

# Virginia Department of Health

## Vaccinia Disease and Vaccinia Adverse Events: Overview for Healthcare Providers

<b>Organism</b>	Vaccinia virus, used in smallpox vaccine; genus <i>Orthopoxvirus</i> , family <i>Poxviridae</i>
<b>Reporting to Public Health</b>	Suspected or confirmed cases of vaccinia disease and vaccinia adverse events require <u>immediate</u> notification to the local health department (LHD). See <a href="http://www.vdh.virginia.gov/LHD/index.htm">www.vdh.virginia.gov/LHD/index.htm</a> .
<b>Infective Dose</b>	Infectious dose unknown
<b>Route of Infection</b>	Inoculation with vaccine (ACAM2000®) or via direct contact with vaccine site or materials containing vaccinia virus.
<b>Communicability</b>	Communicable to unvaccinated contacts; maximum viral shedding 4–15 days after vaccination; virus can be cultured ~2–5 days after vaccination until scab separates (17–21 days after vaccination); secondary transmission usually results in eczema vaccinatum or inadvertent inoculation ~5–19 days post exposure.
<b>Risk factors</b>	<ul style="list-style-type: none"> <li>• Eczema and other acute, chronic or exfoliative skin conditions</li> <li>• Diseases, conditions or treatments which cause immunodeficiency.</li> <li>• Pregnant women; risk for fetal vaccinia if inadvertent vaccination during pregnancy; counsel female about risks to fetus</li> <li>• Children, especially aged 1–4 years</li> <li>• Close contacts, including sexual partners.</li> </ul>
<b>Case-fatality Rate</b>	Depends on the type of adverse event (see Clinical Description section)
<b>Incubation Period</b>	Varies by adverse event (see Clinical Description section)
<b>Clinical Description</b> <i>Post exposure means after inoculation with the vaccine or after direct contact with vaccine site or infectious materials.</i>	<p><u>Normal Site Reaction:</u> Papule (3–4 days after vaccination) → vesicle (days 5–6) → pustule (maximum size in 8–9 days after vaccination) → scab (separates 17–21 days after vaccination) → pitted scar</p> <p><u>Normal Variants (rate 2.4% - 6.6%):</u> Satellite lesions; lymphangitis from site to regional nodes; regional lymphadenopathy; considerable local edema at the site; intense erythema (viral cellulitis). Variants usually resolve spontaneously.</p> <p><u>Adverse Events:</u></p> <ul style="list-style-type: none"> <li>• Bacterial infections: Frequency unknown. Examples include staphylococcal or streptococcal infections. Vaccinia Immune Globulin (VIG) recommended for antibody deficiencies. Obtain Gram stain, bacterial culture or swab (for purulent lesions). Treat with antibiotics if clinically indicated; loose dressing and topical medications may prevent spread and hasten healing.</li> <li>• Inadvertent inoculation: virus is transferred from vaccination site to 2<sup>nd</sup> location on vaccinee or close contact; most common adverse event; often involves face, eyelid, nose, mouth, lips, genitalia, anus. Lesions at autoinoculation sites progress through the same stages (e.g., papular, vesicular, pustular, crusting, and scab) as the vaccination site. Use contact precautions. If few lesions, no specific treatment required; usually resolves ~3 weeks. Administer VIG with extensive lesions, especially if confluent or covering large portions of body.</li> <li>• Ocular vaccinia: occurs if vaccinia virus is transferred to periocular soft tissue or the eye itself (conjunctivitis, blepharitis, iritis or keratitis); accounts for the majority of inadvertent inoculations. Consult ophthalmologist. Treat with off-label topical antivirals. Administer VIG for severe conditions.</li> <li>• For Vaccinia Keratitis: Consult ophthalmologist immediately. Treat with off-label topical antivirals; consider topical prophylactic antibacterials. VIG contraindicated unless life- or other vision-threatening conditions present.</li> <li>• Erythema multiforme (5.6%–14.3% of adult vaccinees develop rashes at sites other than the vaccination): rash may be</li> </ul>

	<p>erythematous macules, papules, urticaria, bulls-eye vesicles or even pustules. Occurs 1–2 weeks post exposure. Treat symptoms; consider antipruritics. Rare evolution to Stevens-Johnson syndrome requires hospitalization. VIG not recommended. Pruritic rash leads to scratching and possible superinfection. Diff.Dx: generalized vaccinia; inadvertent inoculation.</p> <ul style="list-style-type: none"> <li>Generalized vaccinia: disseminated maculopapular or vesicular lesions; fever may be present; usually self-limiting; occurs within a week after exposure. Use contact precautions. Cover lesions; if not possible, avoid physical contact with others. Administer VIG if severe/recurrent but not if mild or limited. Antivirals usually not indicated. Consider NSAIDS; oral antipruritics. Diff.Dx: erythema multiforme, eczema vaccinatum, progressive vaccinia, severe varicella; inadvertent inoculation at multiple sites; smallpox; disseminated herpes.</li> <li>Eczema vaccinatum: vaccinal lesions, generalized or focal, usually in persons with eczema/atopic dermatitis history. Occurs ~5–19 days post exposure. Fever/lymphadenopathy often present. Use contact precautions. Early diagnosis and early treatment with VIG are critical. Monitor patient for secondary skin infections.</li> <li>Postvaccinal encephalopathy/encephalomyelitis: unknown frequency; occurs ~10-14 days post exposure; most common among infants aged &lt;12 months; symptoms reflect cerebral or cerebellar dysfunction with headache, fever, vomiting, altered mental status (confusion, delirium, somnolence), lethargy, seizures, coma, or sensorimotor dysfunction (altered sensation, paresis). Consider PCR and culture of CSF. VIG not recommended; supportive care; anticonvulsants as needed. Diff Dx: EBV, Herpes viruses, enteroviruses, measles, mumps, <i>Mycoplasma</i> pneumonia, varicella zoster virus, arboviruses.</li> <li>Progressive vaccinia: rare, severe, often fatal, spreading necrosis at vaccination site; metastatic necrotic lesions may occur elsewhere on body. Suspect if lesion progresses w/o healing &gt;15 days post exposure. Secondary bacterial, viral or fungal infection may ensue. Use contact precautions. Administer VIG. Preliminary studies with cidofovir show some effect in vitro. Immediate consultation with the CDC is recommended to determine if any experimental antiviral drugs are available. Surgical debridement not proven useful. Diff.Dx: bacterial infection; severe varicella; severe smallpox; disseminated herpes.</li> <li>Fetal vaccinia: extremely rare and likely fatal; macular, papular, vesicular, pustular or ulcerative rash in newborn (often premature) of vaccinated mother. Efficacy of VIG in newborn is unknown; antivirals not recommended.</li> </ul>
Differential Diagnosis	Depends on the type of adverse event (see Clinical Description section)
Specimen Collection and Laboratory Testing <sup>†</sup>	<ul style="list-style-type: none"> <li>In situations where clinical diagnosis is not straightforward, laboratory diagnostics for vaccinia might be helpful and might prevent inappropriate use of potentially toxic therapies. However, diagnostics for conditions easily confused with vaccinia infections (i.e., varicella, herpes zoster, herpes simplex, and enteroviruses), should be considered initially, especially for a nonvaccinee or someone believed to be a noncontact of a vaccinee.</li> <li><sup>†</sup>If vaccinia is suspected, notify LHD immediately to discuss the case and laboratory testing. Specimens should be sent to Division of Consolidated Laboratory Services (DCLS) <u>after</u> LHD has been consulted and testing has been approved by LHD/DCLS. The DCLS Emergency Duty Officer can be reached 24/7 at (804) 335-4617.</li> </ul>
Treatment (IND)	VIG and cidofovir can be obtained only after consultation with local health department or CDC Clinician Information Line, available 24/7 at (877) 554-4625. Cidofovir is for 2 <sup>nd</sup> line treatment only.
Postexposure Prophylaxis	VIG or cidofovir (2 <sup>°</sup> ) recommended for certain adverse events, depending upon severity of condition
Vaccine	Not applicable (the smallpox vaccine is composed of vaccinia virus)
Infection Control	Virus inactivated by 200 ppm sodium hypochlorite (mix 1 tablespoon of 5.25-6% sodium hypochlorite per gallon of water). Let sit on surface for 10 minutes. After contact with vaccine site, wash hands thoroughly with soap and water or disinfectant.