

RABIES PRE- AND POST-EXPOSURE PROPHYLAXIS

I. EPIZOOTIOLOGY AND EPIDEMIOLOGY OF RABIES IN OKLAHOMA:

Rabies is enzootic in Oklahoma with cyclical animal outbreak activity (greater than 200 laboratory-confirmed cases) occurring every 8 - 10 years. Most human exposures to rabies in Oklahoma occur when persons are exposed to a rabid domestic animal that was infected through a rabid skunk encounter, or they were exposed to a rabid bat.

II. ETIOLOGY AND SPREAD:

- A. The rabies virus belongs to the genus *Lyssavirus* in the family *Rhabdoviridae*. The rabies virus multiplies at the site of inoculation then uses the peripheral nervous system to migrate and ascend to the central nervous system, ultimately causing encephalitis. In a rabid animal or person, the virus is present in saliva, tears, cerebrospinal fluid, and neurologic tissue (brain, spinal cord, and peripheral nerves). Transmission of rabies is most likely to occur following a bite from a rabid animal. Non-bite exposures to rabies may result if saliva or neurologic tissue/fluid contacts a mucous membrane (eyes, nose, mouth, genitalia) or a fresh, open skin wound. Rabies virus does not enter the blood stream, so blood is **not** an infectious fluid. Rabies virus is also not present in the urine, feces, or milk. The rabies virus cannot penetrate intact skin. Rabies virus is very fragile outside of the animal host, and is rapidly inactivated by drying or exposure to ultraviolet light.
- B. There is no known effective treatment for rabies, so the disease is considered universally fatal once symptoms of rabies have begun. Fortunately, the relatively slow incubation period of rabies (average of 4 - 12 weeks) allows for the successful initiation of rabies post-exposure prophylaxis (PEP) for most patients.

III. PRE-EXPOSURE PROPHYLAXIS FOR CERTAIN OCCUPATIONAL OR AVOCATIONAL GROUPS:

- A. Pre-exposure vaccination is indicated for persons whose occupation, travel, or recreational activities place them at higher risk of exposure to rabies. Occupational groups include veterinarians, veterinary technicians, animal control officers, bat researchers, wildlife workers, and animal disease laboratory workers. International travelers are recommended to receive pre-exposure vaccination if they are likely to contact animals in countries where canine or other animal rabies is prevalent, and immediate access to appropriate medical care, including rabies vaccine and immune globulin, might be limited. Refer travelers to the CDC Travelers Health website for country-specific recommendations at www.cdc.gov/travel/.
- B. Pre-exposure prophylaxis is given for two reasons:
 - 1. To provide protection against unrecognized or unapparent exposures to rabies.
 - 2. To simplify post-exposure prophylaxis (PEP) by eliminating the need for rabies immune globulin (RIG) and by decreasing the number of required vaccine doses.

Pre-exposure immunization does not eliminate the need for prompt post-exposure prophylaxis following a recognized exposure; it only reduces the PEP regimen. Therefore, before initiating PEP, a complete immunization history should be obtained from the client to determine the correct PEP immunization schedule.

C. Initial Primary Pre-Exposure Course:

1. Series of three 1-ml doses of human rabies vaccine (human diploid cell vaccine [HDCV] or purified chick embryo cell vaccine [PCECV]) administered intramuscularly in the deltoid muscle on days 0, 7, and 21 or 28.
2. *Intradermal administration of human rabies vaccine is no longer approved for pre- or post-exposure prophylaxis.*

D. Serologic Testing To Determine Need For Booster Dose Of Vaccine

1. It is advised that rabies antibodies are measured using the Rapid Fluorescent Focus Inhibition Test (RFFIT). The recommended interval for serological testing is determined by the person's risk category.
 - a. **Continuous risk:** These are persons who work with rabies virus in research laboratories or vaccine production facilities and are at the highest risk for unapparent exposures. Such persons should have a serum sample tested for rabies virus neutralizing antibody every 6 months.
 - b. **Frequent risk:** This includes other laboratory workers (e.g., those performing rabies diagnostic testing), cavers, veterinarians and staff, and animal control and wildlife officers in areas where animal rabies is enzootic. The frequent-risk category also includes persons who frequently handle bats, regardless of location in the United States or throughout the world, because of the existence of lyssaviruses on all continents except Antarctica. Persons in the frequent-risk group should have a serum sample tested for rabies virus neutralizing antibody every 2 years.
 - c. **Infrequent risk:** This includes veterinarians, veterinary students, and terrestrial animal-control and wildlife officers working in areas where rabies is uncommon to rare. This group also contains certain at-risk international travelers who have completed a full pre-exposure vaccination series with licensed vaccines and according to schedule. This group does not require routine serologic verification of detectable antibody titers or routine pre-exposure booster doses of vaccine. If they are exposed to rabies in the future, they are considered immunologically primed against rabies and simply require PEP for a person previously vaccinated (i.e., days 0 and 3 vaccination).
2. **Booster Dose Schedule**
 - a. If RFFIT titer is *less than* 1:5 or less than 0.5 IU/mL, a single booster dose of 1.0 ml human rabies vaccine should be administered intramuscularly in the deltoid muscle.
 - b. If RFFIT titer is greater than 1:5 or greater than 0.5 IU/mL, no booster is needed at this time.
 - c. If RFFIT titer is equal to 1:5 or 0.5 IU/mL, evaluate individual risk of unapparent rabies exposure. May elect to receive booster dose of vaccine, or recheck titer in 6 - 12 months.

3. Veterinarians and other at-risk persons may encounter difficulties obtaining pre-exposure immunization services from private physicians or other medical facilities, so this is an important public health service that a county health department may choose to provide in their community.
4. Two primary laboratories perform the RFFIT in our region. Shipping information, costs, and submission forms should be obtained in advance to ensure test requisition process goes smoothly. Refer to testing lab's website for forms and instructions.
5. Draw blood into 5 ml serum separator tube. After centrifugation, pack properly labeled serum separator tube in a leak-proof container with absorbent material. Enough pre-frozen gel packs for the anticipated duration of transit should be placed in the package. The use of an overnight or next day carrier is highly recommended.
6. Contact information for laboratories:

Atlanta Health Associates Inc.
309 Pirkle Ferry Road, Suite D300
Cumming, GA 30040
(770) 205-9091
(800) 717-5612
www.atlantahealth.net

Kansas State University Rabies Laboratory
2005 Research Park Circle
Manhattan, KS 66502
(785) 532-4483
www.vet.k-state.edu/rabies

IV. MANAGEMENT OF BITING ANIMALS:

Animal bite reports of concern should be referred to the county health department public health specialist or the Epidemiologist-on-Call for the Acute Disease Service (ADS), Oklahoma State Department of Health (OSDH) (405-271-4060).

V. RABIES RISK EXPOSURE ASSESSMENT:

- A. Animal and human exposure assessments are conducted by an ADS epidemiologist.
- B. When a person is determined to have an exposure that could result in infection with rabies, he/she is referred to their health care provider or other medical facility to receive rabies PEP as soon as possible.
- C. The ADS epidemiologist reviews the rabies PEP schedule with the exposed person and provides the information by phone or fax to the provider when needed to ensure the immunization schedule is correctly followed.
- D. Infrequently, the exposed person is uninsured and ineligible for Medicare, Medicaid, or other medical reimbursement programs. In these instances, the State Epidemiologist, Community & Family Health Services Medical Director, or County Health Department Medical Director, in collaboration with the Regional Director, may activate the following protocol to be provided through the county health department.

VI. RABIES POST-EXPOSURE PROPHYLAXIS

- A. This section may be activated in collaboration with the Regional Director.
- B. Wound cleaning is extremely important in decreasing the risk of rabies virus infection. Animal bite wounds should be immediately cleansed with soap and water. Wound care should occur by a primary care physician or emergency department/urgent care center.
- C. Administer Rabies Post-exposure Prophylaxis (PEP) per recommended schedule*

Vaccination status	Treatment	Regimen*
Not previously vaccinated	Wound cleansing	All PEP should begin with immediate thorough cleansing of all wounds with soap and water. If available, a virucidal agent such as povidone-iodine solution should be used to irrigate the wounds.
	Human Rabies Immune Globulin (HRIG)	Administer 20 IU/kg body weight on day 0. Infiltrate the area of the bite with as much HRIG as is anatomically feasible, even if the bite is healing. Inject any remaining HRIG intramuscularly (IM) in a different injection site, such as the hip or thigh, on the opposite side of the body from where the vaccine was administered. HRIG should not be administered in the same syringe as vaccine or in the same anatomical site as vaccine dose. Because RIG might partially suppress active production of antibody, no more than the recommended dose should be given.
	Vaccine	Human diploid cell vaccine (HDCV) or purified chick embryo cell vaccine (PCECV) 1.0 mL, IM (deltoid area [§]), one each on days 0 [¶] , 3, 7, and 14 [§] .
Previously vaccinated [†]	Wound cleansing	All PEP should begin with immediate thorough cleansing of all wounds with soap and water. If available, a virucidal agent such as povidone-iodine solution should be used to irrigate the wounds.
	RIG	RIG should not be administered.
	Vaccine	HDCV or PCECV 1.0 mL, IM (deltoid area [§]), one each on days 0 [¶] and 3 [§] .

* These regimens are applicable for all age groups, including children

[†] Any person with a history of a complete pre-exposure or post-exposure vaccination regimen with HDCV, PCECV, or rabies vaccine absorbed, or previous vaccination with any other type of rabies vaccine and a documented history of antibody response to the prior vaccination.

[§] The deltoid area is the only acceptable site of vaccination for adults and older children. For younger children, the outer aspect of the thigh can be used. Vaccine should never be administered in the gluteal area.

[¶] Day 0 is the day the first dose of vaccine is administered. Count forward to determine the dates for days 3, 7, and 14 so that the series is given over a period of two weeks.

[§] ACIP provisional recommendations approved June 24, 2009 amended the post-exposure prophylaxis series for unvaccinated persons from 5 one-mL vaccine doses of rabies vaccine to 4 one-mL doses of rabies vaccine administered on days 0, 3, 7, and 14. For persons with immunosuppression, rabies PEP should be administered using all 5 doses of vaccine on days 0, 3, 7, 14, and 28.

*Centers for Disease Control and Prevention. Use of a Reduced (4-Dose) Vaccine Schedule for Postexposure Prophylaxis to Prevent Human Rabies. Recommendations of the Advisory

Committee on Immunization Practices (ACIP). MMWR 2010; 59/No. RR-2. Available online at <http://www.cdc.gov/mmwr/PDF/rr/rr5902.pdf>

Other Resources:

Centers for Disease Control and Prevention. Human Rabies Prevention - United States, 2008, Recommendations of the Advisory Committee on Immunization Practices. MMWR Early Release 2008;57/May 7, 2008.

Available online at: <http://www.cdc.gov/mmwr/pdf/rr/rr57e507.pdf>.

National Association of State Public Health Veterinarians. Compendium of Animal Rabies Prevention and Control, 2011. Available online at

<http://www.nasphv.org/Documents/RabiesCompendium.pdf>.

World Health Organization. Rabies Vaccines: WHO Position Paper. Weekly Epidemiological Record. No. 32, 2010, 85, 309-320. Available online at:

<http://www.who.int/wer/2010/wer8532.pdf?ua=1>.

