



# Rabies 2007: Surveillance and Animal Bite Management

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## Newsletter Insert Quick Reference Guides:

*Which Animal Bites Require Post-Exposure Prophylaxis?*

*Recommended Post-exposure Prophylaxis for Bites from Potentially Rabid Animals*

Wild animals in the Philadelphia area that can carry rabies and transmit it to humans:

- Bats
- Raccoons
- Skunks
- Coyotes
- Foxes
- Groundhogs/Woodchucks

Wild animals that are NOT natural reservoirs for rabies and have not been known to transmit rabies to humans:

- Rabbits and hares
- Opossums
- Most rodents (rats, mice, hamsters, gerbils, squirrels) Groundhogs are the exception and can carry rabies.

Birds, reptiles (lizards, turtles and snakes) and amphibians (frogs and salamanders) DO NOT carry rabies.

## Overview

This newsletter provides an update of the Philadelphia Department of Public Health's (PDPH) recommendations for management of animal bites within the city and reviews the epidemiology of rabies both locally and nationally.

Although the total number of human cases in the United States (U.S.) is small, rabies continues to pose a threat to public health because the infection is enzootic (endemic) in some

animal populations. Moreover, thousands of people in the U.S. each year seek medical care for animal bites and must be evaluated for the possibility of rabies exposure. For persons exposed to rabies virus, timely post-exposure prophylaxis remains the only reliable strategy to prevent the development of clinical disease. Once clinically evident rabies develops, the outcome is almost always fatal.

## Epidemiology and Pathophysiology of Human Rabies

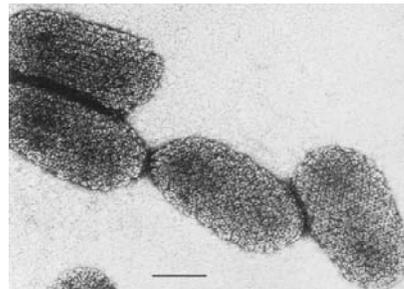
Worldwide, about 55,000 people die from rabies each year. Outside the U.S., most victims are children who were bitten by infected dogs. Rabies is found on all continents except Antarctica and Australia, but most human cases occur in Asia or Africa.

In the U.S., the CDC reported 51 cases of human rabies from 22 states and Puerto Rico between 1990 and 2006. Ten cases (20%) are thought to have acquired rabies outside the U.S. Nucleotide sequence analysis of virus recovered from all cases identified that 37 (73%) were rabies variants found in insectivorous bats, and 13 (25%) were variants associated with dogs and coyotes. The remaining case was infected with the raccoon rabies variant in 2003, the first time such an infection in humans has been documented.

Cases of human rabies in the U.S. often result from a lack of recognition of a rabies-risk exposure or from failure to administer prophylaxis when such contact has been identified. In particular, the relatively large number of cases associated with indigenous bat variants suggests that exposures to bats often are ignored or go entirely unnoticed. (See *Special notes on bat exposures*, page 3)

Rabies is caused by a rhabdovirus. Transmission usually occurs via animal bites and scratches through which infectious saliva is introduced. After inoculation, the rabies virus is sequestered at the site of the bite and is virtually undetectable. There is no viremia. The incubation period in humans is variable, usually several weeks to months, although it may be as brief as 10 days or as long as several years. During this time the infection can be abated by immunization (post-exposure prophylaxis) or host factors. Factors affecting

the incubation period include age, immune status, location and severity of the wound, and the amount of virus inoculated.



The end-stage neurologic syndrome of rabies may be

either furious or paralytic. The furious form is characterized by hyperactivity, hydrophobia, hallucinations, disorientation, and autonomic instability (hyperthermia, hypersalivation, etc.); the paralytic form by paresis with initially intact mentation that deteriorates gradually to disorientation and stupor. In most cases, coma and death occur within 7-10 days of symptom onset.

## Animal Exposures Requiring Post-Exposure Prophylaxis (PEP)

The term exposure is used to indicate any bite or other contact with an animal, animal tissue or animal saliva that should be evaluated for possible rabies exposure. To determine whether an animal exposure requires post-exposure prophylaxis (PEP), several factors must be considered including:

- the species of animal involved
- nature and extent of contact
- circumstances of the incident (provoked or unprovoked attack)
- availability of the animal for observation or laboratory examination

**For quick reference, please review the insert: *Which animal bites require post-exposure prophylaxis?***

Bite exposures occur whenever there is penetration of the skin by an animal's teeth; animal bites should always be evaluated to determine if PEP is needed. Non-bite exposures should also be evaluated when scratches, abrasions, open wounds or mucous membranes are contaminated with saliva, or other potentially infectious material (e.g. brain tissue). As long as the skin remains intact and mucous membranes are not contaminated with infectious material, PEP is not required. The risk of rabies after a bite by a rabid animal (5-80%) is approximately 50 times the risk after a scratch from a rabid animal (0.1-1%). Blood, urine and feces from a rabid animal are not considered infectious and therefore pose no risk for transmitting disease.

### Exposure to a dog, cat, or ferret

If the exposure has been to a dog, cat, or ferret that is still alive and available for observation, PEP need not be initiated immediately. Because the incubation period in humans is relatively long, and because asymptomatic rabid dogs, ferrets, and cats usually develop overt symptoms within 3 days of the time they excrete virus in their saliva, human immunization may be delayed for up to 10 days while the animal is quarantined or tested. After a 10-day observation period, if the animal has no signs of disease, then it is considered not rabid and no treatment of the victim is required.

When an owned dog bites or attacks a human or another animal, the Animal Management Unit of PDPH in collaboration with Philadelphia Animal Care and Control Unit (PACCA) will follow up to establish the rabies immunization status of

the biting dog and to assure its health after the 10-day quarantine period. Reporting the injury to the DDC (215-685-6748) will initiate follow-up.

Dogs, cats, or ferrets that are not available for observation or testing must be considered potentially rabid and the victim should receive appropriate PEP. If the exposure has been to a dog, cat, or ferret that has died or was euthanized AND the animal's brain has a negative examination for rabies, then PEP is not needed. Generally, PEP is not needed if the animal has a documented, currently valid rabies vaccination.



#### Vicious dog attacks

On occasion attacks by owned dogs can be especially vicious or injurious. The Commonwealth of Pennsylvania "Dog Law" (Act No. 1996-151)

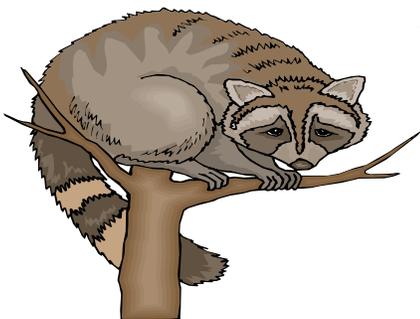
defines a *dangerous dog* as one that has inflicted severe injury on a human without provocation, or has attacked humans or animals repeatedly without provocation. The law further describes requirements for control of danger-

ous dogs, penalties for negligent conduct by owners, and circumstances that would permit confiscation of the dog. For information regarding the vicious dog behavior or negligence by the owner, please contact PACCA directly (267-385-3800). "Harboring a dangerous dog" is a criminal offense. In case of a dog attack contact the police at 911.

- To arrange for rabies fluorescent antibody testing of animals, or for medical consultation on the management of animal exposure incidents, contact Division of Disease Control (DDC) at 215-685-6748.
- For urgent after-hours consultations, call 215-686-1776 and ask for the Disease Control on-call staff.
- **Health care providers are required to report all animal bites to the DDC at 215-685-6748.**

## Exposure to a Wild Animal

Any wild animal that can carry rabies virus must be considered potentially rabid. In the Philadelphia area, the species that can carry and transmit rabies are bats, coyotes, foxes, groundhogs (woodchucks), raccoons, and skunks. Because incubation periods and times of virus secretion are unpredictable in these species, quarantine and observation is not reliable for determining whether these animals are rabid. If someone is bitten by a wild animal that can carry rabies, the victim should receive immediate PEP, unless results of post-mortem examination of the animal



brain for rabies will be available in a timely fashion (48 hours or less). PEP can be stopped if the animal is subsequently proven by laboratory testing not to be rabid.

### Special notes on bat exposures

Some bat exposures may require rabies PEP even in the absence of a recognized bite or scratch. Bats have small, sharp teeth that can produce an insignificant wound that may not be apparent to the victim or recognized by the health care provider. Individuals who wake up to find a bat in the room in which they were sleeping, or individuals who are in situations where they may have had a bat exposure and cannot report or recognize an exposure (for example, unattended children, mentally impaired individuals, intoxicated individuals) should be considered at risk. In these situations, the bat should be tested for rabies; PEP should be recommended if the bat is unavailable for testing.



## Providing Post-Exposure Prophylaxis (PEP)

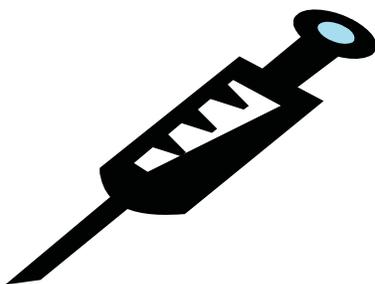
With appropriate and timely prophylaxis following a potential rabies exposure, central nervous system infection can be prevented. Post-exposure management includes three components:

- wound care
- passive immunization (immune globulin)
- active immunization (vaccine)

Several manufacturers supply rabies vaccine and immune globulin in the US. In all PEP regimens, except for persons previously immunized, both products should be used concurrently.

**For treatment and product details, please refer to the insert section: *Recommended Treatment for Bites from Potentially Rabid Animals.***

There have been no post-exposure vaccine failures in the U.S. since licensure of the rabies human diploid cell vaccine (1980). In reported failures of PEP outside the U.S., there were significant deviations from the recommended post-exposure treatment protocol or evidence of problems with vaccine manufacture or storage.



In 2004, a teenage girl in Wisconsin became the first known person to survive rabies infection after the onset of symptoms without either pre- or post-exposure prophylaxis. Since

then, other human cases treated with similar protocols have not recovered. PEP remains the most reliable approach for preventing clinical rabies. It is important that clinicians and the public do not view rabies as a curable disease based on this one case.

### Special Patient Populations

Pregnancy is not a contraindication to rabies PEP. When prophylaxis is administered to patients on immunosuppressive therapy, the immunosuppressive therapy should be stopped during rabies PEP. If interrupting immunosuppression is not possible, rabies antibodies should be measured 2 to 4 weeks after PEP.

### Adverse reactions to post-exposure prophylaxis

The most common reactions to rabies vaccine are local, including pain, swelling, erythema or pruritus at the injection site (30-74% of vaccine recipients). Systemic reactions are less frequent and include headache, dizziness, nausea and abdominal pain. Approximately 6% of patients receiving booster doses of rabies vaccine experience an immune complex-like reaction 2 to 21 days after the booster. This reaction, consisting of urticaria, angioedema, arthritis, arthralgia, nausea, vomiting and/or fever, is rare among patients receiving primary vaccination.

## Epidemiology of Animal Rabies in U.S. and Pennsylvania

In the U.S., rabies vaccination programs for domestic animals and control of stray animals have resulted in a dramatic decline of rabies within the domestic canine and feline populations in the past thirty years. More recently, oral rabies vaccination programs targeted at raccoons and other wildlife have shown great promise for reducing the spread of rabies. Despite these favorable trends, however, rabies remains enzootic in many types of wildlife.

Among carnivorous mammals, raccoons serve as the most common reservoir of rabies virus in the U.S., especially in the Southeast and Mid-Atlantic States. Skunks are a common reservoir in California and the central states. The most recent complete U.S. rabies surveillance data are from 2003, when 7,170 cases of rabies in animals were reported to CDC. The most commonly reported species were raccoons (36.7%), skunks (29.4%), bats (16.9%), and foxes (6.4%). Among U.S. states, Pennsylvania ranked fifth in the number of reported rabies cases in animals in 2003 (409). These 409 animals included 234 raccoons, 80 skunks, 43 cats, 35 bats, and 28 foxes.

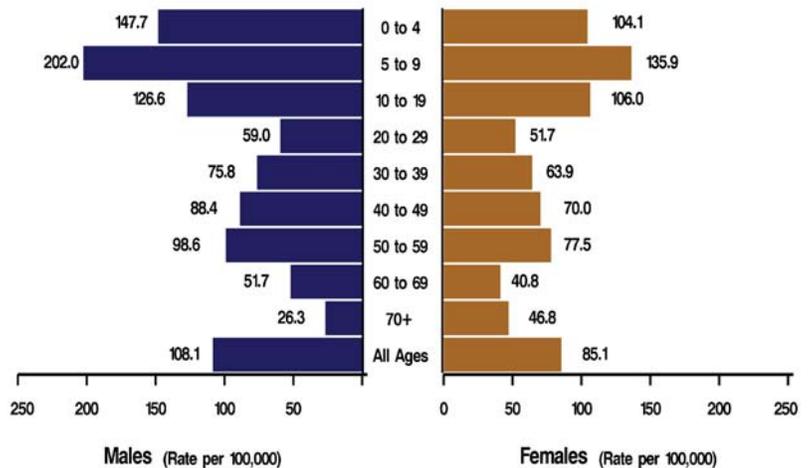
In 2006, the Philadelphia Public Health Laboratory tested 66 animals for rabies by direct fluorescent antibody staining of brain tissue. The animals tested included 37 cats, 14 dogs, 11 bats, 2 raccoons, a skunk, and a squirrel. Among all Philadelphia animals tested for rabies, 2 were positive: a bat and a skunk. Rabies post exposure prophylaxis was recommended for all potential contacts of these animals.

### Reported Animal Exposures in Philadelphia

In Philadelphia, animal bites are reportable to DDC. DDC maintains records of other reported animal expo-

sure, such as scratches or contact with bodily fluids, in which there was a risk of rabies exposure. In 2006, DDC received reports of 1,457 animal exposures. Reported exposure types included 1,412 bites (96.9%), 24 scratches (1.7%) and 21 other exposures (1.4%). The highest animal-exposure incidence is in 5-9 year old boys. (See figure)

Rates of Animal Exposures per 100,000 Population by Age and Gender: Philadelphia, 2006



Dogs and cats accounted for 74.3% and 21.8% of all reported exposures, respectively. The other species of animals with reported exposures included bats (19), rats (10), squirrel (7), mice (4), guinea pig (4), ferret (3), opossum (2), raccoons (2), fox (1), groundhog (1), rabbit (1), skunk (1), and hamsters (1). An owner of the animal involved was identified for 61.3% of incidents. In 236 bite incidents (16.2%), it is known that victims were bitten by a pet from their own household.

## Further Reading

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