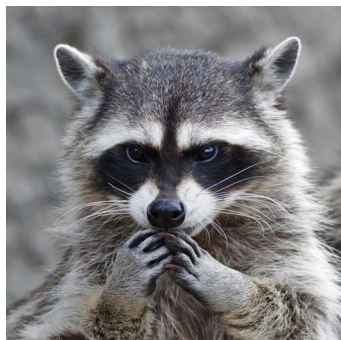




Module 4:

Raccoon Exposures

More Than Just Masked Mischief





Module 4 : Raccoon Exposures

- After completion of this module, learners have a better understanding of:
 - Epidemiology of rabies in raccoons and other wildlife in the US.
 - RIG (Rabies Immunoglobulin) Administration:
 - What RIG is.
 - RIG dosing.
 - How and where to administer RIG.



(CDC, 2024)



Case 3: The Backyard Fight *Presentation*

Chief Complaint:
Raccoon Bite



(CDC, 2024)

A man, aged 63, presents to the ER with a bite wound on his right leg. He reports that he was bitten by a raccoon in his backyard this morning in Maryland. He heard a commotion outside and found his dog, which is up to date on its rabies vaccination, fighting with a raccoon by the outside trash can. When he went to kick the raccoon off his dog, its jaws briefly locked down on his leg. The raccoon then fled into the bushes and disappeared.



Case 3: The Backyard Fight *Examination*



Chief Complaint:

Raccoon bite to the right leg.

- **Physical Findings:**

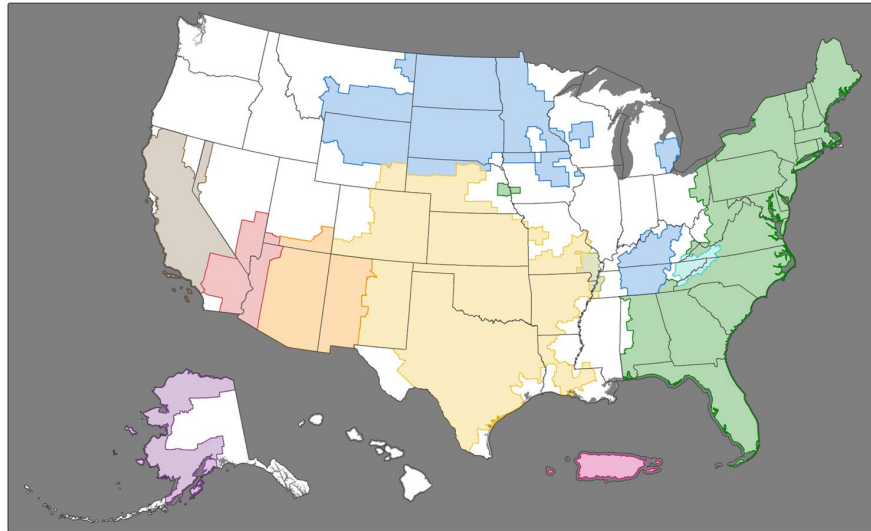
Lacerations and puncture wounds to the right calf.

- **Patient's Rabies Vaccination History:**

Not previously vaccinated.



The Epidemiology of Raccoon Rabies in the US



Rabies Virus Variant territory

ARC FX	CA SK	AZ FX	AZ FX & SC SK	SC SK	NC SK & NC SK	NC SK	NC SK & E RC	E RC	PR MG
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- **Raccoons** are the predominant reservoir for rabies in the eastern United States.
- Raccoons outside of the eastern United States can also become infected with and transmit other variants of the rabies virus.
- **In the absence of a negative rabies diagnosis, ALL raccoons involved in an exposure incident in the eastern US should be suspected of having rabies!**



Raccoon Rabies in the US by the Numbers

To keep the raccoon rabies variant area contained, the USDA drops oral rabies vaccine into raccoon habitats along the western edge of the raccoon variant front.

Raccoon Rabies Data:

- Nationwide, 1080 raccoons tested positive for rabies in 2024, 12 of which were outside the raccoon rabies variant reservoir area.
- In Maryland, 131 raccoons tested positive for rabies in 2024 (**65% of all positive animals**).
- Between 2000 and 2023, **44.1% of all raccoons tested for rabies in Maryland were positive.**



Oral Rabies Vaccine (USDA, 2023)



Case 3: The Backyard Fight

Risk Assessment



Risk Assessment:

- The epidemiology of raccoon rabies in Maryland suggests a high likelihood that the raccoon in this scenario is rabid. The raccoon is not available for testing and should be regarded as rabies suspect.
- The patient was bitten by the raccoon and, therefore, possibly exposed to the rabies virus.



Case 3: The Backyard Fight

PEP Determination

PEP Decision:

Initiate rabies PEP.



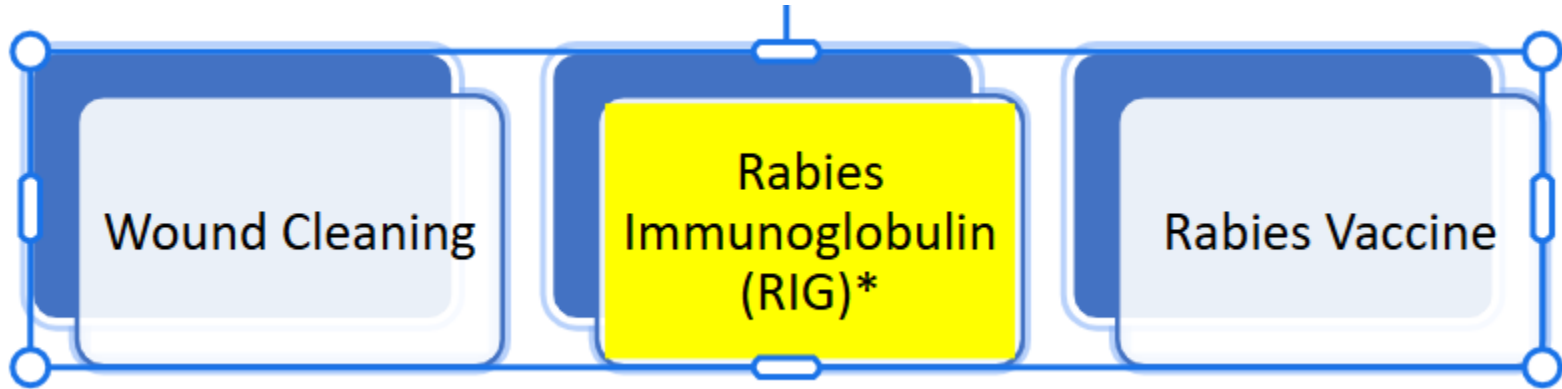
What about his dog?

Local health and animal control officials will work with the patient and provide him with specific instructions based on his dog's vaccination status.

In this scenario, since the dog is up to date on its rabies vaccination, the dog should receive an immediate booster vaccination, stay under the owner's supervision, and be monitored for signs of rabies for 45 days.



Three Components of Rabies PEP



*only if the patient has *not* previously received a full course of rabies PEP or PrEP

What is RIG?

- RIG comprises of IgG derived from the plasma of donors who have been hyperimmunized with the rabies vaccine. Human RIG (hRIG) originates from human donors and is the only type of RIG approved for use in the United States. RIG, derived from horses or eRIG, is commonly used in other countries.

RIG serves to:

- Provides **passive immunity** before the patient's body can develop its own immunity through vaccination.
- **Neutralizes the rabies virus directly** at the exposure site, before the virus has time to penetrate peripheral nerves and migrate to the central nervous system.



(FDA, 2017)

Who Gets RIG?

For people who have **never been vaccinated** against rabies, PEP should **ALWAYS** INCLUDE the administration of **HRIG** and **rabies vaccine**!

- The combination of HRIG and vaccine is recommended for both bite and non-bite exposures, regardless of the interval between exposure and initiation of treatment, so long as the patient is not showing signs consistent with rabies.
- For people who have previously been vaccinated against rabies (and are not immunocompromised), PEP consists of two doses of vaccine three days apart. RIG should not be administered to these persons.



(FDA, 2017)



Who Gets RIG: Additional Considerations

Per the CDC Rabies Team, for people who have **previously been vaccinated** against rabies and ARE **immunocompromised**:

“Individuals who were previously vaccinated, but who have newly developed or worsening immune disorders may not respond well to a 2-dose booster series; full PEP with HRIG and 5 doses of vaccine should be considered.

If there is any doubt in a patient's ability to respond adequately to vaccination, a titer check is always a reasonable action.”

Contact your local or state health department for further guidance.



What is Rabies **PrEP**?

Rabies pre-exposure prophylaxis (PrEP) is a series of rabies vaccines given BEFORE exposure to the rabies virus. Persons who may receive PrEP include:

- Persons who work directly with animals that could have rabies (ex., veterinarians, wildlife officers, and animal control personnel).
- Persons traveling to parts of the world where rabies is common and access to medical care is limited.
- Persons working in laboratories handling live rabies virus or potentially rabid animals





Rabies **PrEP** Schedule

- Updated 2022 ACIP rabies PrEP recommendations consist of a **two-dose PrEP vaccine schedule (on days 0 and 7) to protect people from rabies for up to three years**. Options for maintaining protection beyond three years are outlined in the ACIP recommendations and include vaccine titers or a booster dose depending on individual risk category.
- Individuals should consult current ACIP recommendations to determine their risk category based their potential for both recognized and unrecognized rabies exposures.

Decisions regarding whether a person should be considered pre-immunized for rabies should be made in consultation with state or local public health professionals.

How Much RIG Should Be Administered?

- The recommended dose of HRIG is 20 IU/kg body weight for all age groups, including children.





Where To Administer RIG: The Basics



- To be optimally effective, **as much of the RIG dose as anatomically feasible should be infiltrated in and around all exposure sites.**
- Infiltration of the exposure site/wound introduces neutralizing antibodies directly into the exposure site, where they can bind to any rabies virus that may be present in the tissue.



Where Should RIG Be Administered?

- If there is **no bite or scratch** (like in many bat exposures) and the **location of contact is unknown**, then the full dose of RIG should be administered intramuscularly (IM) at a site distant from the site of the rabies vaccination.
- If there is **no bite or scratch or the wound is healed/healing** and the **location of contact is known**, then RIG should still be administered at the site where contact occurred.
- If wounds **are visible**, as much of the dose as anatomically feasible should be infiltrated into and around any detectable bite or scratch wounds.

Any remaining volume should be administered IM into an anatomical site distant from the rabies vaccine site.

Administration of RIG in the gluteal region should be avoided whenever possible!



RIG: Distal Extremities and Healed Wounds

- If the wound is **small and on a distal extremity** (ex., finger, toe), use clinical judgement to decide how much RIG to inject to avoid complications (e.g., ischemia, compartment syndrome) due to localized swelling of the fingers or toes. Any additional dose should be administered intramuscularly at a site distant from the vaccine injection site.
- If the wound is **healed or healing**, still administer as much RIG as anatomically feasible in the area where the wound was/still is.



RIG: Extensive Wounds

- If the **wound is extensive**, do not exceed the dose-appropriate volume of HRIG. If the indicated volume is inadequate to inject all wounds, you can dilute the HRIG with normal saline to ensure sufficient volume to inject all wounds.*

* The one exception is the newer and more concentrated version of HRIG, HyperRAb 300 IU/ml, which requires using dextrose 5% in water (D5W) as the diluent. HRIG dilution is particularly important in children whose body weight might be small in relation to the size and number of wounds.

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Important Do's for RIG



To maximize the benefits of RIG, **Do:**

- ✓ Give RIG to ALL patients receiving rabies PEP who have not been previously vaccinated against rabies.
- ✓ If possible, infiltrate all sites of exposure. Failure to do so has been linked to PEP failure.
- ✓ Administer RIG as early as possible after exposure to neutralize the virus.
- ✓ Use different syringes for RIG and vaccine.
- ✓ Delay wound closure (if indicated) until wounds have been infiltrated with RIG.



Important **Don'ts** for RIG



To avoid complications and reduced effectiveness:

- ✓ **Don't** give RIG to a patient who has been previously vaccinated against rabies who is not immunocompromised.
- ✓ **Don't** give more than the recommended dose.
- ✓ **Don't** administer RIG at the same anatomical site or in the same syringe as the vaccine.
- ✓ **Don't** administer RIG later than 7 days after the vaccine series has been initiated.
- ✓ **Don't** administer RIG into the gluteal area unless the gluteal area is the site of exposure or all other acceptable anatomical regions have been utilized.

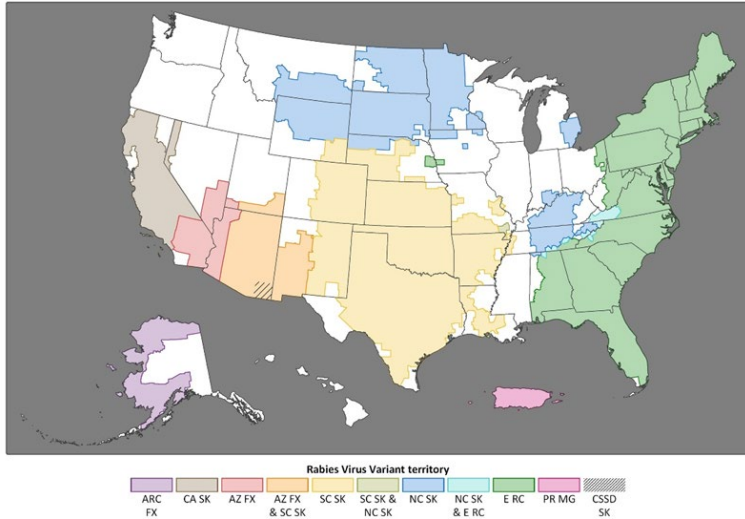


Case 3: The Backyard Fight *PEP Administration*



1. Clean the wound thoroughly using soap, water, and, ideally, an antiseptic agent such as povidone iodine. Consider a tetanus booster (Tdap) and other adjective therapies for wound management.
2. Calculate the volume of RIG to administer based on the patient's weight and recommended dose 20 IU/kg.
3. Infiltrate as much RIG as anatomically feasible in and around the wound/site of exposure.
4. Inject the remainder of the RIG, if any, into a muscle (e.g., deltoid or thigh) distant from where you plan to administer the vaccine.
5. Initiate rabies vaccination series.

Rabies in Wildlife



(CDC, 2024)

- Wildlife accounts for over 90% of U.S animal rabies cases.
- Rabies virus variants are maintained in specific wildlife reservoirs (**raccoon, skunks, foxes, bats, and mongoose**) and circulate in defined geographic areas.
- Rabies risk varies by location and species. The geographic location of exposure should be considered when assessing PEP need.

When in doubt, always consults with your local or state health department.



Other Wildlife Considerations



(Mike Budd/USFWS, 2023)

- In addition to bats and raccoons, skunks and foxes are also rabies reservoirs in the United States. In Puerto Rico, the mongoose is the dominant reservoir.
- Any bite or scratch from a wild mammal in an area with endemic terrestrial rabies should be considered a possible rabies exposure unless the animal tests negative for rabies.
- In Maryland, in 2024, there were 9 rabies-positive foxes, 8 rabies-positive groundhogs, 21 rabies-positive skunks, and 1 rabies-positive coyote.



Small Rodents and Opossums

- Small rodents such as mice, rats, chipmunks, and squirrels **are very rarely infected with rabies** and have not been known to transmit rabies to humans.
- Small rodent exposures **DO NOT typically require PEP**. However, please contact the your local or state health department for any unusual circumstances.
- Birds, fish, reptiles, and amphibians do NOT transmit rabies.
- Opossums can get rabies. A common myth is that they are immune to the virus.



(USFWS, 2021)



Knowledge Check Module 4

TRUE OR FALSE?



Knowledge Check Question 1

TRUE OR FALSE?

If an immunocompetent vet-tech with a history of complete rabies PrEP was bitten by a kitten that later tests positive for rabies, the vet-tech should get the whole series, including RIG, because of the high risk of rabies from the exposure.



Knowledge Check Question 1 Answer

If you answered FALSE, you were correct.

Administering RIG to a previously vaccinated person can interfere with the effectiveness of the booster vaccines by suppressing the body's natural secondary (anamnestic) immune response.



Knowledge Check Question 2

TRUE OR FALSE?

A person with no previous history of rabies vaccination who had mucosal contact with potentially infectious saliva but wasn't bitten or scratched does not require RIG because there is no bite to infiltrate.



Knowledge Check Question 2 Answer

If you answered FALSE, you were correct.

All rabies exposures requiring PEP should include RIG unless the person is previously vaccinated. RIG is not infiltrated into mucous membranes (eyes, mouth, nose), so a full dose of RIG would be administered in a muscle distant from the anatomical location of the rabies vaccine.



Module 4

Conclusion

Exit and proceed to the next module