirty eight Percent (38%) of those who refused treatment were male and 62% were female.

### PEP by Gender

Females accounted for 54% and males 46% of the 348 people who received PEP (Table 2).

<b>Table 2. Cases of Reported Animal Bites Receiving PEP by Gender, Rhode Island 2005</b>			
<b>Gender</b>	<b>Number of reported cases</b>	<b>Percent</b>	<b>Rate<sup>1</sup> of disease risk per 10,000</b>
<b>Males</b>	158	46	3.1
<b>Females</b>	190	54	3.5
<b>TOTAL</b>	<b>348</b>	<b>100</b>	<b>3.3</b>
<small><sup>1</sup>Denominators for computing rates for RI were based on 2000 Census counts obtained from the U.S. Census Bureau.</small>			

### Rates

The estimated rate of use of PEP in 2005 was 3.3 PEP/10,000 population. Figure 3 shows the relative age distribution of persons receiving PEP compared to the age distribution of Rhode Island's population. The highest rate (4.8 PEP/10,000 population/year) of use was noted in the 55-59 age group, and the lowest rate of use occurred in the 75 and older age groups (1.9 PEP/10,000 population/year).

Figure 3.

Distribution of Rabies PEP Compared with the Incidence Rate per 10,000 RI Population by Age Group



Despite the current prominence of raccoons as the largest wildlife reservoir in the United States, only one documented human rabies case has been associated with this ubiquitous carnivore.

**PEP Distribution by County**

Providence and Washington counties had the highest incidence rate for individuals receiving PEP (Table 3).

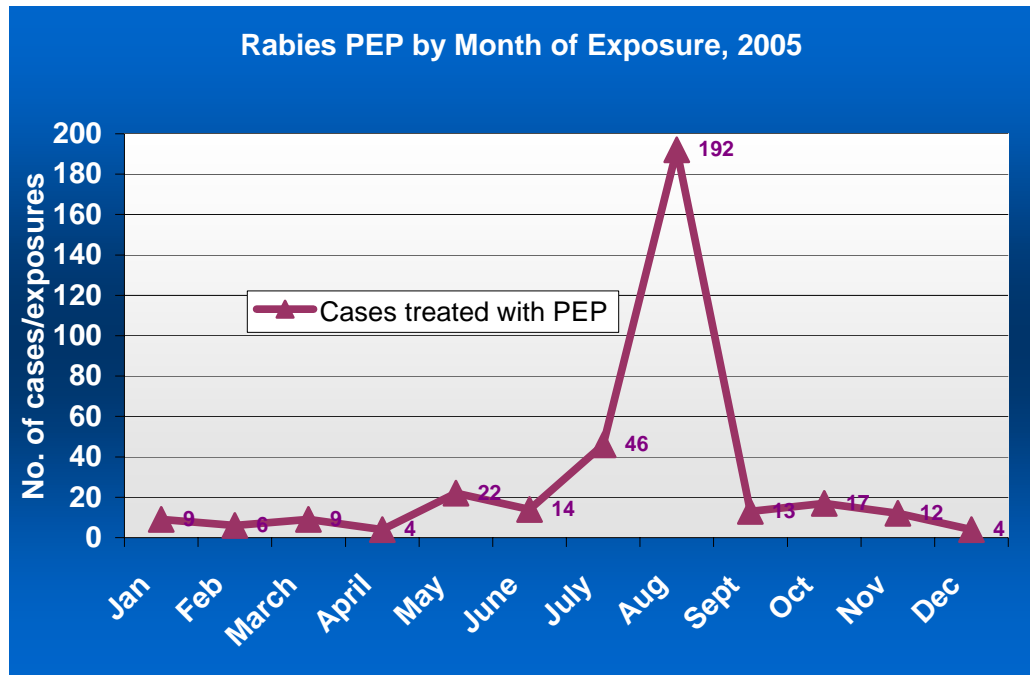
County	No. of reported cases requiring PEP	Percent	Rate <sup>1</sup> of disease per 10,000
Bristol	11	3.2	2.2
Kent	30	8.6	1.8
Newport	18	5.2	2.1
Providence	221	63.5	3.6
Washington	44	12.6	3.6
Other	24	6.9	
<b>TOTAL</b>	<b>348</b>	<b>100</b>	<b>3.1</b>

<sup>1</sup> Denominators for computing rates for RI were based on 2000 population counts obtained from the U.S. Census Bureau.

**Seasonal Distribution**

Rabies PEP shows a seasonal distribution increasing throughout the summer months. Following articles published in the Providence Journal on August 18 and 19, 2005, the number of persons treated for possible rabies exposure increased significantly from 46 in July to 192 in August (Figure 4).

Figure 4.

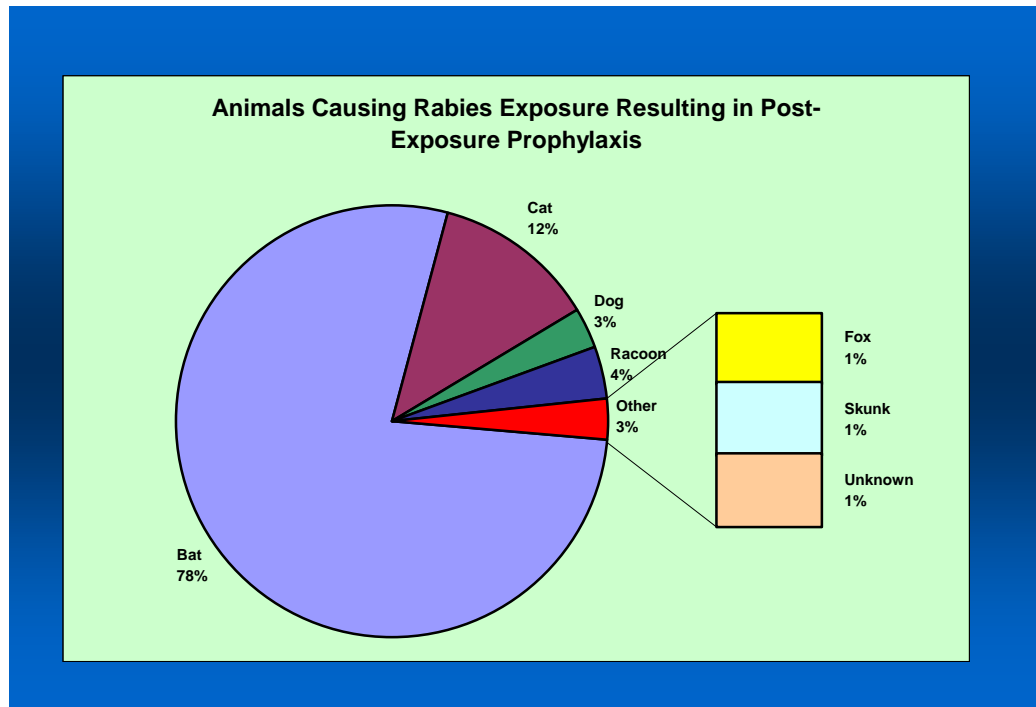


**Animal Exposures Resulting in PEP**

Among the animals causing exposures that resulted in PEP, the majority (78%) were bats.

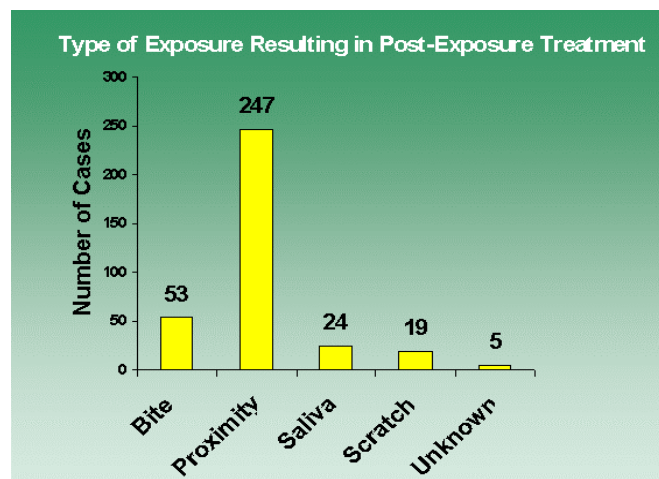
During 2005, the RI Department of Health received 1687 reports of possible rabies exposure. 348 people received treatment.

Figure 5.



The most common types of exposures that put people at risk for rabies transmission are bite wounds, scratches, bat exposures by proximity, and saliva on a mucous membrane or an open wound. Exposure by proximity to a bat (71%) caused the majority of PEP cases. Bites accounted for 16% of the PEP cases and exposures by scratches (5%) and saliva (7%) accounted for the remainder (Figure 6).

Figure 6



## Discussion & Recommendations

Rabies post-exposure prophylaxis includes wound treatment and rabies vaccination as part of either a five dose regimen for rabies vaccine plus RIG for those not previously vaccinated, or the two-injection regimen for previously vaccinated persons. This approach has proven 100% successful in preventing rabies following exposures (CDC MMWR 1999 48 (RR-1): 1-21<sup>4</sup>). However, PEP is time-consuming, carries a risk of adverse reactions and is costly. Decisions to administer PEP must be based on careful clinical assessment of exposure. Therefore it is imperative to gather accurate and complete case report information to properly ascertain the degree of exposure. Appropriate PEP treatment decisions rely on correctly assessing an exposure to a rabid or potentially rabid animal, and on weighing the benefits and costs of treatment if the patient was not truly exposed.

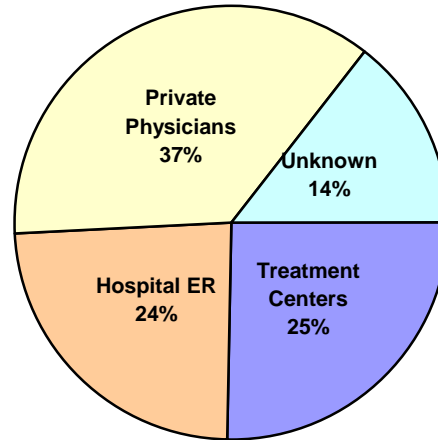
In RI, the average cost for PEP is \$1100.00. Not all cases in 2005 received the full series and cost varies depending on treatment. Given these variations, the estimated cost of PEP for 2005 was \$382,800 for the 348 individuals who received treatment.

The availability of the suspect animal for testing is also important. During 2005, 377 animals were tested at the state laboratory for rabies infection while there were 1687 reports of animal exposures and 348 people treated with vaccine. Of the 348 persons treated with PEP, only 32 were treated as the direct result of an exposure to an animal that tested positive for rabies. Rabies infection in animals can only be diagnosed by laboratory testing. The number of people who need to receive PEP can be decreased if the suspect animal is captured and sent to the state lab. Instructions for capturing bats (bats were the cause for most PEP administered in RI in 2005 (78%)) can be found at the [RI Department of Health's website](#) and Appendix 2 of this document.

The cost to test an animal for rabies is \$125/test. The laboratory tested 373 animals for a total cost of \$46,625 during 2005. Twenty-nine (29) animals tested positive resulting in 32 people being treated at an estimated cost of \$35,200. The 344 animals that tested negative incurred the cost of the test only. Therefore, there is a significant cost savings by having a robust testing system available for rabies.

The price of treatment received at local hospital emergency rooms is higher than if the treatment is received at walk-in facilities or at offices of private physicians. Figure 7 shows the locations where people received PEP during 2005. Hospital emergency rooms accounted for 24% of all PEP administrations. While people in RI must pick up their own rabies vaccine from designated hospitals, they can be advised to use their own physician or health care center for the administration of the vaccine.

Figure 7

**PEP Treatment Locations**

Continual public rabies prevention education is especially relevant to bats. Despite an increased investment in public education and outreach with an emphasis on bats and rabies risk, public knowledge about the risk of rabies exposure from bats is lacking<sup>5</sup>. A New York study documented that only 17%–26% of respondents knew that bats found in homes should not be immediately released (before considering the need to test the bat)<sup>6</sup>. Additionally, a Colorado study found that at least a third of human encounters with bats that result in a possible exposure could have been prevented by adopting a "do not touch" approach to wildlife<sup>7</sup>.

Although educating the public about bats and rabies may ultimately increase the number of persons who seek PEP, a balanced approach is necessary to curtail inappropriate PEP and avoid unnecessary human deaths, such as the recent [Mississippi](#)<sup>8</sup> case in which a patient did not seek PEP after being exposed to bats.

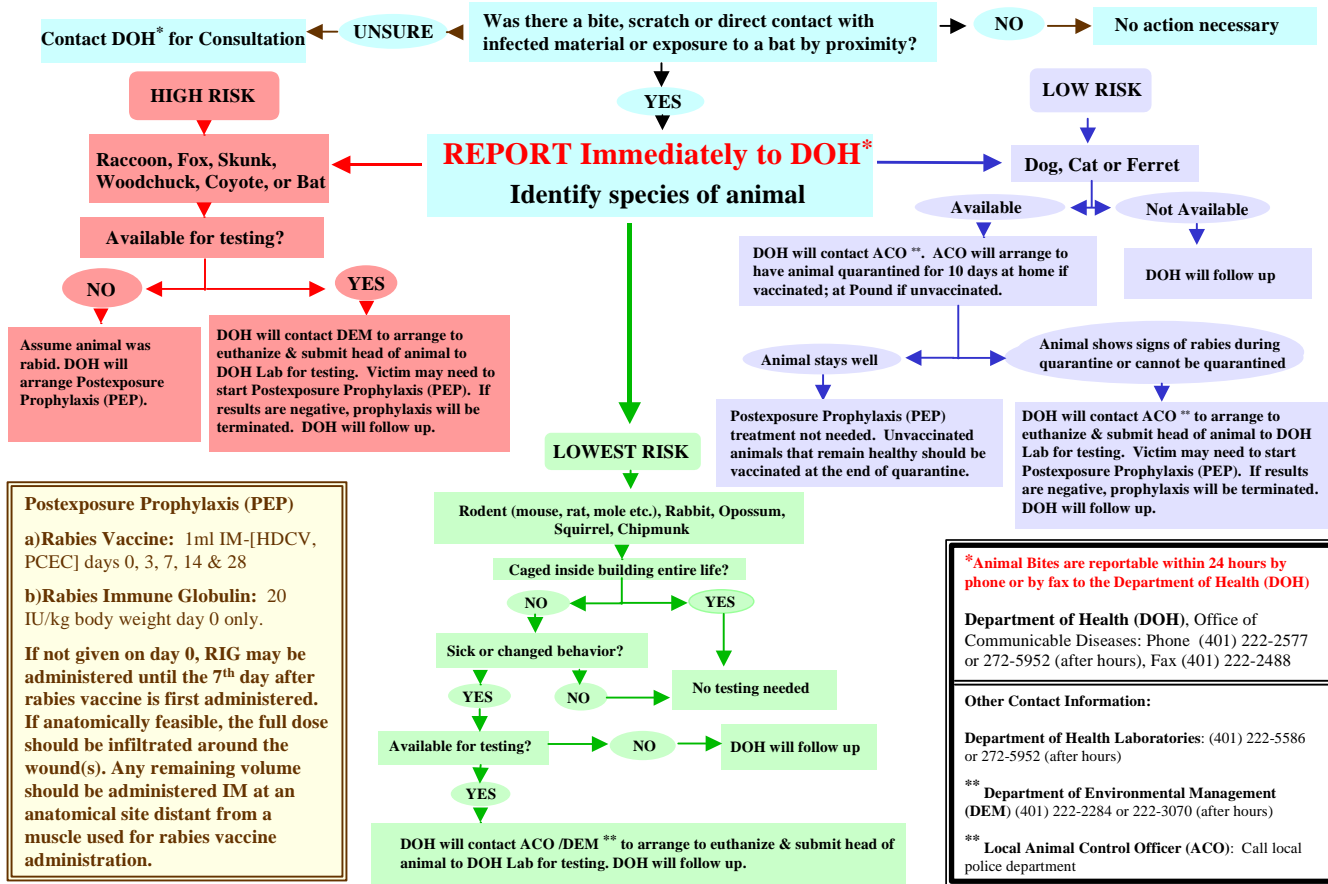
## References

1. John W. Krebs, et al., [Rabies surveillance in the United States during 2004](#), Public Veterinary Medicine: Public Health JAVMA, Vol 227, No. 12, December 15, 2005.
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3. Rhode Island Department of Health, [Management of Human Exposures to Suspect Rabid Animals, A Guide for Physicians and Other Health Care Providers, June 2005](#).
4. US Department of Health and Human Services, CDC. [Human Rabies Prevention – United States, 1999. Recommendations of the Advisory Committee on Immunization Practices \(ACIP\)](#). MMWR January 8, 1999, Vol 48, No. RR-1.
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7. Pape WJ, Fitzsimmons TD, Hoffman RE. [Risk for rabies transmission from encounters with bats, Colorado, 1977–1996](#). Emerg Infect Dis. 1999;5:433–7.
8. CDC, [Human Rabies---Mississippi, 2005](#). March 3, 2006/55(08);207-208.

# Appendices

## Appendix 1

### Rhode Island Department of Health Management of Human Exposure to a Suspected Rabid Animal



**Postexposure Prophylaxis (PEP)**  
 a) Rabies Vaccine: 1ml IM-[HDCV, PCEC] days 0, 3, 7, 14 & 28  
 b) Rabies Immune Globulin: 20 IU/kg body weight day 0 only.  
 If not given on day 0, RIG may be administered until the 7<sup>th</sup> day after rabies vaccine is first administered. If anatomically feasible, the full dose should be infiltrated around the wound(s). Any remaining volume should be administered IM at an anatomical site distant from a muscle used for rabies vaccine administration.

**\*Animal Bites are reportable within 24 hours by phone or by fax to the Department of Health (DOH)**  
 Department of Health (DOH), Office of Communicable Diseases: Phone (401) 222-2577 or 272-5952 (after hours), Fax (401) 222-2488  
 Other Contact Information:  
 Department of Health Laboratories: (401) 222-5586 or 272-5952 (after hours)  
 \*\* Department of Environmental Management (DEM) (401) 222-2284 or 222-3070 (after hours)  
 \*\* Local Animal Control Officer (ACO): Call local police department

Revised 2005: Office of Communicable Diseases

## Appendix 2.

**How to Safely Capture a Bat in your Home**

If a bat is present in your home and you cannot rule out the possibility of exposure, leave the bat alone and contact an animal-control or public health agency for assistance. If professional help is unavailable, use precautions to capture the bat safely, as described below.

What you will need:

- Leather work gloves
- Small clear or transparent container with a cover or lid
- Tape

When the bat lands, approach it slowly, while wearing the gloves, and place the small container over it. Slide the lid under the container to trap the bat inside. Tape the container securely with the lid, and punch small holes in the cardboard, allowing the bat to breathe. Contact your health department or animal-control authority to make arrangements for rabies testing.

If you see a bat in your home and you are sure no human or pet exposure has occurred, confine the bat to a room by closing all doors and windows leading out of the room except those to the outside.

For questions on:

Capturing bats - call the State Rabies Laboratory at (401) 222-6041

How to have a bat analyzed for rabies - call (401) 222-2577

Suspected animal(s) having rabies - call the State Vet (DEM) at (401) 222-2781 ext 4503

## Contacts

Name	Function	Agency	Telephone No
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Chris Hannafin,DMV	State Veterinarian	Dept of Environmental Management (DEM)	222-2781 ext 4503

For other contacts: [Who to call when a potential rabies exposure occurs.](#)

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