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 exposure from 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 and/or neurologic tissue/fluid contacts a mucous membrane (eyes, nose, mouth, genitalia) or a fresh, open skin wound. Rabies virus does not enter the bloodstream, 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 (UV) 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 in humans (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 come in contact with 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 when an exposure occurs.

Pre-exposure immunization does not eliminate the need for prompt post-exposure prophylaxis following a recognized exposure; it only reduces the PEP regimen. Anyone who receives the pre-exposure prophylaxis series is considered immunologically primed against future rabies exposure. Therefore, if they are exposed to a rabid animal, they simply require PEP for a person previously vaccinated (i.e., days 0 and 3 vaccination).
RABIES PRE-EXPOSURE PROPHYLAXIS GUIDE*

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<th>Risk category</th>
<th>Nature of risk</th>
<th>Typical populations</th>
<th>Pre-exposure recommendations</th>
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<tr>
<td>Continuous</td>
<td>Virus present continuously, often in high concentrations. Specific exposures likely to go unrecognized. Bite, non-bite, or aerosol exposure.</td>
<td>Rabies research laboratory workers, rabies biologics production workers.</td>
<td>Primary course. Serologic testing every 6 months; booster vaccination if antibody titer below acceptable level.**</td>
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<tr>
<td>Frequent</td>
<td>Exposure usually episodic, with source recognized, but exposure also might be unrecognized. Bite, non-bite, or aerosol exposure.</td>
<td>Rabies diagnostic lab workers, cavers, veterinarians and staff, animal control and wildlife workers in rabies-enzootic areas. All persons who frequently handle bats.</td>
<td>Primary course. Serologic testing every 2 years; booster vaccination if antibody titer falls below acceptable level.**</td>
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<tr>
<td>Infrequent (greater than the population at large)</td>
<td>Exposure nearly always episodic with source recognized. Bite or non-bite exposure.</td>
<td>Veterinarians and animal control workers in areas with low rabies rates; Veterinary students; Travelers to rabies enzootic areas without appropriate medical care and biologics.</td>
<td>Primary course. No serologic testing or booster vaccination.</td>
</tr>
<tr>
<td>Rare (population at large)</td>
<td>Exposure always episodic with source recognized. Bite or non-bite exposure.</td>
<td>U.S. population at large, including persons in rabies-epizootic areas.</td>
<td>No vaccination necessary.</td>
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**Minimum acceptable antibody level is complete virus neutralization at a 1:5 serum dilution by the rapid fluorescent focus inhibition test. A booster dose should be administered if the titer falls below this level.

C. Initial Primary Pre-Exposure Course:

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.

Special Consideration: The public health nurse must ensure another competent employee who is CPR certified is present before any vaccinations can be administered.

Human rabies vaccine preparations for intradermal (ID) administration are no longer available in the United States.

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. See the table above under the column titled “Pre-exposure recommendations”. An acceptable antibody titer level does not negate the need for PEP for a person previously vaccinated if a recognized exposure to rabies occurs.
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 into a sealed plastic bag within 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. Inform the client that they will be charged an additional handling fee by the reference laboratory because the county health department is unable to decant the serum from the separator tube into a plastic tube.

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](http://www.atlantahealth.net)

   Kansas State University Rabies Laboratory
   2005 Research Park Circle
   Manhattan, KS 66502
   (785) 532-4483
   [www.vet.k-state.edu/rabies](http://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. The Epidemiologist-on-Call for the Acute Disease Service (ADS), Oklahoma State Department of Health (OSDH) (PH: 405-271-4060) is also available for after-hours (available 24/7/365) reports and for any question/concern regarding rabies risk and recommendations.

V. **RABIES RISK EXPOSURE ASSESSMENT:**

A. Animal and human rabies 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.

B. Administer Rabies Post-exposure Prophylaxis (PEP) per recommended schedule*

Special Consideration: The public health nurse must ensure another competent employee who is CPR certified is present before any vaccinations can be administered.

<table>
<thead>
<tr>
<th>Vaccination status</th>
<th>Treatment</th>
<th>Regimen**</th>
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<tbody>
<tr>
<td>Not previously vaccinated</td>
<td>Wound cleansing</td>
<td>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.</td>
</tr>
<tr>
<td>Human Rabies Immune Globulin (HRIG)</td>
<td>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 deltoid or quadricep, 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.</td>
<td></td>
</tr>
<tr>
<td>Vaccine</td>
<td>Human diploid cell vaccine (HDCV) or purified chick embryo cell vaccine (PCECV) 1.0 mL, IM (deltoid area§), one each on days 0¹, 3, 7, and 14**.</td>
<td></td>
</tr>
<tr>
<td>Previously vaccinated‡</td>
<td>Wound cleansing</td>
<td>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.</td>
</tr>
<tr>
<td>HRIG</td>
<td>HRIG should not be administered.</td>
<td></td>
</tr>
<tr>
<td>Vaccine</td>
<td>HDCV or PCECV 1.0 mL, IM (deltoid area§), one each on days 0⁶ and 3.</td>
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†These regimens are applicable for all age groups, including children
§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. For persons not previously vaccinated, count forward to determine the dates for days 3, 7, and 14 so that the series is given over a two week period. For persons previously vaccinated, count forward 3 days only.
**For persons with immunosuppression, rabies PEP should be administered using all 5 doses of vaccine on days 0, 3, 7, 14, and 28.
‡Any person with a history of a complete pre-exposure vaccination regimen with HDCV, PCECV, or rabies vaccine absorbed (RVA); prior PEP with HDCV, PCECV, or RVA; or previous vaccination with any other type of rabies vaccine and a documented history of antibody response to the prior vaccination.

REFERENCES:


