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

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## 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 the behavior and appearance of the animal, the severity and location of the bite, whether the exposure was provoked, and the species of the animal. PEP can be delayed when the dog, cat, or ferret is currently healthy, and can be observed for 10 days. Likewise, PEP can be delayed up to 5 days while an animal is being tested if the appearance/behavior of the animal, bite severity and bite location are not high risk. Each exposure situation should be carefully assessed to determine timing of PEP in relation to animal testing results.

PEP should be initiated immediately 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[1].

## Wound Care

Prompt irrigation and cleansing of wounds using soap and water 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.

## References

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

[2]Monroe BP, Yager P, Blanton J, et al. Rabies surveillance in the United States during 2014. JAVMA 2016;248(7):777-88. Available at: https://avmajournals.avma.org/doi/full/10.2460/javma.248.7.777

[3]Washington State Animals Tested for Rabies, 1988-2018. Available at: https://www.doh.wa.gov/Portals/1/Documents/5100/rabiestested-past1988-2018.pdf

[4]NASPHV. Compendium of Animal Rabies Prevention and Control, 2016, JAVMA 2016;248(5):505-517. Available at: http://nasphv.org/Documents/NASPHVRabiesCompendium.pdf

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# Washington State Human Rabies Prevention Algorithm

- **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**† deserve special consideration.

| Risk | Animal type | Geographic location of exposure | Notify LHJ | Animal testing recommendation | PEP recommendation |
|---|---|---|---|---|---|
| HIGH | **Any rabid-acting* mammal** | Anywhere | Yes | Test if available. | - If animal tests positive, OR if unable to test, immediate PEP.<br>- If bite to head/neck from any animal highly suspected to be rabid, immediate PEP.<br>- If non-severe bite to other area (e.g., extremities) from any animal, PEP can be delayed 24-48 hours while animal is tested. If non-contact exposure, or other low risk exposure, PEP can be delayed up to 5 days while animal is tested. |
| | **Bat**† | | | | |
| | **Wild carnivore** (e.g., raccoon, skunk, fox, coyote, wolf, or hybrid) | In area with endemic rabies in wild carnivores (not WA) | | | |
| MEDIUM | **Dog, cat, or ferret** without signs of rabies (Does not 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 | **Confine and observe for 10 days.**§ If signs of rabies* develop during observation, call LHJ for immediate testing (*see rabid-acting* mammal above*). | - If tests positive or if unable to observe or test, give PEP.<br>- If observing, consider starting PEP immediately given elevated risk; can discontinue if animal survives 10-day observation. |
| MEDIUM-LOW | **Wild animal hybrids** (e.g., wolf-dogs) | In Washington | Yes | Generally test if available, unless exposure was clearly provoked and normal appearing *See special considerations for hybrids.* | - If tests positive, give PEP.<br>- *See special considerations for hybrids (wild carnivores section).* |
| | **Raccoons** | In Washington | Yes | Generally, test if available, unless exposure was clearly provoked and normal appearing. Can test for surveillance. | - If tests positive, give PEP.<br>- If unable to test: if provoked[α] and normal appearing/behaving then PEP not routinely recommended; if unprovoked or behavior suspicious for rabies, recommend PEP. |
| | **Other wild carnivores** | In Washington | Yes | Test if available. | - If tests positive or if unable to test, give PEP |
| LOW | **Dog, cat, or ferret** (D/C/F) without signs of rabies<br><br>(Does not apply to hybrids, e.g., wolf-dogs.) | In the U.S. (or a country not known to be endemic for canine rabies) | No^ | • **Confine and observe for 10 days.**§<br>○ If signs of rabies develop during observation, call LHJ for immediate testing (*see rabid-acting* mammal*).<br>• Animal euthanized due to chronic illness or injuries, or unwanted D/C/F:<br>○ If feral/stray, test unless provoked exposure from a healthy animal<br>○ If owned, test if unprovoked or D/C/F had known exposure to bat/rabid animal; otherwise victim can waive testing if provoked. | - If observing, PEP not necessary if animal healthy for 10 days.<br>- If tests positive, give PEP.<br>- **If unable to observe or test** then consider exposure location:<br>• **Outside WA State**: Consult LHJ; consider D/C/F vaccination status and contact with rabies reservoir species in that locale.<br>• **In WA State:** If D/C/F had exposure to an untested bat or rabid animal in last 6 months give PEP. Otherwise:<br>○ If provoked[α], PEP not recommended.<br>○ If unvaccinated and unprovoked and time spent outdoors, give PEP. Otherwise consult CDE. |
| VERY LOW | **Rodent, hare/rabbit, or opossum** | Anywhere | No^ | No need to test unless *rabid-acting**. 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 *rabid-acting** animal; consult LHJ in such cases. |
| | **Livestock** (e.g., cattle, llama, horse, pig) | | | | |

*** 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 a sudden change in behavior, such as: 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.

† **Bats:** An exposure assessment is necessary when a bat is found in the same 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 Appendix A for additional information on exposure assessments related to bats.

§ **Observations:** Local health jurisdiction (LHJ) 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 develops symptoms consistent with rabies or dies during observation, a veterinarian should be consulted to evaluate for rabies and the LHJ should be notified immediately.

^ **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.

α **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 rabid bats and may become rabid in Washington State; examples since 1988 include horse, llama, and two cats.
  - Historical animal testing for rabies in Washington State: https://www.doh.wa.gov/YouandYourFamily/IllnessandDisease/Rabies/RabiesActivity.aspx.
- Animals incubating or infected with rabies could be accidently imported into Washington State.
  - Risk differs elsewhere in the world (e.g., raccoon variant rabies in the east coast, skunk variant rabies in central US, dog variant rabies in Asia, 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 or geographic origin of the animal; **(3)** animal vaccination status; **(4)** circumstances of exposure (provoked[α] 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 with soap and water alone has been shown to reduce the likelihood of developing rabies.

**References and additional resources**

- WASHINGTON STATE:
  - Local health jurisdiction contact information: https://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:** Public Health Veterinarian; if unavailable call Epidemiology
- UNITED STATES: Centers for Disease Control and Prevention: https://www.cdc.gov/rabies/
- INTERNATIONAL: World Health Organization recommendations: https://www.who.int/rabies/en/

## Rabies Post-exposure Prophylaxis (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 situation determined by the local health jurisdiction to be a potential rabies exposure, the bat in question should be submitted to the Public Health Laboratories (PHL) for testing. Testing should only be performed to inform decisions about PEP or to inform public information releases regarding a bat in a public setting.

- If positive, give PEP.
- If negative, no need for PEP; discontinue PEP if already started.
- If specimen is unacceptable for testing, see below guidance for PEP if bat is not available

**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, mouth parts, or claws 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).
    - Is an unattended child old enough to be a reliable witness about whether contact occurred?
- **Bat found in the same room (or if outdoors, in close proximity)** 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 same room and cannot be reasonably certain that a bite, scratch, or mucous membrane exposure did not occur 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, exposure assessment should be performed (see exposure assessment form, Appendix A)**
  - Considerations:
    - These situations should not be considered exposures if circumstances suggest it is unlikely an exposure took place (e.g., desiccated bat, bed net used, bat found in an adjacent room or at a later time etc.).
    - Was the bat alive or dead? If dead, is there any indication of how long it has been there (e.g., desiccated, 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.
- Many patients without a definitive exposure (such as healthy adults who are light sleepers and would have detected a bat bite) may elect to forgo PEP

**Special Situations:**

- **Mass bat exposure event,** or multiple people exposed to a bat or bat colony, e.g. at a camp, apartment, church, etc. → **individual exposure assessments should be performed to determine risk (see Appendix A).** The risk assessment tool may be modified depending on the situation. Information to assess includes: direct contact with bat, description of bat(s), waking to find a bat in the same room, seeing contact with another person and a bat, whether a person would be aware of a bat bite

- **Bat noted roosting or flying in sleeping area open to outdoors → exposure assessments (Appendix A) should be performed**

- **Bat found in a body of water** in which someone was swimming→ **PEP not recommended**

## Rabies Post-exposure Prophylaxis (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 14 **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:**

- **Provoked exposure to a normal appearing and behaving raccoon → Testing not routinely recommended, except for surveillance purposes.**
- **Exposure to other 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[α] 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:

[α] **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 75-130 cats, 40-90 dogs, and 0-2 ferrets for rabies. Since 1980, only 2 cats from Washington have tested positive; both were 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 without signs consistent with rabies** (normal appearance and behavior) → **Perform 10-day observation**
  - If animal alive and unchanged 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[α] 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
  - **Provoked exposure** to a normal appearing and behaving dog, cat, or ferret → Testing not routinely recommended
  - Considerations for testing/PEP 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[α] bite/exposure → Testing not routinely recommended** (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 **does not have signs consistent with rabies**
  - ***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[α] bite/exposure → PEP generally <u>not</u> recommended**
- If **unprovoked** bite/exposure**→ PEP generally recommended**

- ***Exposure occurred <u>outside of Washington</u> 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 <u>country</u> → Recommend PEP**
  - If **animal from/exposure occurred in another <u>state</u> → 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 consistent with rabies. 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.

[α] **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 "<u>un</u>provoked" 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.

[β] **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 Post-exposure Prophylaxis (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 United States, raccoon-variant rabies occasionally spills over into large rodents, especially woodchucks (groundhogs). According to CDC's national data (2017), woodchucks accounted for 100% of 33 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. Rodents and lagomorphs can carry other pathogens such as the causative agents of tularemia, rat-bite fever, or plague, among others. Persons with exposure to rodents or lagomorphs should be placed on fever watch to exclude other infections.

**Guidance on testing and PEP if animal <u>is available:</u>**

- **Rodent, lagomorph or opossum is rabid-acting* → Test animal for rabies** (consult with local health jurisdiction/veterinarian 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 <u>not</u> 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/veterinarian** 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 Post-exposure Prophylaxis (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[α] → 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:**

[α] **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.

## Appendix A: Bat Exposure Assessment Questionnaire

1. Did (you/your child/dependent) have any contact with a bat?

   a. Bitten ☐ Yes ☐ No ☐ Don't Know

   b. Scratched ☐ Yes ☐ No ☐ Don't Know

   c. Touched ☐ Yes ☐ No ☐ Don't Know

   If yes to (c) please describe (ask specifically about touching of head/mouth/teeth/claws and whether or not gloves or other materials were worn/used):

   _____

   _____

   d. Any other contact (ask specifically about possible bare-skin contact with the bat or if the contact could have been with the head/mouth/teeth/claws):

   _____

   _____

**If Yes to 1 a or b, recommend post-exposure prophylaxis (PEP)**
**If Yes to 1 c or d, recommend PEP if contact may have resulted in bite, scratch or exposure of bat to mucous membrane**

2. Were (you/your child/dependent) asleep and then awoke to find a bat in the room?
   ☐ Yes ☐ No ☐ Don't Know

If Yes:

Do (you/your child/dependent) have any of the following conditions that may decrease your/their awareness of a bat bite?

| | |
|---|---|
| a. Deep sleeper or other condition that may make you/them less likely to awaken if scratched/bitten by a bat (may feel like being pricked with a needle) | ☐ Yes ☐ No ☐ Don't Know |
| b. Drug or alcohol use during this time | ☐ Yes ☐ No ☐ Don't Know |
| c. On medications during this time that may have made you/them drowsy or less likely to awaken if scratched/bitten by a bat (may feel like being pricked with a needle) | ☐ Yes ☐ No ☐ Don't Know |
| d. Moderate or severe developmental delay | ☐ Yes ☐ No ☐ Don't Know |
| e. Are there any other reasons you/they may not be aware of a bat scratch/bite (please list _____) | ☐ Yes ☐ No ☐ Don't Know |

If answering for a child/dependent:

3. Do you think your child/dependent is a reliable witness about whether contact occurred?
   ☐ Yes ☐ No ☐ Don't Know

**If Yes to 2 AND Yes or Don't Know to any of a-e OR No or Don't Know to 3, recommend PEP**

**Additional Questions to consider for mass bat exposure events (e.g. large number of people exposed to a bat or bat colony)**

1. Did (you/your child/dependent) see a bat while at [insert location]? (check all that apply)
   ☐ In a sleeping room ☐ Not in a sleeping room ☐ Outside
   ☐ Other, describe _____
   ☐ No Bat Seen
   If a bat was seen, ask to describe the **DATE** and circumstances of each sighting:

   _____
   _____

2. If a bat was seen, was the bat (if more than one bat was seen, collect information for each incident in the space above) [check all that apply]:

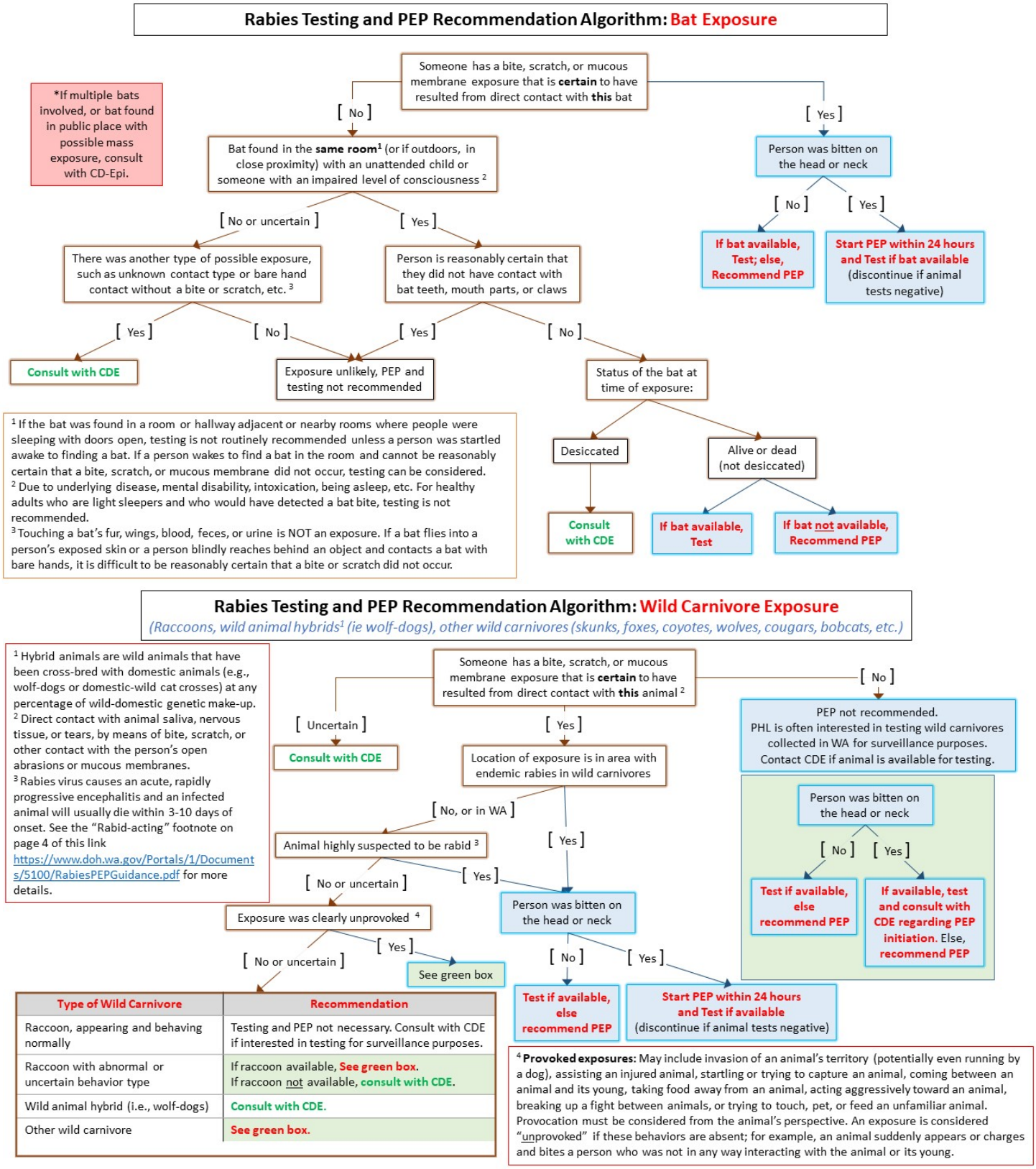
   ☐ Healthy, flying normally
   ☐ Injured or apparently sick
   ☐ Flying with difficulty
   ☐ Crawling on the ground or otherwise seeming unable to fly
   ☐ Hissing or vocalizing
   ☐ Seen during daylight
   ☐ Attacking or exhibiting aggressive behavior
   ☐ Dead
   ☐ Unknown

3. Did (you/your child/dependent) recall seeing a bat swoop down or make contact with any other person while they were sleeping?
   ☐ Yes ☐ No ☐ Don't Know

4. If yes, do (you/your child/dependent) recall the names of any other people the bat may have had contact with? _____

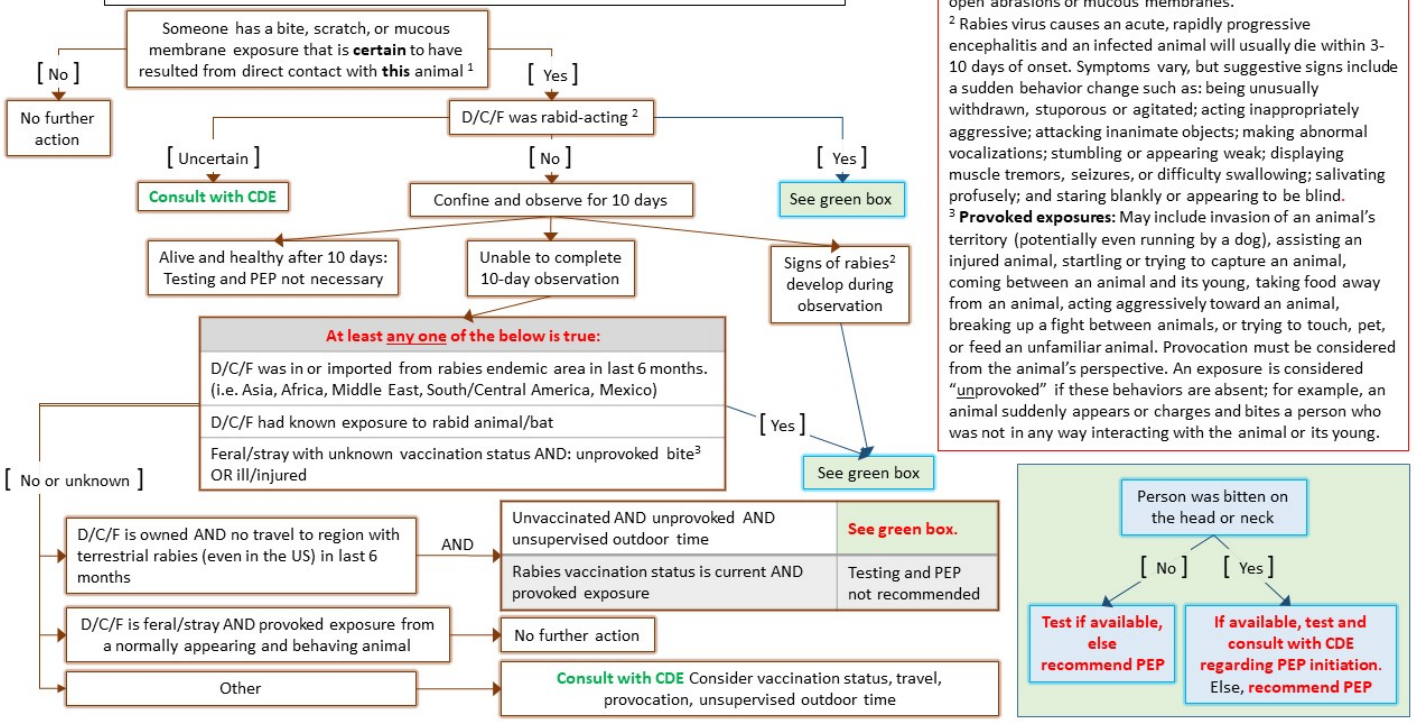
# Appendix B: Back-end Algorithm for Rabies Excel Calculator

*For Excel calculator version, email hanna.oltean@doh.wa.gov



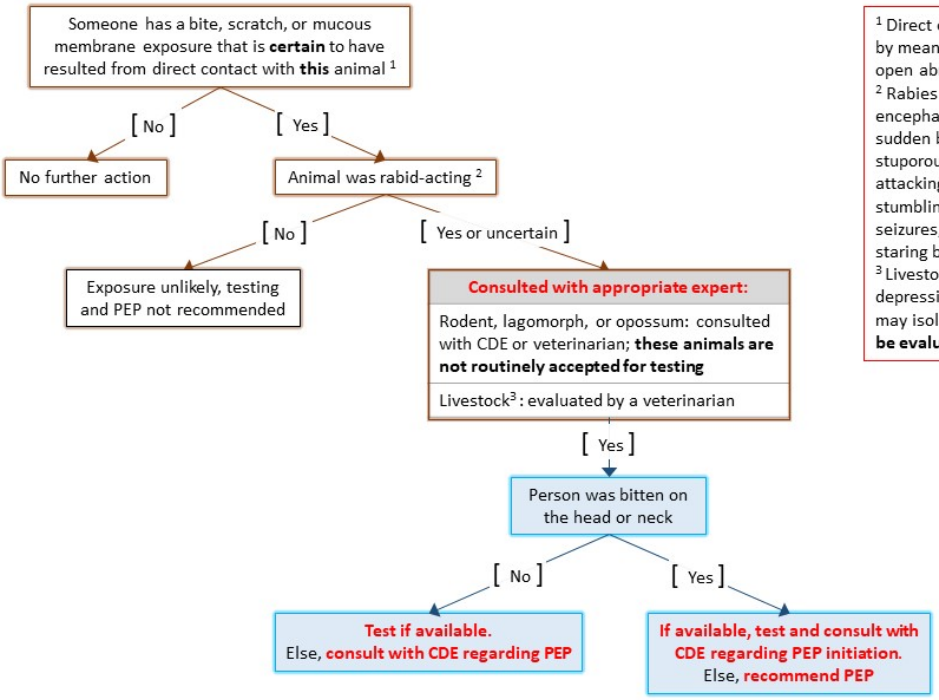

| Type of Wild Carnivore | Recommendation |
|---|---|
| Raccoon, appearing and behaving normally | Testing and PEP not necessary. Consult with CDE if interested in testing for surveillance purposes. |
| Raccoon with abnormal or uncertain behavior type | If raccoon available, **See green box**.<br>If raccoon not available, **consult with CDE**. |
| Wild animal hybrid (i.e., wolf-dogs) | **Consult with CDE.** |
| Other wild carnivore | **See green box.** |

## Rabies Testing and PEP Recommendation Algorithm:
## Dog, Cat, Ferret (D/C/F) Exposure *(NOT including hybrids, e.g. wolf-dogs)




[1] Direct contact with animal saliva, nervous tissue, or tears, by means of bite, scratch, or other contact with the person's open abrasions or mucous membranes.
[2] Rabies virus causes an acute, rapidly progressive encephalitis and an infected animal will usually die within 3-10 days of onset. Symptoms vary, but suggestive signs include a sudden behavior change such as: being unusually withdrawn, stuporous or agitated; acting inappropriately aggressive; attacking inanimate objects; making abnormal vocalizations; stumbling or appearing weak; displaying muscle tremors, seizures, or difficulty swallowing; salivating profusely; and staring blankly or appearing to be blind.
[3] **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.

## Rabies Testing and PEP Recommendation Algorithm:
## Livestock or Rodents, Hare/Rabbit, Opossum Exposure




[1] Direct contact with animal saliva, nervous tissue, or tears, by means of bite, scratch, or other contact with the person's open abrasions or mucous membranes.
[2] Rabies virus causes an acute, rapidly progressive encephalitis. Symptoms vary, but suggestive signs include a sudden behavior change such as: being unusually withdrawn, stuporous or agitated; acting inappropriately aggressive; attacking inanimate objects; making abnormal vocalizations; stumbling or appearing weak; displaying muscle tremors, seizures, or difficulty swallowing; salivating profusely; and staring blankly or appearing to be blind.
[3] Livestock may also display head-pressing, circling, depression, dropping head or ears, constant bellowing, or may isolate themselves from herd mates. **Livestock should be evaluated by a veterinarian.**