

OREGON HEALTH AUTHORITY
IMMUNIZATION PROGRAM

Rabies Inactivated Virus Vaccine IMOVAX ^{®1} (HDCV) and RabAvert ^{®2} (PCECV)	
Last Reviewed	26 March 2019
Last Revised	26 March 2019
This order expires	31 July 2021

No changes from the previous version.

I. OREGON MODEL IMMUNIZATION PROTOCOL:

1. Check the ALERT Immunization Information System to determine whether the patient needs this vaccine or a tetanus booster.
2. Screen client for contraindications and precautions.
3. Provide a current Vaccine Information Statement(s) (VIS) and answer any questions.
4. Record all required data elements in the client's permanent health record.
5. Verify needle length for IM injection into the vastus lateralis or deltoid muscles.
6. Avoid injecting in the upper third of the deltoid muscle.
7. Both client and vaccinator must be seated for vaccine administration.
8. See section II for schedules
9. Give tetanus booster if the client has not been immunized in the past ten years.
10. Ask client to remain seated on the premises for 15 minutes after vaccination to decrease the risk of injury should they faint.

Health Officer Signature

Date

Health Officer Signature

Date

II. A. Table 1. VACCINE SCHEDULE: Pre-exposure: 1,2,3

Dose and Route: 1.0 ml IM in the deltoid		
Course of vaccination	Preferred Age	Dose Regimen
Primary*	All age groups	3–dose series at days 0, 7, and 21 or 28 days
Booster[◇]	All age groups	1 dose ^{§, ‡}

* Immunocompromised Individuals: Patients who are immunosuppressed by disease or medications should postpone pre-exposure vaccinations and consider avoiding activities for which rabies pre-exposure prophylaxis is indicated. When this course is not possible, immunosuppressed persons who are at risk for rabies should have their virus neutralizing antibody titers checked after completing the 3–dose pre-exposure series with HDCV or PCECV.⁵

[◇]Reference Pre-exposure recommendations in section V below to determine which populations might require a booster dose.

[§]A pre-exposure booster is indicated if the antibody titer level falls below the minimum acceptable virus neutralization at a 1:5 serum dilution by the rapid fluorescent focus inhibition test. Globally, few laboratories perform the rapid fluorescent focus inhibition test, which is the gold standard test method for measuring rabies antibody levels. Those in the United States are listed on the CDC website www.cdc.gov/rabies/specific_groups/doctors/serology.html.

[‡]In the United States, preexposure vaccination consists of a series of 3 injections with human diploid cell rabies vaccine (HDCV) or purified chick embryo cell (PCEC) vaccine.

- b. Do not remove vaccine from refrigerator until ready to reconstitute it with the diluent supplied.
- c. Reconstitute only with the supplied diluent. Gently swirl the contents until completely dissolved. Use immediately after reconstitution.

II. B. Pre-exposure Travel

- Travelers should receive all 3 preexposure immunizations before travel. If 3 doses of rabies vaccine cannot be completed before travel, the traveler should not start the series, as it would be problematic to plan postexposure prophylaxis after a partial immunization series.³
- Preexposure vaccination does not eliminate the need for additional medical attention after a rabies exposure, but it simplifies postexposure prophylaxis.³
- Preexposure vaccination may also provide some degree of protection when there is an unapparent or unrecognized exposure to rabies virus and when postexposure prophylaxis might be delayed.³

- Regardless of whether preexposure vaccine is administered, travelers going to areas where the risk of rabies is high should be encouraged to purchase medical evacuation insurance (see Chapter 2, Travel Insurance, Travel Health Insurance, & Medical Evacuation Insurance).³

Travelers who have completed a 3-dose preexposure rabies immunization series or have received the full postexposure prophylaxis are considered preimmunized and do not require routine boosters, except after a likely rabies exposure. Periodic serum testing for rabies virus neutralizing antibody is not necessary in routine international travelers.³

II. C. Table 2. VACCINE SCHEDULE: Post-exposure⁴

Dose and Route: 1.0 ml IM in the deltoid		
Course of vaccination	Preferred Age	Dose Regimen
Previously vaccinated	All age groups	2–dose series at days 0 and 3
Previously unvaccinated	All age groups	4–dose series at days 0, 3, 7, and 14
Previously unvaccinated Immunocompromised		5–dose series at days 0, 3, 7, 14 and 28

No cases of rabies postexposure prophylaxis failure have been documented among persons immunosuppressed because of human immunodeficiency virus infection.⁵

Immunosuppressive agents should not be administered during postexposure prophylaxis unless essential for the treatment of other conditions. When postexposure prophylaxis is administered to an immunosuppressed person, one or more serum samples should be tested for rabies virus neutralizing antibody to ensure that an acceptable antibody response has developed. If no acceptable antibody response is detected, the patient should be managed in consultation with their physician and appropriate public health officials.⁵

The minimum acceptable virus neutralization is 1:5 serum dilution by the rapid fluorescent focus inhibition test. Globally, few laboratories perform the rapid fluorescent focus inhibition test, which is the gold standard test method for measuring rabies antibody levels. Those in the United States are listed on the CDC website www.cdc.gov/rabies/specific_groups/doctors/serology.html

III. Table 3. LICENSED RABIES VACCINE:

Product name	Vaccine component(s)	Acceptable age range	Preservative
IMOVAX^{®1} Human diploid cell vaccine (HDCV) Sanofi Pasteur	The vaccine is obtained from infected human diploid cells, inactivated by β-propiolactone. One dose (1.0mL) contains <100 mg albumin, <150 µg neomycin sulfate and 20 µg of phenol red indicator.	≥Infancy*	The vaccine contains no preservative or stabilizer. It should be used as a single dose vial.
RabAvert^{®2} Purified chick embryo cell vaccine (PCECV) Novartis	Vaccine is obtained by growing the fixed-virus strain in chicken fibroblasts, which are inactivated with β-propiolactone. One dose (1mL) contains <12 mg polygeline (processed bovine gelatin), <0.3 mg human serum albumin, 1 mg potassium glutamate, 0.3 mg sodium EDTA, <1µg neomycin, <20 ng chlortetracycline, and <2ng amphotericin B. Minimal amounts of chicken protein may be present in the final product; albumin content is <3 ng/dose.	In all age groups [◇]	The vaccine contains no preservative.
* Imovax [®] pkg insert, pg. 1, 04-2013 ◇ RabAvert [®] pkg insert, pg. 1, 11-2015			

IV. A. RECOMMENDATIONS FOR USE:

Primary or Pre-exposure Vaccination³

Pre-exposure vaccination should be offered to persons whose activities might bring them into contact with rabies virus or potentially rabid bats, raccoons, skunks, cats, dogs, or other species at risk for having rabies; such as:

- Veterinary students, veterinarians and other animal handlers
- Certain laboratory workers.
- Animal handlers
- Field biologists
- Missionaries and other long-term travelers and expatriates
- Cavers
- International travelers who might come in contact with animals in areas where dogs, monkeys, bats, and cats rabies is enzootic and immediate access to appropriate medical care, including biologics, might be limited.
- Children who are too young to understand either the need to avoid animals or to report a traumatic contact are considered at greater risk of rabid animal exposure and should be offered pre-exposure immunization when travelling to endemic areas.

Routine pre-exposure prophylaxis for other situations might not be indicated.

Pre-exposure prophylaxis is administered for these reasons:

- Although pre-exposure vaccination does not eliminate the need for additional therapy after a rabies exposure, it simplifies therapy by eliminating the need for HRIG and decreasing the number of doses of vaccine needed—important for persons at high risk for being exposed to rabies in areas where immunizing products might not be available or where they might be at high risk for adverse reactions.
- Pre-exposure prophylaxis might protect persons whose post exposure therapy is delayed.
- It might provide protection to persons at risk for unapparent exposures to rabies.

Supplies of rabies vaccine have been restored, and the pre-exposure vaccination recommendations should be followed.

IV. B. Table 4. CRITERIA FOR PRE-EXPOSURE RABIES IMMUNIZATION³

Risk category	Nature of risk	Typical populations	Pre-exposure Recommendations
<u>Continuous</u>	Virus present continuously, often in high concentrations. Specific exposures likely to go unrecognized. Bite, non-bite, or aerosol exposure.	Rabies research laboratory workers;* rabies biologics production workers.	Primary course. Serologic testing every 6 months; booster vaccination if antibody titer is below acceptable level. ◊
<u>Frequent</u>	Exposure usually episodic, with source recognized, but exposure also might be unrecognized. Bite, non-bite, or aerosol exposure possible.	Rabies diagnostic lab workers, travelers involved in outdoor and other activities that might bring them into direct contact with dogs, bats, and other mammals e.g. cavers, missionaries, veterinarians and staff, and animal-control and wildlife workers in rabies-enzootic areas. Long-term travelers and expatriates.	Primary course. Serologic testing every 2 years; booster vaccination if antibody titer is below acceptable level. ◊
<u>Infrequent</u> (greater than population at large)	Exposure nearly always episodic with source recognized. Bite or non-bite exposure.	Veterinarians and animal-control and wildlife workers in areas with low rabies rates. Veterinary students. Travelers visiting areas where rabies is enzootic and immediate access to appropriate medical care including biologics is limited.	Primary course. No serologic testing or booster vaccination.
<u>Rare</u> (population at large)	Exposure always episodic with source recognized. Bite or non-bite exposure.	U.S. population at large, including persons in rabies-epizootic areas.	No pre-exposure vaccination necessary.

- * Judgment of relative risk and extra monitoring of vaccination status of laboratory workers is the responsibility of the laboratory supervisor. (see <http://www.cdc.gov/biosafety/publications/> for more information).
- ◇ Pre-exposure booster immunization consists of one 1.0 ml dose of human diploid cell (rabies) vaccine (HDCV) or purified chick embryo cell (PCECV) vaccine IM into deltoid. 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.

V. CONTRAINDICATIONS

1. In cases of pre-exposure immunization, there are no known specific contraindications other than situations such as developing febrile illness, or previous allergic reaction to any vaccine component.^{1,2}
2. For post-exposure treatment, there are no known specific contraindications to the use of rabies vaccine.¹⁻³
3. Persons who have experienced “immune complex-like” hypersensitivity reactions should receive no further doses of IMMOVAX®(HDCV) vaccine unless they are exposed to rabies or likely to be unavoidably or unapparently exposed to rabies virus and have unsatisfactory antibody titers.¹

VI. PRECAUTIONS

1. RabAvert®
PCECV: is produced in chick embryo cell culture. Persons with a history of anaphylactic, anaphylactoid, or other immediate reactions (e.g., hives, swelling of the mouth and throat, difficulty breathing, hypotension or shock) subsequent to egg ingestion should not be immunized with this vaccine. IMMOVAX® (HDCV) should be administered instead.
Rare cases of Guillain-Barré syndrome have been reported with RabAvert®.¹
2. IMMOVAX®
HDCV: serum sickness type reactions have been reported in up to 7% of persons receiving booster doses of IMMOVAX®.²
Rare cases of Guillain-Barré syndrome have been reported with IMMOVAX®.²
3. Any suspected or documented bite or scratch from a bat should be grounds for seeking post-exposure prophylaxis.³

VII. A. OTHER CONSIDERATIONS

1. **Adverse Events:** epinephrine hydrochloride solution (1:1,000) and other appropriate agents and equipment must be available for immediate use in case of anaphylactic or acute hypersensitivity reaction.^{1,2}
2. **Immunocompromised:** Corticosteroids, other immunosuppressive agents, antimalarials, and immunosuppressive illnesses can interfere with the development of active immunity after vaccination. For persons with immunosuppression, **pre-exposure** prophylaxis should be administered with the awareness that the immune response might be inadequate. Patients who are immunosuppressed by disease or medications should postpone pre-exposure vaccinations and consider avoiding activities for which rabies pre-exposure prophylaxis is indicated. When this course is not possible, immunosuppressed persons who are at risk for rabies should have their virus neutralizing antibody titers checked after completing the pre-exposure series. A patient who fails to seroconvert after the third dose should be managed in consultation with their physician and appropriate public health officials. No cases of rabies postexposure prophylaxis failure have been documented among persons immunosuppressed because of human immunodeficiency virus infection.^{1, 2} Immunosuppressive agents should not be administered during postexposure therapy unless essential for the treatment of other conditions. When rabies **postexposure** prophylaxis is administered to persons receiving corticosteroids or other immunosuppressive therapy, or who are immunosuppressed, it is important that a serum sample on day 14 (the day of the fourth vaccination) be tested for rabies antibody to ensure that an acceptable antibody response has been induced. HRIG must not be administered at more than the recommended dose, since active immunization to the vaccine may be impaired.^{4,5,6}
3. **Pregnancy:** is not a contraindication to post-exposure prophylaxis. If the risk of exposure to rabies is substantial, preexposure prophylaxis might also be indicated during pregnancy.^{4,5}
4. **Lactation:** It is not known whether rabies vaccines are excreted in human milk. Use with caution in nursing mothers.^{1,2}

VII. B. PRE-EXPOSURE VACCINATION AND SEROLOGIC TESTING⁷

For most persons, completing pre-exposure or postexposure prophylaxis routine serological testing is not necessary to document seroconversion, unless the:

- the person is immunosuppressed;
- significant deviations of the prophylaxis schedule have occurred;
- the patient initiated vaccination internationally with a product of questionable quality; or

- the person's antibody status is being monitored routinely due to occupational exposure to rabies virus.

VIII. SIDE EFFECTS AND ADVERSE REACTIONS³

- Travelers should be advised that they may experience local reactions after vaccination, such as pain, erythema, swelling, or itching at the injection site, or mild systemic reactions, such as headache, nausea, abdominal pain, muscle aches, and dizziness.
- Approximately 6% of persons receiving booster vaccinations with IMMOVAX[®] (HDCV) may experience an immune complex-like reaction characterized by urticaria, pruritus, and malaise. The likelihood of these reactions is less with RabAvert[®] (PCECV).
- Once initiated, rabies postexposure prophylaxis should not be interrupted or discontinued because of local or mild systemic reactions to rabies vaccine.

IX. Table 5. STORAGE AND HANDLING

All clinics and pharmacies enrolled with the Vaccines for Children (VFC) Program must immediately report any storage and handling deviations to the Oregon Immunization Program at 971-673-4VFC (4823)

Vaccine	Latx	Temp	Storage Issues	Notes
Imovax [®] 1	No	Store at 2°–8°C (36°F–46°F)	Do not use if vaccine has been frozen.	Give within 30 minutes of mixing
Rabavert [®] 2			Protect from light	

X. ADVERSE EVENTS REPORTING

Public providers are to complete the Vaccine Adverse Events Reporting System (VAERS) report online at <https://vaers.hhs.gov/reportevent.html>

Private providers are to report events directly to VAERS and can read about options on how to do so at <https://vaers.hhs.gov/reportevent.html> .

To request this material in an alternative format (e.g., Braille) or to clarify any part of the above order, contact the Oregon Health Authority Immunization Program at 971.673.0300 and 711 for TTY. For other questions, consult with the vaccine recipient's primary health care provider or a consulting physician.

Electronic copy of this immunization protocol is available at: [immunization protocols](#)

REFERENCES

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7. CDC. Rabies serology. 2016. Available at: www.cdc.gov/rabies/specific_groups/doctors/serology.html . Accessed 25 March 2019.