

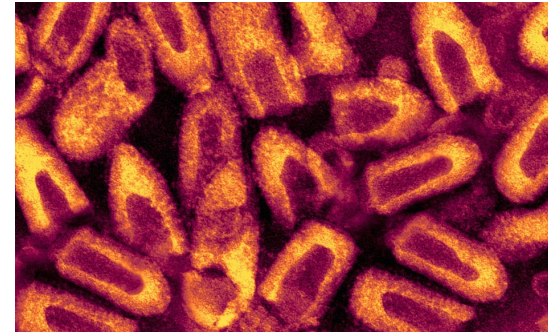
# Animal Bites and Rabies: Case Investigation and Management

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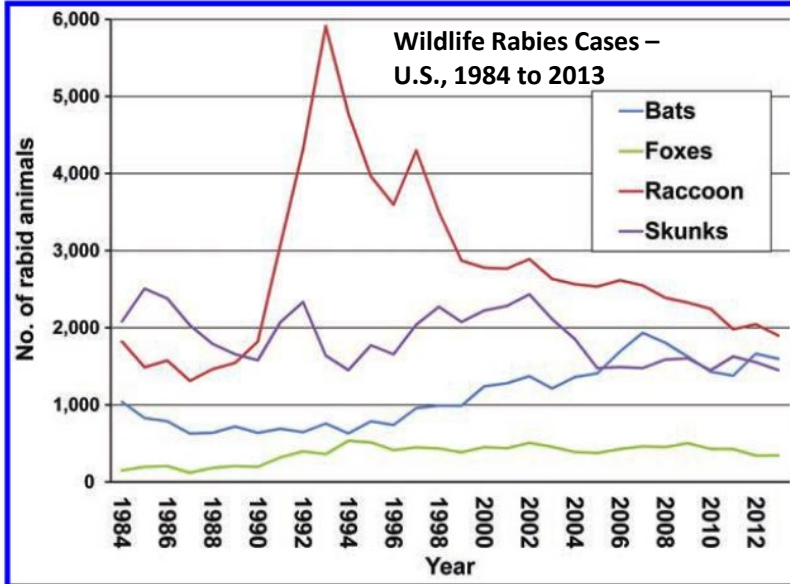
# Rabies

- Zoonotic disease in the *Lyssavirus* genus.
- Incubation period may vary from a few days to several years, but is typically one to three months.
- The virus is mostly transmitted through the bite of a rabid animal.
- Non-bite exposures can occur.
  - Being scratched by a rabid animal.
  - Scratches, abrasions, open wounds mucous membranes contaminated with saliva or infectious material.
  - Inhalation of aerosolized rabies virus (laboratory workers).
  - Human-to-human transmission: cornea and organ transplants.
    - Eight documented reports.

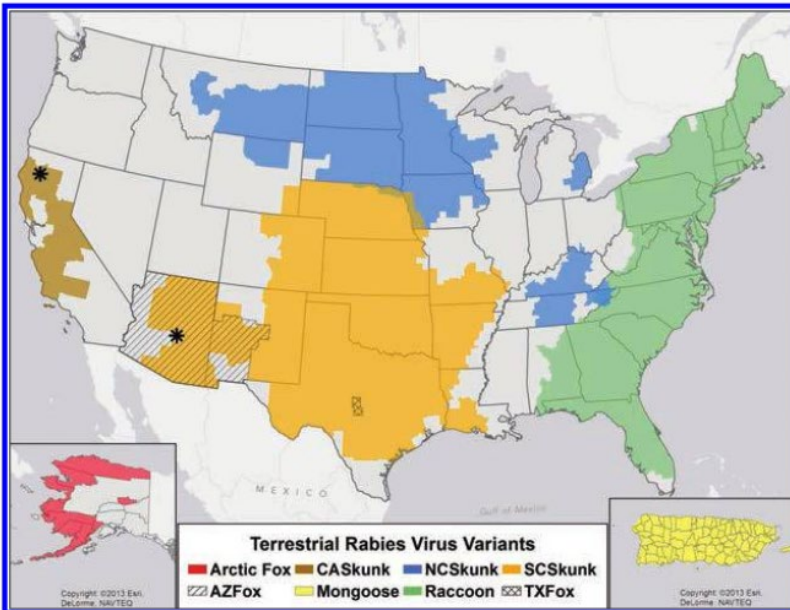
## SYMPTOMS

- **First symptoms of rabies are similar to the flu.**
  - General weakness, discomfort, fever, or headache
- **Progression to cerebral dysfunction.**
  - Anxiety, delirium, hallucinations, and insomnia
- **Rabies is almost always fatal, and treatment is typically supportive.**
  - <10 documented cases of human survival (more later).

# Animal Rabies in the U.S.



- Overall, the incidence of rabies-positive animals has been decreasing.
- More raccoons are positive for rabies in West Virginia than other animal species.
- The U.S. can be divided into areas of terrestrial rabies virus variants.



## 41 year-old male resident of Wirt County

- **October 4:** patient examined at hospital for one-day history of shaking, speech difficulties, unwillingness to drink liquids, vomiting and severe anxiety.
  - WBC count was high.
  - Abnormal urinalysis.
    - High ketone levels (body in starvation; breaking down fats)
    - High protein levels
    - Trace blood
    - Carboxy acid tetrahyocannabinol (marijuana)
  
- **October 6:** paralysis, extreme agitation, spastic muscle activity, put on mechanical ventilation.
  
- **October 12:** West Virginia Department of Health and Human Resources, Bureau for Public Health, Office of Laboratory Services (OLS) conducted rabies testing.

## Differential Diagnoses

- Tetanus
- Viral encephalitis
- Acute hemorrhagic encephalitis
- Drug toxicities or withdrawal
- Rabies

## Public Health Investigation

- Case and two acquaintances had shot a bat from the front porch of house.
  - Case examined the head of the bat by opening its mouth and teeth.
- Post-Exposure Prophylaxis (PEP) was administered to 48 people.
  - 15 medical technicians, 12 RNs, 4 physicians, 2 LPNs, 1 LPN student.
  - 11 family members and friends.

# Animal Bites/Rabies Data

- **In the U.S., millions of people are bitten by animals each year.**
  - 4.5 million people are bitten by dogs alone.
- **Animal bites represent 1% of the ER visits each year.**
- **Children 5-14 years of age are the most common victims of animal bites.**
- **40,000 people receive PEP each year due to potential exposures.**
- **From 1960 to 2018, a total of 125 human rabies cases were reported in the US with a quarter resulting from dog bite during international travel.**
  - 70% of the infections acquired in the US were attributed with bats



# Oral Rabies Vaccine (ORV) Project

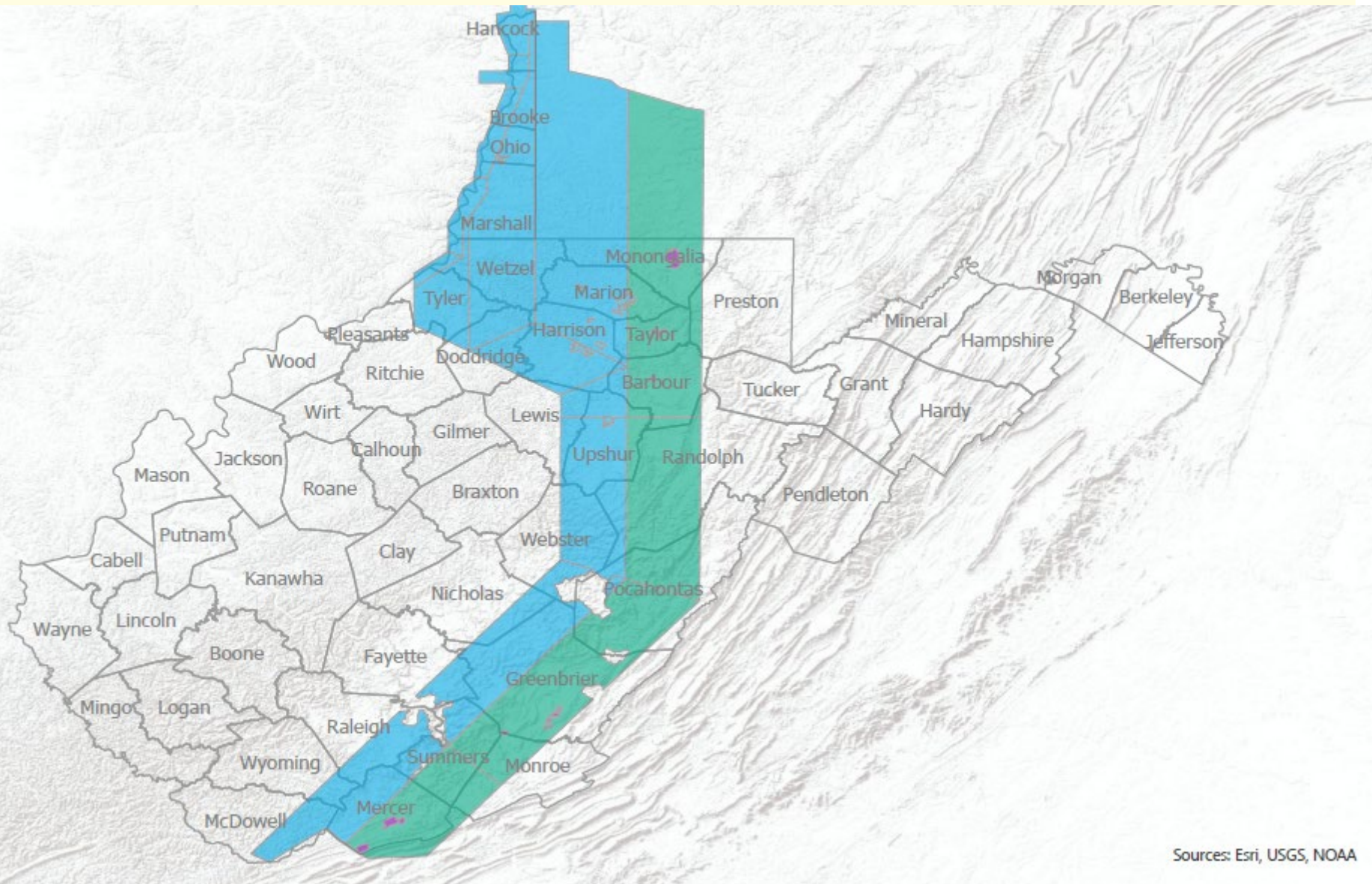
- **ORV project was established in 1995 to limit the spread of rabies in wildlife (mostly raccoons and skunks).**
  - First started in West Virginia in 2001.
- **Aerial bait drop zone spans from Maine to Alabama to reduce eastern raccoon rabies variant (RRV).**
- **ORV bait zone in West Virginia serves to prevent westward spread of RRV.**
  - No raccoon variant rabies has been reported west of the zone.

# ORV Baits

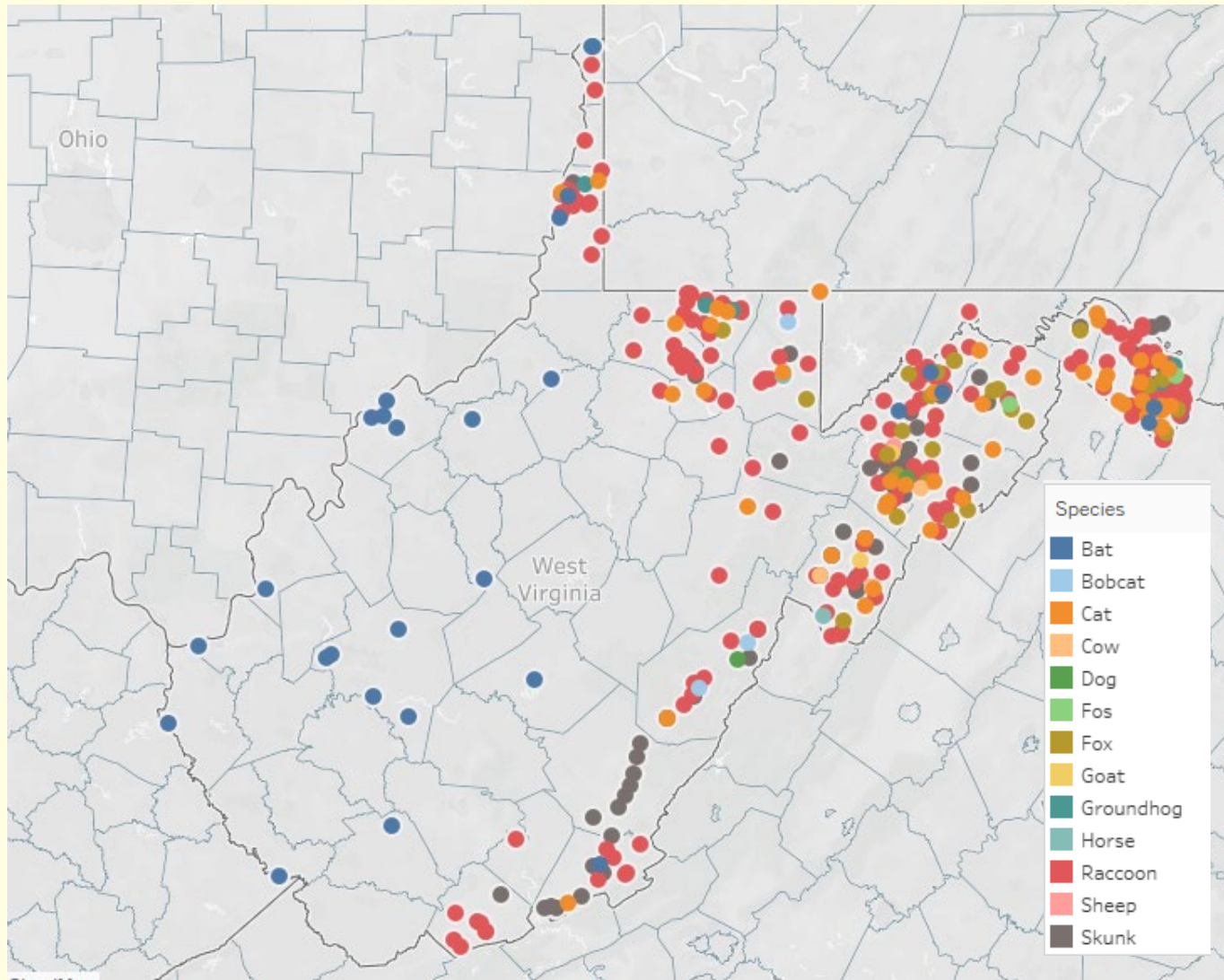
- **Coated plastic packet containing rabies vaccine.**
  - Sprinkled with fishmeal coating.
  - Enclosed in fishmeal-polymer blocks.
- **Wildlife eat the bait and swallow the vaccine.**
- **Hand-baiting occurs in urban/residential areas.**
  - Targets skunks and raccoons.



# 2021 ORV Bait Zone



# Animal Rabies 2012-2021



# 2019 Rabies Surveillance Data

- **50 counties submitted animals for testing at OLS.**
  - 23 counties reported rabies positive animals.
- **568 animals were tested for rabies through OLS.**
  - 58 (10.2%) were positive for rabies.
    - Raccoons (24), bats (8), cats (15), skunks (4), foxes (4), goats (2) and a groundhog

# 2020 Data

- **53 Counties submitted animals for testing through OLS.**
  - 13 counties reported rabies positive animals.
- **459 animals were tested through OLS.**
  - 28 tested positive (6.1%)
  - Raccoon (12), Fox (5), Cat (3), Bat (3), Skunk (3) and Groundhog (2)

- **48 Counties submitted animals for testing through OLS.**
  - 8 counties reported rabies positive animals.
- **295 animals were tested through OLS.**
  - 15 tested positive (5.1%).
  - Raccoon (6), Fox (1), Cat (2), Bat (1), and Skunk (5)

**The following information is taken from  
the 2010 Rabies Control Guide (DC-4).**



- **In West Virginia, animal bites and other potential rabies exposures (OPREs) should be reported to LHD within 24 hours.**
- **Why are we reporting animal bites?**
  - Rabies prevention (in humans and animals).
  - Educate the public and providers.
  - Gather data (surveillance).
  - Understand local rabies epidemiology.
  - Targeting interventions.
- **Animal bites/OPREs should be reported in West Virginia Electronic Disease Surveillance System (WVEDSS) or in HealthSpace (depending on your locality).**

## Animal Bites

### Human Exposure

A bite or scratch from a vector species or the introduction of saliva or central nervous system (CNS) tissue from a vector species into an open, fresh wound or mucous membrane (eye, mouth, or nose) of a human being.

### Vector Species

Species include bats or terrestrial mammals, especially carnivores.

Wild species known to be reservoirs of rabies include, but are not limited to, raccoons, skunks, foxes, coyotes, bobcats, wolves, or any hybrids between these wild species and domestic dogs and cats.

Domestic species include, but are not limited to, dogs, cats, and ferrets.

**Confirmed case:** Human exposure from a vector species as defined above.

# Before Conducting an Investigation

- **Was there an exposure?**
  - Based on the case definition.
  
- **Is the victim a West Virginia resident?**
  - If not, send animal bite/OPRE information to the home jurisdiction of the resident.
  
- **Was the exposing animal a mammal?**
  - Only mammalian species transmit rabies.

# What Should NOT be Reported?

- Human exposures to non-mammalian species
  - Reptiles and birds do not transmit rabies.
  
- Animal exposure to potentially rabid animals
  - Human patient-centric reporting.
  
- Non-exposures
  - e.g. touching an animal's fur, picking up an animal, contact with blood or feces of an animal.

## Questions to Keep in Mind

- What is the species of the animal?
  - Wild vs. domestic? Mammal?
- What is the type of exposure?
  - Bite? Scratch? What part of body?
- What are the circumstances of the exposure?
  - Provoked vs. unprovoked? Status of animal?
- What is the local rabies epidemiology in the county where the exposure occurred?

# Animal to Human Exposures

**Dogs, cats, and ferrets are the only animals that have an established observation period.**

- Should be confined for 10 days by the owner, veterinarian, or animal control officer (regardless of ownership or vaccination status).
- Recommendations regarding PEP administration should be made after confinement period.

**Rules of confinement for cats, dogs, and ferrets:**

- The animal should **NOT** be killed, sold, released, given away, or vaccinated during the confinement period.
- Any illness should be reported immediately to the local health department (LHD).
- Confirm the status of the animal after the confinement period.
- If the animal develops signs of rabies → immediately euthanize and test.

### **Immediate euthanasia and testing of the animal.**

- A severe bite on the head, face, neck or hands.
- Bites that result in hospitalization/death.
- An animal with a history of aggressive behavior and biting.

**If the animal is not available for confinement and/or testing (e.g. stray), physician should evaluate the patient to determine the need for PEP with assistance from state and local health officials.**



**CONFINEMENT (for dogs, cats, and ferrets only):** housing in a building, pen or some other escape-proof enclosure.

- Tying the animal in an open yard is not adequate.
- The animal may not be removed from the premises without permission from the LHD.
- The animal should not be permitted to run at large.

**STRICT ISOLATION:** A kennel in a veterinary hospital, animal control facility, commercial boarding establishment, or a pen at home that prevents direct contact between the animal and any human or other animal, but allows for observation, feeding, watering, and sanitation.

- Sanitarian is responsible for approval isolation area.

Other pets include small mammals such as hamsters, gerbils, rats, mice, rabbits, guinea pigs, etc.

- No available rabies vaccine for these animals.
- They pose a low risk for rabies transmission and their bites almost never require rabies PEP.
- *Only mammals can transmit rabies. Other classes of owned animals, such as birds, reptiles, amphibians, fish and invertebrates pose no risk for rabies transmission.*

# Species of Exposing Animal - Exotic Pets

- No established rabies observation period.
- Vaccination may reduce the risk of rabies but does not eliminate it in these species.
- When a person is bitten by an exotic pet → consider the animal factors.
  - Is the animal a mammal?
- The decision for PEP should be made on case-by-case situation and local and state health officials should be consulted for guidance.

# Species of Exposing Animal - Monkeys

- Monkeys can be dangerous animals and should NOT be kept as pets.
- No rabies observation period.
- Consider the animal factors.
  - If rabies is a concern → euthanize and test or consider PEP if owner refuses testing.
- Monkey bites have an additional risk for transmitting Herpes B virus.
  - Only for macaques.

# Species of Exposing Animal - Macaque

- Macaque monkeys are thought to be the natural host for the virus.
- Macaques infected with B virus usually show no symptoms.
- Infection in macaques can only be transmitted during active viral shedding through body fluids.
- Infection with B virus is extremely rare in humans but can result in severe brain damage or death if the patient is not treated soon after exposure.
- Infection in humans is typically caused by animal bites or scratches or by mucosal contact with body fluid or tissue.



## Cattle, Horses, Sheep, Goats, and Pigs

- Do not pose high risk for transmitting rabies.
- All exposures involving livestock should be reported to West Virginia Department of Agriculture.
- The animal may be kept under observation for 14 days.
  - Shedding period of virus in the saliva is unknown.
- Consider euthanasia and testing of the animal or PEP for the exposure victim.
- Always consult with your Regional Epidemiologist and Division of Infectious Disease Epidemiology (DIDE) staff.

## Raccoons, Foxes, Groundhogs, Skunks, Coyotes, and Bobcats

- Should be considered rabid unless proven negative by testing.
- LHD should be notified immediately.
- Confinement and observation is NOT an option.
- Animal is available → euthanize and test.
- Animal is not available → strongly recommend PEP.
- State laws prohibit importation, distribution, or keeping of wild animals or hybrids as pets.

# Species of Exposing Animal - Bat

- The majority of human cases of rabies in the U.S. were caused by bats.
- In all cases of human exposure, if possible, the bat should be safely collected and tested.
- PEP should be considered for all types of bat exposure unless the bat is tested negative.
- Always recommend seeking medical care in conditions where there is a potential exposure even with no visible wound.



# Species of Exposing Animal - Bat (cont.)

- Any bat that is active by day, is found in a place where bats are not usually seen, or is unable to fly, is likely to be rabid.
- Whenever possible, the bat should be captured, but it is best not to handle it.
- Suspect bat exposures are likely.
  - Awakening in a room with a bat.
  - Seeing a bat in the room of an unattended child.
  - Seeing bat near mentally impaired/intoxicated person.
- You cannot get rabies from having contact with bat guano, blood, urine, or from touching its fur.

# Type of Exposure

Only saliva and brain/nervous system tissues are considered infectious material.

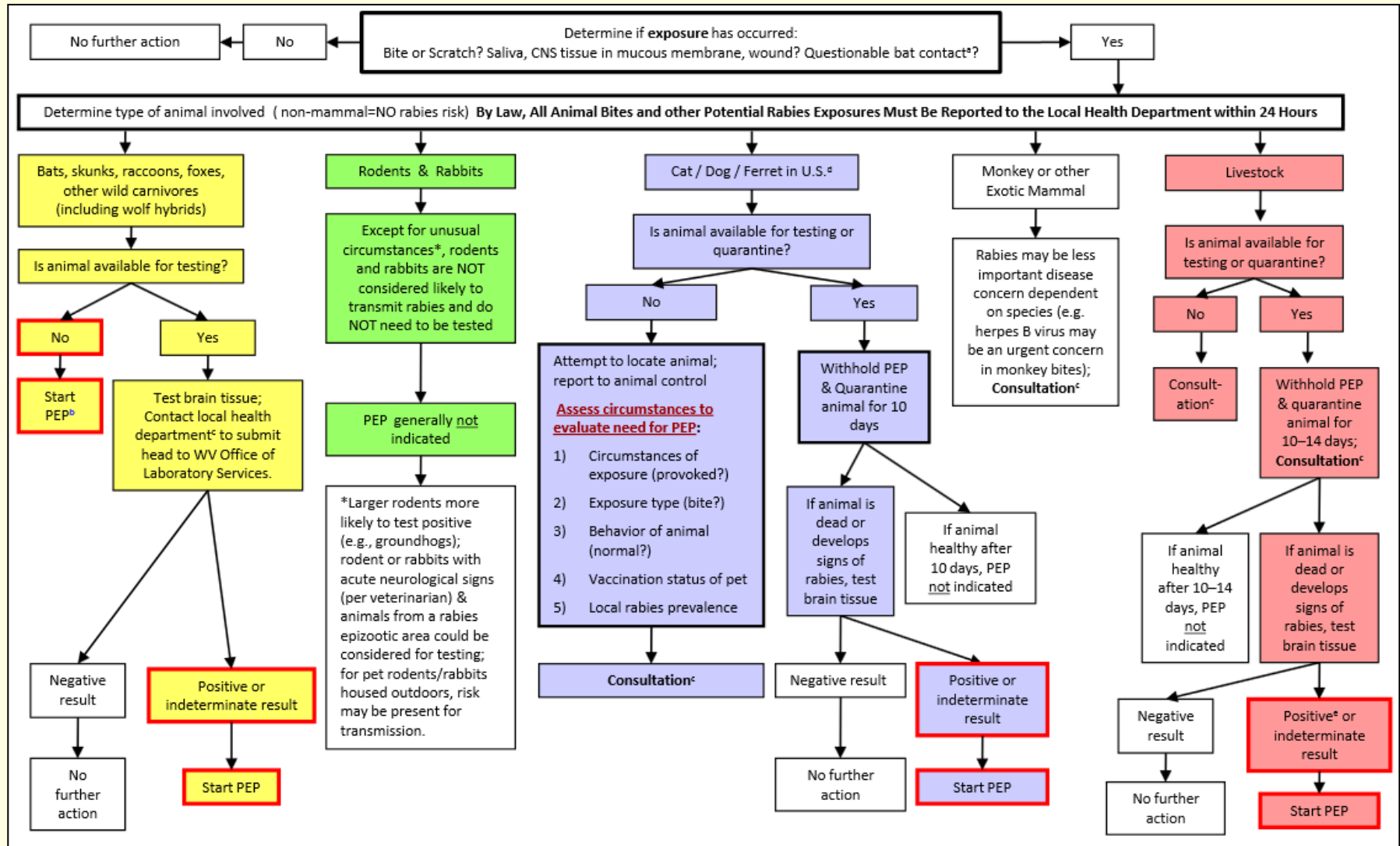
- Bite exposure: penetration of the skin by an animal's teeth. All bites represent a potential rabies exposure.
- Non-bite exposure: the contamination of open, fresh wound and/or mucous membrane by infectious material from a rabid animal.
- Non-exposure: petting, handling an animal or contact with blood, urine, or feces.

**Getting information about circumstances of the exposure can guide public health recommendations.**

- Is the animal vaccinated/up-to-date on vaccinations?
- How was the animal acting at time of exposure?
- Is the animal housed indoors or outdoors?
- In what county did the exposure occur?
  - Can use local rabies epidemiology for risk assessment.

- **Rabies surveillance data can assist in the decision making regarding the recommendation for PEP.**
  
- **Surveillance data includes:**
  - Incidence of animal rabies in the area (county).
  - Species of rabies-positive animal.
  - Year when last rabies-positive animal was reported.

# PEP Risk Assessment



# PEP Recommendations

## PEP for Immunocompetent Person not Previously Immunized

PRODUCT	ROUTE	SITE	DOSAGE	DOSES	SCHEDULE
HRIG	Around bite; Excess intramuscularly	Wound; Gluteus or anterolateral thigh	20 IU/kg (0.133 mL/kg)	1	Day 0
Vaccine	Intramuscularly	Deltoid <sup>1</sup> ; Anterolateral thigh <sup>2</sup>	1.0 mL	4	Day 0, 3, 7, 14

## PEP for Immunocompetent Person Previously Immunized

PRODUCT	ROUTE	SITE	DOSAGE	DOSES	SCHEDULE
HRIG	N/A	N/A	N/A	N/A	N/A
Vaccine	Intramuscularly	Deltoid <sup>1</sup> ; Anterolateral thigh <sup>2</sup>	1.0 mL	2	Day 0, 3

## PEP for Immunocompromised Persons (Previously Immunized & Not Immunized)

PRODUCT	ROUTE	SITE	DOSAGE	DOSES	SCHEDULE
HRIG	N/A	N/A	N/A	N/A	N/A
Vaccine	Intramuscularly	Deltoid <sup>1</sup> ; Anterolateral thigh <sup>2</sup>	1.0 mL	2	Day 0, 3
HRIG	Around bite; Excess intramuscularly	Wound; Gluteus or anterolateral thigh	20 IU/kg (0.133 mL/kg)	1	Day 0
Vaccine	Intramuscularly	Deltoid <sup>1</sup> ; Anterolateral thigh <sup>2</sup>	1.0 mL	5	Day 0, 3, 7, 14, 28

**Though public health can strongly recommend rabies PEP, it is ultimately a decision that is made between the patient and his/her physician.**

- **Human Rabies Immunoglobulin (HRIG):**
  - 20 IU/Kg
  - Injected at site of exposure and intramuscularly
  - Day 0 only
  
- **Vaccine:**
  - 1 ml doses injected intramuscularly
  - Days 0, 3, 7, and 14

# PEP for Previously Vaccinated

- **HRIG is not used**
- **Vaccine:**
  - 1 ml doses injected intramuscularly
  - Days 0 and 3



## For previously vaccinated, immunocompromised:

- **HRIG is not used**
  
- **Vaccine:**
  - 1 ml doses injected intramuscularly
  - Days 0 and 3

## For never vaccinated, immunocompromised individuals:

- **HRIG:**
  - 20 IU/Kg
  - Injected at site of exposure and intramuscularly
  - Day 0 only
  
- **Vaccine:**
  - 1 ml doses injected intramuscularly
  - Days 0, 3, 7, 14, and 28

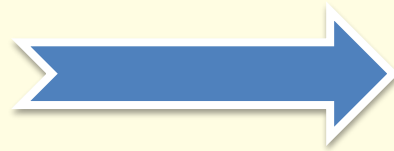
## Animal to Animal Exposures

## § 19-20-9a. For Dogs, Cats, and Ferrets

- If any unvaccinated domesticated animal is bitten by a rabid animal, the owner shall confine the bitten animal for a period of six months. The animal should be vaccinated at time of entry into confinement. Every effort should be made to vaccinate the animal within 96 hours of exposure.
  - **Primary recommendation is euthanasia.**
- Vaccinated domesticated animals are revaccinated, confined, and observed for 45 days.
- “If the animal is not confined and quarantined as directed in subsections...the humane officer, dog warden or sheriff may cause the animal to be placed in the custody and care of a licensed veterinarian...at the owner's expense.”

## DOGS, CATS, OR FERRETS WITH EXPIRED VACCINATIONS

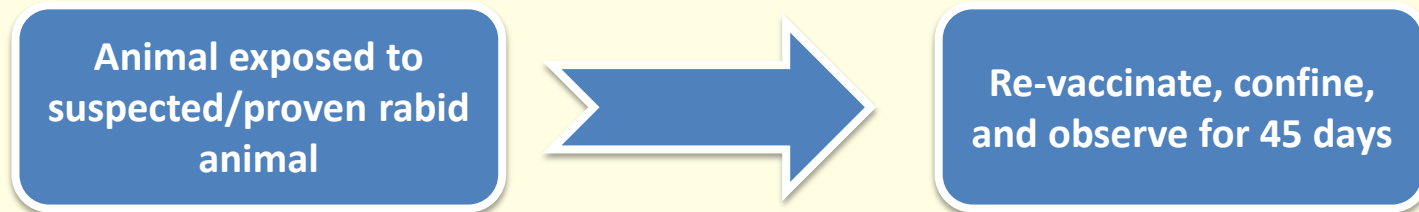
Animal exposed to  
suspected/proven rabid  
animal



Consider:  
Severity of exposure  
Time since last vaccination  
# of previous vaccinations  
Current health status  
Local rabies epidemiology

Consult with DIDE epidemiologists.

## VACCINATED LIVESTOCK



- Sign of illness should be immediately evaluated by a veterinarian.
- If signs of rabies develop → humanely euthanize animal and test immediately.
- If the animal dies → submit head to OLS for testing.
- Unvaccinated livestock should either be slaughtered or confined for 6 months.

**The West Virginia Department of Agriculture should be contacted for all suspected/proven rabid animals.**

## WILD OR EXOTIC ANIMALS



- Zoos or research institutions may establish vaccination programs which attempt to protect valuable animals, but the programs should not replace appropriate public health activities to protect humans from rabies exposures.
- Employees who work with animals at such facilities should receive pre-exposure rabies immunizations.

# Scenario #1: Itty Bitty Kitties

Woman in Preston County found two kittens in her neighborhood. Both kittens had visible wounds. The woman took the kittens to the local veterinarian to start their rabies vaccinations. The kittens remained in a cage away from other pets in the home. Two months later, one of the kittens appeared to have a broken back. The veterinarian suspected rabies. The animal was euthanized and tested positive for rabies at OLS. The woman contacted DIDE and shared that she had been bitten by the cat and that her mother was scratched. The woman wants to keep the second kitten but is concerned about it having rabies.

- How would you manage potential human exposure(s)?
- How would you manage potential animal exposure(s)?



# Scenario #2: Going Bananas

Woman in Kanawha County takes her pet monkey to Dollar General and the monkey bites another customer. The woman says that the monkey is a therapy monkey and is up-to-date on all vaccinations.

- How would you manage potential human exposure(s)?
- What should happen to the monkey?

# Scenario #3: Rac Attack

Husband and wife from Pocahontas County were sitting on their porch with their two dogs when a raccoon appeared on porch. The dogs proceeded to attack the raccoon. The husband gets scratched while trying to break up the fight between the dogs and the raccoon. The injured raccoon ran away. Only one of the dogs is vaccinated.

- How would you manage potential human exposure(s)?
- How would you manage potential animal exposure?

# Scenario #4: Gone Batty

Five year-old child in Wood County woke up screaming when she noticed that there was a bat on her bed. When her parents arrived in her room, her father opened the window to let the bat out. The child had no visible bite marks on her body.

- Is PEP recommended? If yes, for whom?

# Contact Information

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