

## Prevention of Human Rabies: Assessment of Rabies Exposures from Animal Contact and Guidance on Rabies Post-Exposure Prophylaxis

**These recommendations are intended to promote consistent guidance from public health authorities in Washington State.** They were developed by a working group consisting of local and state epidemiologists, health officers, veterinarians, and environmental health specialists within Washington State. They are based on ACIP guidelines<sup>1</sup>, animal testing data in Washington and the United States<sup>2-3</sup>, expert opinion, and other available literature<sup>4</sup>. The guidance will be reviewed as necessary based on the epidemiology of rabies as new information becomes available. The circumstances of each potential exposure should be considered on a case-by-case basis. The decision to give rabies post-exposure prophylaxis (PEP) is ultimately a decision between the patient and their healthcare provider.

### Timing of Rabies Post-Exposure Prophylaxis

Administration of rabies PEP following exposure to a rabid animal is considered a medical urgency, not an emergency. Local health jurisdictions should be available for consultation with healthcare providers and should facilitate testing the animal for rabies at the Washington State Public Health Laboratories if needed. It may be appropriate to initiate PEP prior to receiving test results depending on behavior and appearance of animal, severity and location of bite, whether the exposure was provoked, and the species of the animal. In general, PEP should be started immediately for a bite from any animal highly suspected to have rabies. Immediate PEP should also be considered for bites to the head and neck from a high risk animal or severe bites from a wild carnivore from a rabies endemic area. For dog, cat, and ferret exposures where the animal was in or imported from a country with endemic canine rabies, providers should consider starting PEP immediately given the elevated risk of the animal being rabid even if the animal is being observed. If PEP is started prior to the availability of animal testing results, PEP can be discontinued if the animal is later found to be negative. If PEP has not been started and test results indicate the animal was rabid, PEP should be started immediately. Since incubation periods of more than 1 year have been reported for human rabies cases, PEP should be administered regardless of the time interval since a documented or likely exposure to rabies occurred<sup>1</sup>.

### Wound Care

Prompt irrigation and cleansing of wounds is an important component of rabies prevention. Animal studies have shown that wound cleansing alone reduces the likelihood of rabies. Wound management should also include consideration of the need for tetanus immunization or booster.

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### References:

<sup>1</sup>CDC. Human Rabies Prevention—United States, 2008 Recommendations of the ACIP. MMWR 2008;57:1–28. Available at: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr57e507a1.htm>

<sup>2</sup>Blanton JD, Palmer D, Dyer J, Rupprecht CE. Rabies surveillance in the United States during 2010. JAVMA 2011;239:773-83. Available at: <http://avmajournals.avma.org/doi/pdf/10.2460/javma.239.6.773>

<sup>3</sup>Washington State Animals Tested for Rabies, 1988-2013. Available at: <http://www.doh.wa.gov/Portals/1/Documents/5100/rabiestested-past.pdf>

<sup>4</sup>CDC. Compendium of Animal Rabies Prevention and Control, 2011, NASPHV, Inc. MMWR 2011;60:1–17. Available at: <http://www.cdc.gov/mmwr/pdf/rr/rr6006.pdf>

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# Washington State Guidelines for Human Rabies Prevention

- **All suspected rabies exposures (to people) must be immediately reported** to the local health jurisdiction (LHJ) per WAC 246-101. This includes reporting of all persons to whom rabies post-exposure prophylaxis (PEP) is administered.
- **Consultations and animal testing** are available from the LHJ. Healthcare providers are encouraged to consult LHJs prior to initiating PEP.
- **Rabies exposures include** bites, scratches, and fresh wounds or mucous membranes contaminated with a mammal's saliva or neural tissue. Touching animal fur, blood, urine, or feces is not a rabies exposure. Non-mammals, e.g., birds and reptiles, do not get rabies. **Bat exposures**<sup>†</sup> deserve special consideration.

Risk	Animal type	Geographic location of exposure	Notify LHJ	Animal testing recommendation	PEP recommendation
HIGH	<b>Any rabid-acting* mammal</b>	Anywhere	Yes	Test if available.	<ul style="list-style-type: none"> <li>- If animal tests positive, OR if unable to test, OR a <u>bite</u> from any animal highly suspected to be rabid, give PEP immediately.</li> <li>- If bite to head/neck from any animal or severe bite from non-bat animal, consider giving PEP immediately.</li> <li>- If non-severe bite to other area (e.g., extremities) from any animal, PEP can be delayed 24-48 hours while animal is tested.</li> </ul>
	<b>Bat</b> <sup>†</sup>				
	<b>Wild carnivore</b> (e.g., raccoon, skunk, fox, coyote, wolf, or hybrid)	In area with endemic rabies in wild carnivores ( <u>not</u> WA)			
MEDIUM	<b>Dog, cat, or ferret</b> with normal appearance & behavior. (Does <u>not</u> apply to hybrids, e.g. wolf-dogs.)	In or imported in past 6 months from rabies endemic area including Asia, Africa, Middle East, South/Central America, or Mexico	Yes	<b>Confine and observe for 10 days.</b> <sup>§</sup> If signs of rabies* develop during observation, call LHJ for immediate testing ( <i>see rabid-acting* mammal above</i> ).	<ul style="list-style-type: none"> <li>- If tests positive or <u>if</u> unable to observe or test, give PEP.</li> <li>- If observing, consider starting PEP immediately given elevated risk; can discontinue if animal survives 10-day observation.</li> </ul>
MEDIUM-LOW	<b>Wild animal hybrids</b> (e.g., wolf-dogs)	In Washington	Yes	Generally test if available. <i>See special considerations for hybrids.</i>	<ul style="list-style-type: none"> <li>- If tests positive, give PEP.</li> <li>- <i>See special considerations for hybrids (wild carnivores section).</i></li> </ul>
	<b>Raccoons</b>	In Washington	Yes	Test if available.	<ul style="list-style-type: none"> <li>- If tests positive, give PEP.</li> <li>- If unable to test: if provoked<sup>a</sup> and normal appearing/behaving then PEP not routinely recommended; if unprovoked or behavior suspicious for rabies, recommend PEP.</li> </ul>
	<b>Other wild carnivores</b>	In Washington	Yes	Test if available.	<ul style="list-style-type: none"> <li>- If tests positive or if unable to test, give PEP</li> </ul>
LOW	<b>Dog, cat, or ferret</b> (D/C/F) with normal appearance & behavior. (Does <u>not</u> apply to hybrids, e.g., wolf-dogs.)	In the U.S. (or a country not known to be endemic for canine rabies)	No <sup>^</sup>	<ul style="list-style-type: none"> <li>• <b>Confine and observe for 10 days.</b><sup>§</sup> <ul style="list-style-type: none"> <li>○ If signs of rabies develop during observation, call LHJ for immediate testing (<i>see rabid-acting* mammal</i>).</li> </ul> </li> <li>• Animal euthanized due to chronic illness or injuries, or unwanted D/C/F:           <ul style="list-style-type: none"> <li>○ If feral/stray then test.</li> <li>○ If owned, test if unprovoked or D/C/F had known exposure to bat/rabid animal; otherwise victim can waive testing if provoked.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>- If observing, PEP not necessary if animal healthy for 10 days.</li> <li>- If tests positive, give PEP.</li> <li>- <b>If unable to observe or test</b> then consider exposure location:           <ul style="list-style-type: none"> <li>• <b>Outside WA State:</b> Consult LHJ; consider D/C/F vaccination status and contact with rabies reservoir species in that locale.</li> <li>• <b>In WA State:</b> If D/C/F had exposure to an untested bat or rabid animal in last 6 months give PEP. Otherwise:               <ul style="list-style-type: none"> <li>○ If provoked<sup>a</sup>, PEP <u>not</u> recommended.</li> <li>○ If <u>unprovoked cat exposure</u>, recommend PEP</li> <li>○ If <u>unprovoked dog/ferret exposure</u>, consult LHJ, generally recommend PEP.</li> </ul> </li> </ul> </li> </ul>
VERY LOW	<b>Rodent, lagomorph/ rabbit, or opossum</b>	Anywhere	No <sup>^</sup>	No need to test unless <i>rabid-acting*</i> . Consult with LHJ if thought to be rabid; livestock should be evaluated by a veterinarian.	PEP not recommended unless animal tests positive or unable to test a <i>rabid-acting*</i> animal; consult LHJ in such cases.
	<b>Livestock</b> (e.g., cattle, llama, horse, pig)				

NOTE: See definitions and explanations on next page.

# Washington State Guidelines for Human Rabies Prevention

\* **Rabid-acting:** Rabies virus causes an acute, rapidly progressive encephalitis. Observing unusual behavior or unhealthy appearance is a proxy to identify potentially rabid animals. Behavior changes and neurologic signs exhibited are variable based on species and stage of disease progression. In terrestrial mammals, suggestive signs include being unusually withdrawn, stuporous or agitated; acting inappropriately aggressive or attempting to bite; approaching people (wild animals only); attacking inanimate objects; making abnormal vocalizations; stumbling or appearing weak; displaying muscle tremors, seizures, or difficulty swallowing; appearing afraid of water; salivating profusely (foaming at the mouth); and staring blankly or appearing to be blind. Livestock may also display head-pressing, circling, depression, drooping head or ears, or constant bellowing, or may isolate themselves from herd mates.

<sup>†</sup> **Bats:** May assume exposure when a bat is found in a room with a person who cannot say that exposure did not occur (e.g., unattended infant or child, intoxicated adult, sleeping person). Bat bites may not leave visible marks. See detailed bat exposure assessment document for additional information on exposure assessments related to bats.

<sup>§</sup> **Observations:** Local county policy may differ as to whether dog/cat/ferret (D/C/F) observation should be done in home or with animal control. If D/C/F becomes ill or dies during observation, a veterinarian should be consulted to evaluate for rabies and the LHJ should be notified immediately.

<sup>^</sup> **Notifying LHJ:** In general, low risk bites/exposures from dogs, cats, and ferrets in Washington and rodents, rabbits, opossum, and livestock are not reportable to the LHJ. However if PEP is given or animal shows signs of rabies, then exposure must be reported to the LHJ.

<sup>α</sup> **Provoked exposures:** May include invasion of an animal's territory (potentially even running by a dog), assisting an injured animal, startling or trying to capture an animal, coming between an animal and its young, taking food away from an animal, acting aggressively toward an animal, breaking up a fight between animals, or trying to touch, pet, or feed an unfamiliar animal. Provocation must be considered from the animal's perspective. An exposure is considered "unprovoked" if these behaviors are absent; for example, an animal suddenly appears or charges and bites a person who was not in any way interacting with the animal or its young.

## Legal reporting requirements in Washington State regulation (WAC 246-101-101 and -301)

- All healthcare providers, healthcare facilities, and veterinarians are required to *immediately* notify the local health jurisdiction (LHJ) regarding suspected rabies exposures, including: (1) "Animal bites (when human exposure to rabies is suspected)," and (2) "Rabies, suspected human exposure (suspected human rabies exposure due to a bite from or other exposure to an animal that is suspected to be rabid)"
- The algorithm is intended to be a guide in determining whether an exposure to rabies should be suspected and whether reporting to the LHJ is necessary.

## Washington State rabies facts

- Bats are currently the only known reservoir for rabies in Washington State.
  - Rabies is not known to be endemic in raccoons, skunks, foxes, or other wild carnivores in this state; however surveillance for rabies in wild carnivores is minimal in Washington.
  - Rarely, other animals are bitten by bats and may become rabid in Washington State; examples since 1988 include horse, llama, and cat.
  - Historical animal testing for rabies in Washington State: <http://www.doh.wa.gov/YouandYourFamily/IllnessandDisease/Rabies/RabiesActivity.aspx>.
- Animals incubating or infected with rabies could be accidentally imported into Washington State.
  - Risk differs elsewhere in the world (e.g., raccoon rabies in the east coast, skunk rabies in central states, dog rabies in Asia and Africa, etc.).

## Criteria for assessing risk of rabies exposure

- Consider the following: **(1)** animal type and health/behavior (see *rabid-acting\**); **(2)** geographic location of exposure; **(3)** animal vaccination status; **(4)** circumstances of exposure (provoked<sup>α</sup> vs. unprovoked); **(5)** likelihood the animal could have been exposed to another rabid animal (outdoor vs. indoor animal; travel/import history of animal; feral/stray vs. pet).
- If you are unsure, consultations are available from your LHJ. If unable to reach LHJ, call DOH Communicable Disease Epidemiology (see below).

## Wound care

- Wound cleansing is important in rabies prevention. In animal studies, thorough wound cleansing alone has been shown to reduce the likelihood of rabies.

## References and additional resources

- WASHINGTON STATE:
  - Local health jurisdiction contact information: <http://www.doh.wa.gov/AboutUs/PublicHealthSystem/LocalHealthJurisdictions.aspx> (24/7 on-call service)
  - Washington State Department of Health (only contact if unable to reach LHJ):
    - **Humans potentially exposed:** Office of Communicable Disease Epidemiology, 877-539-4344 or 206-418-5500 (24/7 on-call service)
    - **Animals potentially exposed:** Environmental Health Zoonotic Disease Program, 360-236-3385 (M-F, 8 am – 4 pm); if unavailable call Epidemiology
- UNITED STATES: Centers for Disease Control and Prevention: <http://www.cdc.gov/rabies/>
- INTERNATIONAL: World Health Organization recommendations: <http://www.who.int/rabies/en/>

## **Rabies PEP Recommendations for Humans Exposed to Bats**

For exposure assessment purposes, all bats should be presumed to be rabid unless testing shows they are negative for rabies.

### **Guidance on testing and PEP if bat is available:**

In any exposure or potential exposure situation, the bat in question should be submitted for testing. It is always preferable to test the bat because a negative result will rule-out exposure to rabies.

- If positive, give PEP.
- If negative, no need for PEP; discontinue PEP if already started.

### **Guidance on PEP if bat is not available to test:**

- Person with a known bat **bite, scratch or mucous membrane exposure** → **Recommend PEP**
- Person has **other type of direct contact with a bat** (e.g., bat lands on person, bat flies into person) → **Recommend PEP** unless the person is reasonably certain a bite, scratch, or mucous membrane exposure did not occur.
  - Considerations:
    - What was the nature of the contact?
      - Touching a bat's fur, wings, blood, feces, or urine is NOT an exposure; whereas contact with bat teeth or mouth parts represents a potential for scratch, bite, puncture, or saliva exposure.
      - If a bat flies into a person's exposed skin or a person blindly reaches behind an object and contacts a bat with bare hands, it is difficult to be reasonably certain a bite or scratch did not occur.
    - Was the bat dead? If the bat is completely dried out, any virus present would be inactivated; whereas if the bat is still moist (i.e., recently died) then contact with teeth or saliva may still be a risk (e.g., if a person put their fingers in the bat's mouth – especially if they had a resulting puncture wound).
    - For unattended children, is the child old enough to be a reliable witness about whether contact occurred?
- **Bat found in the room** with a person who might be unaware that a bite or direct contact occurred, e.g., a person wakes up to find a bat in the room OR a reliable person witnesses a bat in the room with a previously unattended child, a person with impaired level of consciousness (i.e., underlying disease, mental disability, intoxication, etc.) → **Generally recommend PEP**
  - Considerations:
    - These situations should not be considered exposures if circumstances suggest it is unlikely an exposure took place (e.g., bat dried up, bed net used, etc.).
    - Was the bat alive or dead? If dead, is there any indication of how long it has been there (e.g., dried up, covered in maggots)? Evaluate this in comparison to how long the person was in the room (e.g., only slept there 1 night).
    - For unattended children found with a bat in the room, is the child old enough to be a reliable witness about whether any contact occurred?
    - For others sleeping in adjacent or nearby rooms with doors that were open to room where bat found, PEP is not routinely recommended though may be appropriate in some circumstances. Consider how the bat likely entered the home, where it was found in proximity to rooms, open window, chimney, etc.
- **Bat noted roosting or flying in sleeping area open to outdoors** (e.g., an open-shelter or a lean-to) → **PEP not routinely recommended**
- **Bat found in a body of water** in which someone was swimming → **PEP not recommended**

## **Rabies PEP Recommendations for Humans Exposed to Wild Carnivores, including Wild Animal Hybrids**

These recommendations apply to raccoons, skunks, foxes, coyotes, wolf, cougar, bobcats, and any other wild carnivore. This excludes non-carnivorous wild animals such as bats, rodents, rabbits, etc. See below for special considerations for wild animal hybrids (e.g., wolf-dogs or domestic-wild cat crosses).

**Risk of rabies from wild carnivores in Washington State:** The risk of acquiring rabies after exposure to a wild carnivore in Washington State is low since the state is not known to have rabies in terrestrial species (unlike elsewhere in the U.S.). However, wild carnivores are not routinely trapped and tested for rabies in Washington so data on the occurrence of rabies in these animals are limited.

Approximately 2-15 **raccoons** are tested in Washington per year; historically none have tested positive (data since 1920s). For **other wild carnivore species**, generally only 0-3 of each are tested annually. The last rabid coyote was detected in 1930. Only 4 skunks (2 imported and 2 improperly given live vaccine) have tested positive in Washington, but no wild rabid skunks have ever been identified in the state. No foxes, wolf-dog hybrids, or other carnivores have ever tested positive in Washington (data since 1920s). While public health authorities do not believe wild carnivores are currently a reservoir for rabies in Washington, these animals may be illegally or accidentally imported from other terrestrial rabies endemic states or countries and/or become infected with rabies after exposures to bats (i.e., spillover rabies).

### **Guidance on testing and PEP if animal is available:**

- **Exposure to a wild carnivore → Test animal for rabies.**
  - If positive, give PEP
  - If negative, no need for PEP; can discontinue PEP if already started

### **Guidance on PEP if exposure occurred in Washington State and animal is not available to test:**

- **Raccoons**
  - Counsel provider and/or exposed person regarding risk of raccoon rabies in WA State.
  - **Provoked<sup>a</sup> exposure** by normal appearing and behaving raccoon → **PEP not routinely recommended**
  - **Unprovoked exposure OR exposure to a rabid-acting\* raccoon → Recommend PEP**
- **Skunk, fox, coyote, or other wild carnivore (except raccoons & hybrids):**
  - Counsel provider and/or exposed person regarding risk of rabies in WA State.
  - **All exposures → Recommend PEP**

NOTE: This recommendation differs from the recommendation for raccoons because when healthy, these wild carnivore species are considered much less likely to interact with humans than raccoons. In clearly provoked exposures PEP may not be warranted; these should be discussed with your local health jurisdiction on a case-by-case basis.

### **Guidance on PEP if exposure occurred outside of Washington or animal is from another geographic area (besides Washington) and animal is not available to test:**

- **Raccoon, skunk, fox, coyote, or any other wild carnivore:**
  - **All exposures → Recommend PEP**

NOTE: Specific guidance for exposure in some states and countries may differ based on local rabies epidemiology.

**Special considerations for wild animal hybrids:**

Hybrid animals are wild animals that have been cross-bred with domestic animals (e.g., wolf-dogs or domestic-wild cat crosses). A hybrid may be considered a hybrid at any percentage of wild-domestic genetic make-up, e.g., 25% wolf / 75% dog or 50% wolf / 50% dog. The period of rabies virus shedding (i.e., the infectious period) in hybrids is unknown because few or no studies have been conducted to evaluate the shedding period in species other than domestic dogs, cats, and ferrets. Thus a 10-day observation period as is typically used for domestic dogs, cats, and ferrets does not ensure rabies virus was not being shed at the time of the exposure to a hybrid animal. When such animals bite (or otherwise expose) humans, the Compendium of Animal Rabies Prevention and Control and the ACIP recommendations for the prevention of human rabies indicate that euthanizing and testing the hybrid is the safest course of action. In Washington State, the local health officer has the authority to order euthanasia of a hybrid by WAC 246-100. However, since hybrids are often kept as domesticated pets, they are generally under the supervision of owners and much less likely than truly wild animals to interact with a rabid animal; this is especially true if they are kept indoors as opposed to being caged, chained, or fenced in an outdoor area. There may be instances when options other than euthanasia can be considered; please consult DOH for additional guidance.

**Definitions and explanations:**

<sup>a</sup> **Provoked exposures:** Examples include: invasion of an animal's territory (potentially even running by a dog), assisting an injured animal, startling or trying to capture an animal, coming between an animal and its young, taking food away from an animal, acting aggressively toward an animal, breaking up a fight between animals, or trying to touch, pet or feed an animal. An exposure is considered "unprovoked" if these behaviors are absent; for example an animal suddenly appears or charges and bites a person who was not in any way interacting with the animal or its young.

\* **Rabid-acting:** Rabies virus causes an acute, rapidly progressive encephalitis. Observing unusual behavior or unhealthy appearance is a proxy to identify potentially rabid animals. Behavior changes and neurologic signs are variable based on species and stage of disease progression. In terrestrial mammals, suggestive signs include being unusually withdrawn, stuporous or agitated; acting inappropriately aggressive or attempting to bite; approaching people (wild animals only); attacking inanimate objects; making abnormal vocalizations; stumbling or appearing weak; displaying muscle tremors, seizures, or difficulty swallowing; appearing afraid of water; salivating profusely (foaming at the mouth); and staring blankly or appearing to be blind. Livestock may also display head-pressing, circling, depression, drooping head or ears, or constant bellowing, or may isolate themselves from herd mates.

## Rabies PEP Recommendations for Humans Exposed to Dogs, Cats, or Ferrets

These recommendations do not apply to hybrid animals, including wolf-dog hybrids or domestic-wild cat crosses, which are considered wild carnivores (see other guideline).

**Risk of rabies from dogs, cats, and ferrets in Washington State:** The risk of acquiring rabies after exposure to any of these animals is low. While dog rabies was once rampant, it hasn't been seen in Washington since the 1950s. Each year, the Washington State Department of Health tests approximately 80-130 cats, 50-90 dogs, and 1-5 ferrets for rabies. Since 1980, only 1 cat from Washington has tested positive; it was confirmed to have bat-variant rabies infection. A dog (with known prior exposure to a bat) was suspected to be rabid in 1987 but the infection was not confirmed. The natural tendency of cats to hunt and catch animals, including bats, may make them more likely than dogs or ferrets to acquire rabies. Nationally, more cats than dogs are found to be rabid.

### Guidance on observing/testing and PEP if animal is available:

- **Dog, cat or ferret is rabid-acting\*** → **Test animal for rabies**
  - If positive, give PEP
  - If negative, no need for PEP; discontinue PEP if already started
- **Dog, cat or ferret appears healthy** (normal appearance and behavior) → **Perform 10-day observation**
  - If animal alive and healthy after 10 days → No need for PEP; discontinue if already started
  - If animal develops signs of rabies → Call LHJ and immediately test for rabies
    - If positive, give PEP
    - If negative, no need for PEP; discontinue PEP if already started

NOTE: Observation of healthy animals should be done regardless of vaccination status or exposure circumstances (e.g., provoked<sup>a</sup> vs. unprovoked) and is preferred over euthanasia and testing. Informal observation, such as watching the daily appearance and behavior (e.g., continued eating/drinking, walking normally) of a specific feral cat that cannot be captured, is not preferred but is acceptable.

- **Dog, cat or ferret needs to be (or has been) euthanized** because it has severe injuries or chronic illness not considered consistent with rabies by a veterinarian OR is unwanted
  - **If feral/stray<sup>b</sup> animal** → **Test for rabies**
  - **If owned animal** → Considerations should include: was the pet vaccinated, was it an indoor vs. outdoor animal, its history of travel to or importation from a rabies endemic country within the last 6 months, and whether it had a known exposure to an untested bat or rabid animal.
    - **If animal had exposure to an untested bat/rabid animal or if was in rabies-endemic country in last 6 months** → **Test for rabies**
    - **If provoked<sup>a</sup> bite/exposure** → **Testing can be waived** at victim's discretion (especially if vaccinated)
    - **If unprovoked bite/exposure** → **Testing generally recommended** (especially if unvaccinated or not current on rabies vaccine)

### Guidance on PEP if animal is not available to observe or test:

- Dog, cat or ferret is **rabid-acting\*** → **Recommend PEP**
- Dog, cat or ferret **appears healthy**
  - **Exposure occurred in Washington State:**
    - Counsel provider and/or exposed person regarding the low risk of rabies in dogs, cats, and ferrets in Washington State.

- If animal had a known exposure to an untested bat or rabid animal in last 6 months → Generally recommend PEP
- If provoked<sup>α</sup> bite/exposure → PEP not recommended
- If unprovoked bite/exposure
  - Cat → Recommend PEP
  - Dog or ferret → PEP generally recommended (consult with LHJ to confirm criteria for unprovoked bite/exposure are met)
- **Exposure occurred outside of Washington or animal was imported within 6 months from a rabies-endemic country (e.g., Mexico, Central/South America, India, China and SE Asia, Afghanistan, etc.):**
  - If animal from/exposure occurred in a rabies-endemic country → Recommend PEP
  - If animal from/exposure occurred in another state → Consult LHJ
    - Considerations include potential for contact with rabies reservoir species in that state and the animal's vaccination status

### Definitions and explanations:

**10-day observation:** This rabies virus “shedding period” (or “infectious period”) drives the 10-day observation period for domestic dogs, cats, and ferrets. The shedding period is the time in which the animal is shedding virus in their saliva and thus is infectious to other animals/humans. The shedding period is distinct from the incubation period, though there may be overlap between the two. Animals can be shedding virus before showing signs of illness. If the dog/cat/ferret was shedding virus at the time of the bite/other exposure, then signs of illness (and usually death) would be expected to develop within 10 days. Conversely, if the dog/cat/ferret remains alive and well at the end of the 10-day observation period, then it was not infectious (i.e., not shedding rabies virus) at the time of the human exposure so the person does not need PEP; however, it does not rule out the possibility that the dog/cat/ferret will develop rabies in the future.

<sup>α</sup> **Provoked exposures:** May include invasion of an animal's territory (potentially even running by a dog), assisting an injured animal, startling or trying to capture an animal, coming between an animal and its young, taking food away from an animal, acting aggressively toward an animal, breaking up a fight between animals, or trying to touch, pet, or feed an unfamiliar animal. Provocation must be considered from the animal's perspective. An exposure is considered “unprovoked” if these behaviors are absent; for example, an animal suddenly appears or charges and bites a person who was not in any way interacting with the animal or its young.

\* **Rabid-acting:** Rabies virus causes an acute, rapidly progressive encephalitis. Observing unusual behavior or unhealthy appearance is a proxy to identify potentially rabid animals. Behavior changes and neurologic signs are variable based on species and stage of disease progression. In terrestrial mammals, suggestive signs include being unusually withdrawn, stuporous or agitated; acting inappropriately aggressive or attempting to bite; approaching people (wild animals only); attacking inanimate objects; making abnormal vocalizations; stumbling or appearing weak; displaying muscle tremors, seizures, or difficulty swallowing; appearing afraid of water; salivating profusely (foaming at the mouth); and staring blankly or appearing to be blind. Livestock may also display head-pressing, circling, depression, drooping head or ears, or constant bellowing, or may isolate themselves from herd mates.

<sup>β</sup> **Feral and stray:** Feral animals are essentially wild and not socialized to humans; whereas stray animals are generally friendly to people but have no sign of ownership (e.g., no collar and roaming about).

## **Rabies PEP Recommendations for Humans Exposed to Rodents, Lagomorphs or Opossum**

These recommendations apply to small rodents (e.g., squirrels, chipmunks, rats, mice), large rodents (e.g., beavers, woodchucks), lagomorphs (e.g., rabbits, hares) and opossum.

**Risk of rabies from rodents, lagomorphs, or opossum:** Small rodents and lagomorphs are not reservoirs for rabies virus. These mammals are rarely infected with rabies and have not been known to transmit rabies to humans. In the eastern U.S., raccoon-variant rabies occasionally spills over into large rodents, especially woodchucks (groundhogs). According to CDC's national data (1990-1996), woodchucks accounted for 93% of 371 rabid rodents. Inoculation experiments with opossums in the 1960s found them to be relatively resistant. The risk of acquiring rabies after exposure in Washington State is very low; no rodent, lagomorph or opossum has ever tested positive for rabies in the state (data since 1920s). There are no national guidelines for management of rodents, lagomorphs, or opossums biting humans, however, these exposures rarely call for PEP, especially in Washington. Exposures with unusual circumstances should be discussed with the local health jurisdiction.

### **Guidance on testing and PEP if animal is available:**

- **Rodent, lagomorph or opossum is rabid-acting\*** → **Test animal for rabies** (consult with local health jurisdiction to confirm criteria for rabid-acting first; these animals are not routinely accepted for testing)
  - If positive, give PEP
  - If negative, no need for PEP
- **All other exposures** → **No need to test animal; PEP is not recommended**

### **Guidance on PEP if animal is not available to test:**

- Counsel provider and/or exposed person regarding risk of rabies.
- **Rodent, lagomorph or opossum is rabid-acting\*** → **Consultation with local health jurisdiction** is advised; in rare event of a rabid-acting animal, PEP may be recommended
- **All other exposures** → **PEP is not recommended**

### **Definitions and explanations:**

\* **Rabid-acting:** Rabies virus causes an acute, rapidly progressive encephalitis. Observing unusual behavior or unhealthy appearance is a proxy to identify potentially rabid animals. Behavior changes and neurologic signs are variable based on species and stage of disease progression. In terrestrial mammals, suggestive signs include being unusually withdrawn, stuporous or agitated; acting inappropriately aggressive or attempting to bite; approaching people (wild animals only); attacking inanimate objects; making abnormal vocalizations; stumbling or appearing weak; displaying muscle tremors, seizures, or difficulty swallowing; appearing afraid of water; salivating profusely (foaming at the mouth); and staring blankly or appearing to be blind. Livestock may also display head-pressing, circling, depression, drooping head or ears, or constant bellowing, or may isolate themselves from herd mates.

## Rabies PEP Recommendations for Humans Exposed to Livestock

These recommendations apply to livestock (e.g., cattle, horses, sheep, goat, pigs, llamas).

**Risk of rabies from livestock:** Although rabies in livestock is rare, animals can be exposed to rabies during encounters with wildlife. Rabies should be considered in the differential diagnosis of any acute, progressive, fatal neurological illness in livestock imported from areas where terrestrial rabies exists. Rabies is less commonly found in livestock that have not left Washington State. However, rabid bats can transmit rabies to livestock. In 1994, a rabid llama with bat-variant rabies was identified in King County and in 1992 a rabid horse was identified in Franklin County (rabies variant unknown). Previous vaccination of livestock may not preclude the need to euthanize and test livestock. There are no national guidelines for management of livestock biting humans; each case should be evaluated in consultation with the local health jurisdiction.

### Guidance on testing and PEP if animal is available:

- **Livestock is rabid-acting\*** (and veterinarian does not believe abnormalities can be explained by another identified disease) → **Test for rabies**
  - If positive, give PEP
  - If negative, no need for PEP
- **Livestock bite/exposure is unprovoked<sup>α</sup>** → **Have animal evaluated by veterinarian; test animal if rabies is suspected**
  - See above
- **All other exposures** → **No need to test animal; PEP is not recommended**

### Guidance on PEP if animal is not available to test:

- Counsel provider and/or exposed person regarding risk of rabies in livestock.
- **Livestock is rabid-acting\*** → **PEP recommended.**
- **All other exposures** → **Consultation with LHJ is advised.** PEP is generally not recommended unless there are unusual circumstances.

### Definitions and explanations:

<sup>α</sup> **Provoked exposures:** May include invasion of an animal's territory (potentially even running by a dog), assisting an injured animal, startling or trying to capture an animal, coming between an animal and its young, taking food away from an animal, acting aggressively toward an animal, breaking up a fight between animals, or trying to touch, pet, or feed an unfamiliar animal. Provocation must be considered from the animal's perspective. An exposure is considered "unprovoked" if these behaviors are absent; for example, an animal suddenly appears or charges and bites a person who was not in any way interacting with the animal or its young.

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