



**The What, Where, When and How About
Rabies Exposures and Rabies Post-exposure
Prophylaxis (PEP)**

OBJECTIVES

- Gain familiarity with risk assessments for PEP
- Learn the biologics used for rabies PEP
- Scenarios – actual real-life ones

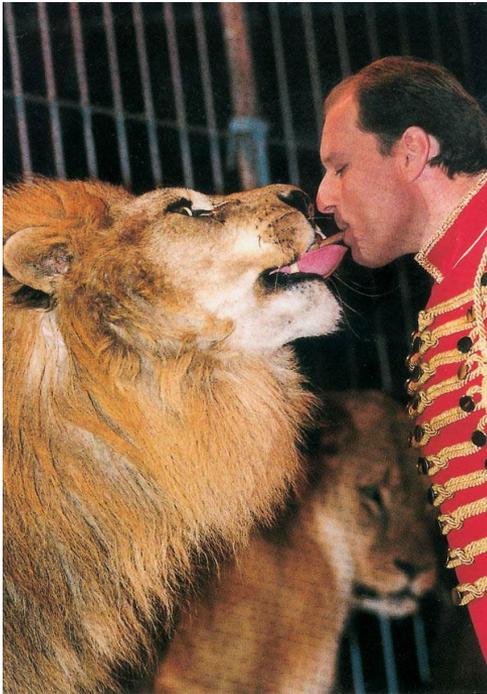
THE RABIES VIRUS *IS*:

- Shed in salivary glands; present in brain/spinal cord
- Not found to a significant extent in other body fluids
- Transmitted via bites, possibly saliva into open wounds or mucous membrane
- Not able to invade intact skin
- Killed by UV light, drying, soap and water and any disinfectant

THE RABIES VIRUS IS *NOT*:

- transmitted by:
 - Blood
 - Urine
 - Feces
 - Skunk spray

A RABIES EXPOSURE IS NOT FROM:



- touching a rabid animal
- touching something a rabid animal touched
- being in the same room as a rabid animal
- A “dry scratch” where there was no saliva contamination



UNIQUE ASPECTS OF RABIES INFECTION



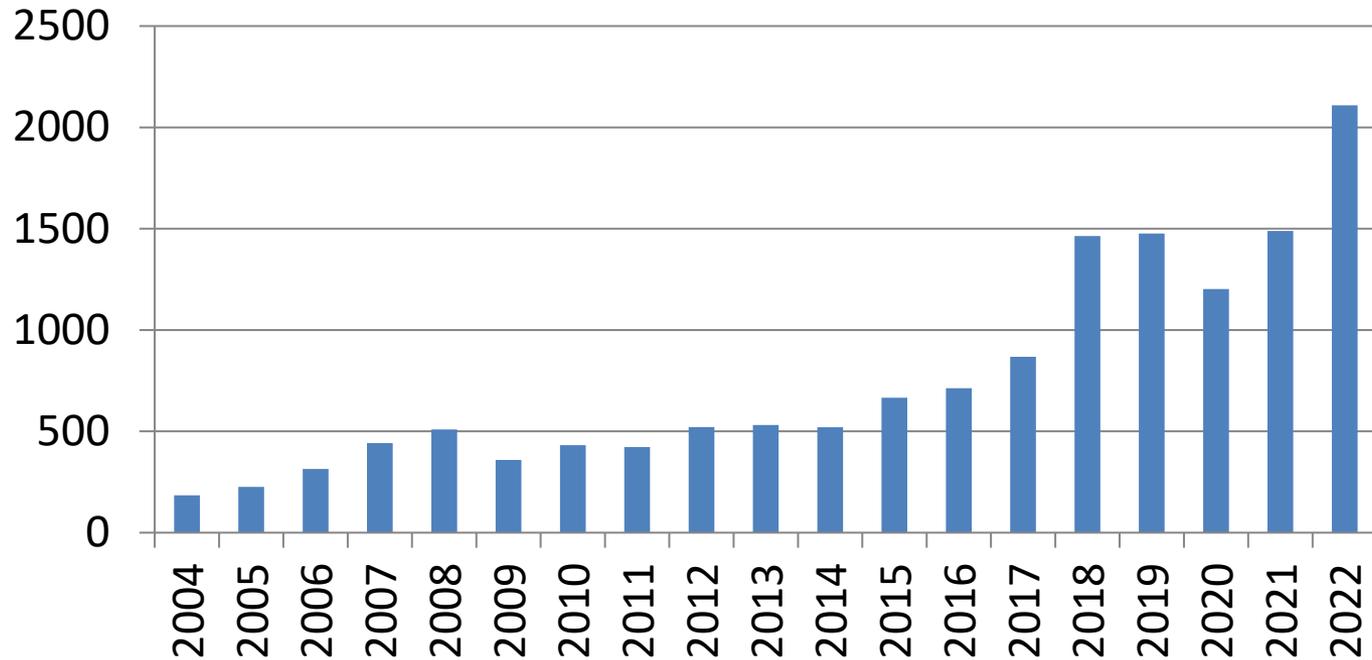
The virus attaches to nerves, where it is hidden from the bitten person's immune system.

There is no early diagnostic test that can tell if a person has been infected.

Can't wait for symptoms to initiate treatment.

An immediate risk assessment must be made after the exposure.

NUMBER OF POSSIBLE HUMAN EXPOSURES TO RABIES REPORTED IN ILLINOIS, 2004-2022 (2022 PROVISIONAL)

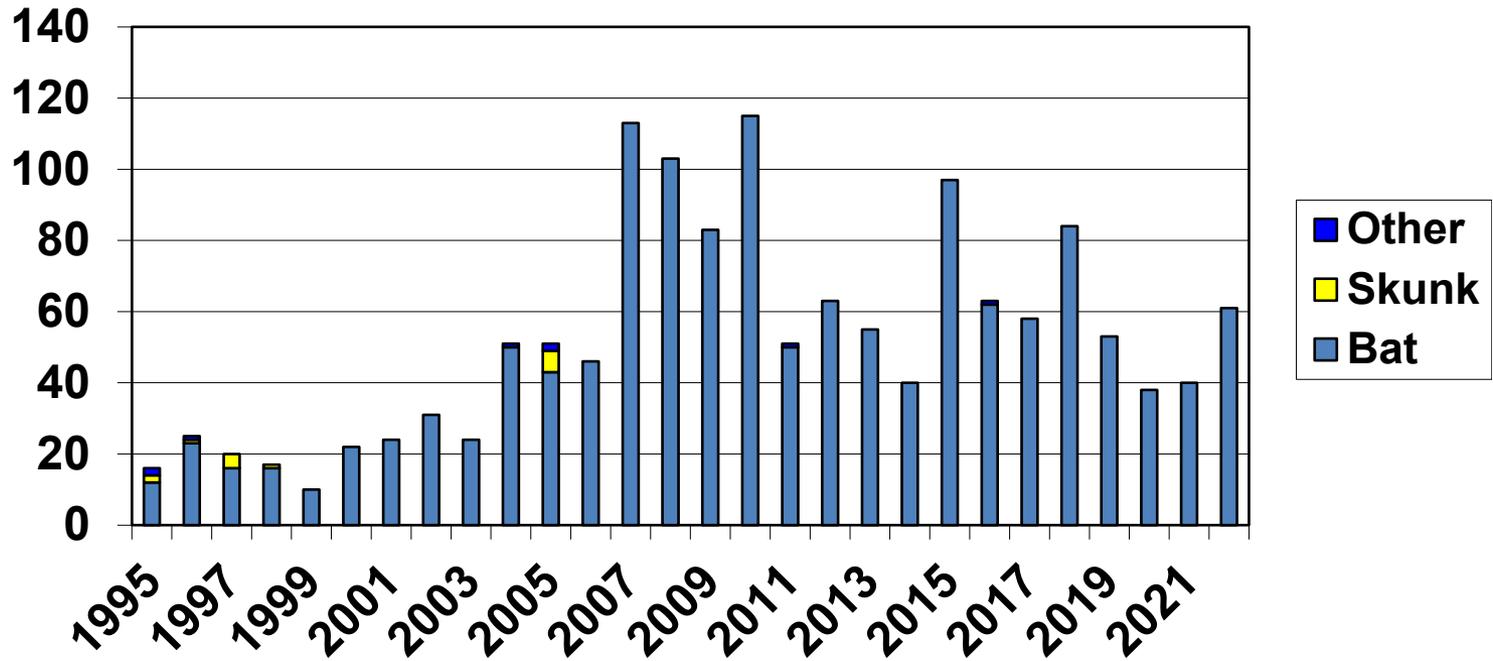




ANIMAL RABIES



ANIMAL RABIES IN ILLINOIS, 1992-2022



RISK OF RABIES BY SPECIES IN ILLINOIS



- **Low**
 - Rodents
 - Rabbits
 - Pocket Pets (hamsters, gerbils, guinea pigs etc)
 - Dogs, cats, ferrets
 - Livestock

- **High**
 - Wild animals, e.g. raccoon, skunk, fox, hybrids
 - Bats



ASSESSING EXPOSURE

WHY IS IT IMPORTANT TO CORRECTLY ASSESS EXPOSURE?

- Costly rabies PEP treatment may be over utilized, resulting in financial burden on healthcare systems
- Some individuals have reported the first day of treatment for rabies was \$20,000.
- If someone does not have insurance or has a high deductible or copay this is VERY expensive.
- Recommend it when needed, but not for every exposure

MILLIONS OF BITES, THOUSANDS OF ED VISITS WHAT DO THESE PATIENTS REALLY NEED?

- Wound care
- Antibiotic therapy
- Tetanus Booster or TIG administration¹
 - Many immigrants not adequately vaccinated against tetanus, thorough history needed
- Rabies specific risk assessment

¹ Talan DA, Abrahamian FM, Moran GJ, et al. Tetanus immunity and physician compliance with tetanus prophylaxis practices among emergency department patients presenting with wounds. *Ann Emerg Med.* 2004;43:305-314.

PEP

Administration of PEP is medically urgent, but not an emergency

Start within a few days if needed

If high risk animal available for testing, test animal

STEPS IN ASSESSING EXPOSURES

- Confirm exposure
- Species of exposing animal
- Geographic location
- Availability of the animal for testing/observation
- Vaccination status of domestic animal
- For dogs,cats,ferrets: Circumstances of the bite





- Low risk bites
- Bites from species such as rabbits, squirrels, chipmunks, rats and mice seldom, if ever, call for rabies prophylaxis



LOW RISK

Dogs, Cats, and Ferrets



- A high number of bites are caused by dogs & cats
- Remaining healthy during a 10-day quarantine is evidence that the pet was not shedding rabies virus at the time of the bite
- Treatment can be withheld, pending results of testing or quarantine unless the animal is symptomatic including unprovoked bites
- Pet vaccination is very effective

PROVOKED OR NON-PROVOKED?

- Provoked exposures:
 - Attempting to feed the animal
 - Entering the animal's territory
 - Breaking up a fight between 2 or more animals
 - Handling an injured animal
 - Running, or riding a bike past an animal
 - Unprovoked exposures:
 - Bite when sitting and reading at a park bench
- GET DETAILS TO ASSESS SITUATION!



Have a break, have a Kit-Kat



SCENARIO

- A dog is vaccinated for rabies
- Dog has always had a nice temperament
- Dog bites owner after it had onset of blindness, extreme aggression
- Vet suspects rabies

SCENARIO

- Child is visiting their mother's friends house
- Vaccinated dog attacks child
- Child is unconscious and ear is found in yard

- Thoughts about PEP?

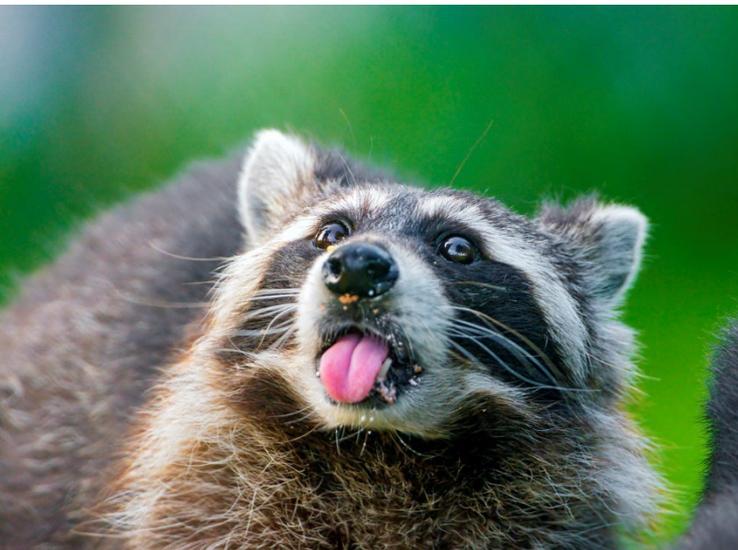
HIGH RISK WILD ANIMAL (BAT, SKUNK, COYOTE, RACCOON, FOX) BITE

- Rabies PEP recommended unless can test the animal negative



SCENARIO

- A person was bitten on the finger by a raccoon
- The hospital told the person to quarantine the raccoon for 10 days no need for rabies PEP



BAT BITE ON FINGER





BAT EXPOSURES



- Small bites; may go unrecognized
- Always ideal to test bat if available
- Bat testing and/or PEP indicated in response to:
 1. Known bite
 2. Direct contact and bite cannot be ruled out
 3. Situations where exposure may have gone unrecognized like bat found in the same room as a sleeping or mentally impaired or very young person

Testing the bat is VERY IMPORTANT!

CAVEATS TO BAT EXPOSURE RECOMMENDATIONS

- The risk is very, very low when there is no known physical contact with a bat
 - Wait for test results
 - No bat, no PEP (Tiny skin wounds can be anything)
 - We draw a line at the bedroom door for sleeping people
 - When people are awake, we need physical contact with a bat to warrant giving PEP

SCENARIO

- 2 yr old child was outside. Mother heard child shriek, went outside and child had hand closed around a bat. “The bat seemed very angry”. They arrive at ED
- What is the most important piece of information you need before starting child on PEP

SCENARIO

- A person awakes to find a bat in the room.
- The bat tests neg
- She sees puncture marks on her hand
- The next day she finds another bat in her bedroom closet but it escapes without testing
- PEP?

SCENARIO

- A bat is found flying in a house at night. No one woke up to the bat in their room. All bedroom doors were open. The bat is not available for testing.
- Would PEP be recommended for all family members?
- Any change in the recommendation if the bat tests positive for rabies?

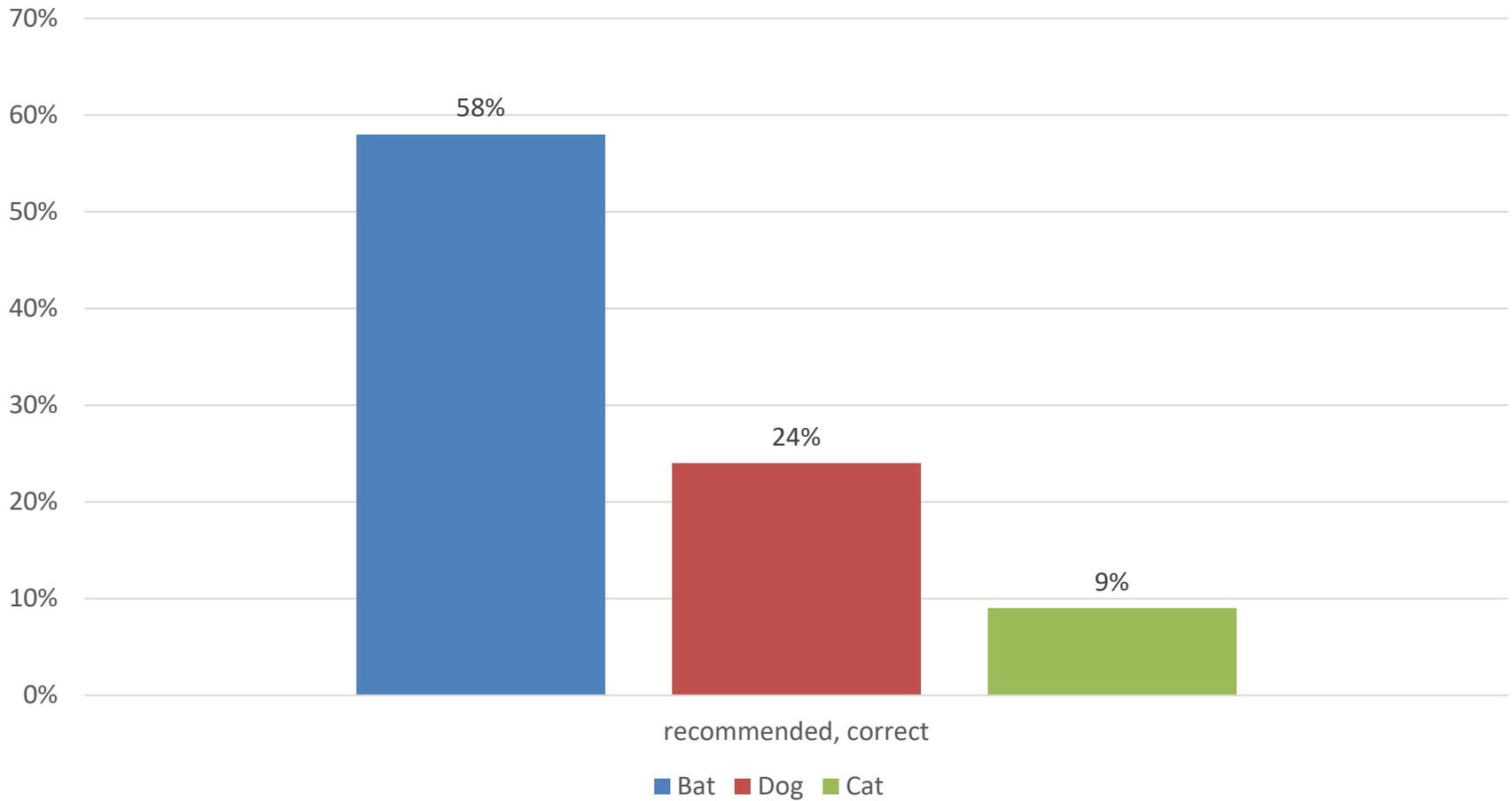


RABIES POST-EXPOSURE PROPHYLAXIS (PEP)

RATIONALE FOR RABIES VACCINATION

- Following inoculation of rabies virus into a human by a rabid animal, the virus replicates locally before invading the nervous system
- This delay provides an opportunity to neutralize the virus
- Once virus has gained access to the nervous system, it is beyond immune attack.

Correctness of Rabies PEP Recommendation



WHERE SHOULD VACCINE BE INJECTED?



Rabies vaccine should be injected in deltoid muscle. In babies, the vastus lateralis (outer thigh) is also an acceptable injection site.

Rabies vaccine should not be injected in gluteus. Studies have shown this site yields lower antibody titers.

To minimize antagonism from RIG, vaccine should be injected in acceptable site distant from where RIG was administered

- Ex., if RIG administered anywhere on right arm, vaccine should be injected in left deltoid

WHAT IS RIG?

- RIG is only indicated in patients who have not previously received full course of rabies PEP or pre-exposure immunization
- RIG is *always* indicated if there is need for post-exposure prophylaxis and the person was not previously vaccinated

WHAT IS RIG? (CONT.)

- In the U.S. RIG comprises IgG derived from plasma of hyper-immunized human donors
- RIG serves two purposes:
 1. Passive immunity during the lag period before active immunity from vaccination
 2. It neutralizes rabies virus directly at exposure site, before virus has time to penetrate peripheral nerves and migrate to central nervous system



IMPORTANT DON'TS FOR RIG



- Because RIG partially counteracts effectiveness of vaccine and can suppress active immunity, heed the following:
 - Don't give RIG to patient who has previously been vaccinated against rabies
 - Don't give more than recommended dose
 - Don't administer at same site as vaccine
 - Don't give in gluteus due to sciatic nerve
 - Don't give later than 7 days after the vaccination series has been initiated

SCENARIO

- A person was bitten by a bat 5 days ago and just looked on-line and found out that bats can carry rabies.
- They would like to know if it is too late to receive rabies PEP?

RABIES POST-EXPOSURE PROPHYLAXIS (PEP) (EXPOSED INDIVIDUALS NOT PREVIOUSLY VACCINATED)

- Rabies Vaccine
 - Given on days 0, 3, 7, and 14 (5th dose on day 28 if immunocompromised)
- Administer Rabies Immune Globulin (RIG)
 - 20 IU/kg
 - Infiltrate as much as feasible around wound
 - Remainder IM at a site distant from vaccine administration
 - Gives passive immunity up to 21 days

Rabies PEP is typically given at a hospital ED



SCENARIO

- An Illinois resident is in China and their family member in Illinois calls to ask what should they do. The person in China was bitten by a family member's dog in China. The dog is typically aggressive with people. They were started on rabies treatment in China. The packaging for the vaccine was in Chinese.
- What do you need to know?

HUMAN RABIES PEP IF PREVIOUSLY VACCINATED; 2 DOSES, 2 VISITS*



1 ml (IM) into deltoid
(adults) or into
anterolateral area of
thigh (children)



D 0 D 3
x 1 x 1

D 0
Wound
Cleansing

IF THE ANIMAL TESTS NEGATIVE

- No need to initiate PEP
- PEP can be discontinued if already started

Incorrect Administration of PEP, 2022

51% of the time

Error	% of total errors
Incorrect timing of vaccines	55%
Incorrect Location of RIG administration	20%
Incorrect location of vaccine administration	17%
No RIG given when needed	7%
Other (RIG x 2, extra vaccine doses, incorrect for someone with previous rabies PEP or pre-exposure)	4%

DIFFICULT CONSULTATIONS – **PLEASE CALL!**

- Patients who have initiated PEP in other countries
- Deviations from schedule occur
- Exotic or unusual species bites
- Dog or cat exposure PEP administration
- Grey areas

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KEY POINTS - SUMMARY



- *Risk Assessment is Critical*
- *There is no test available to detect rabies infection early after exposure*
- *Prophylaxis must be started soon after exposure*