



## EQUINE VIRAL ARTERITIS

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**Definition** Equine viral arteritis (EVA) is a contagious viral disease of equids. Serological evidence of exposure to the causal agent, equine arteritis virus (EAV), is present in equine populations in many countries. The disease is frequently confused with other illnesses that produce similar clinical signs. Documented outbreaks have been infrequent, but this may be related to lack of recognition as the majority of acute EAV infections are subclinical or inapparent. Widespread vasculitis may result in non-immune individuals leading to fever, peripheral edema, pneumonia, and abortion. The name equine viral arteritis comes from the characteristic vascular lesion that is produced by the causal agent equine arteritis virus.

### Biology

Infection with EAV is highly species-specific and is limited to members of the family *Equidae* (includes horses, donkeys, mules, and zebras). The virus replicates primarily in equine macrophages and vascular endothelial cells resulting in the characteristic pathologies.

**Clinical Signs** Depending on the viral strain and size of the inoculum, infection can vary from inapparent to fulminant clinical disease in young foals. Mortality is rare in otherwise healthy adult horses.

Presentation is variable (similar to any infectious agent that causes vasculitis) but most commonly includes:

- Fever (up to 106° F or 41.1° C), depression, anorexia
- Edema: limbs, ventrum, peri or supraorbital region, scrotum/prepuce (male), mammary glands (female)
- Conjunctivitis
- Epiphora
- Rhinitis
- [Urticaria](#)
- Leukopenia
- Abortion- can be associated with ‘abortion storms’
- Temporary subfertility in stallions
- Fatal pneumonitis or pneumo-enteric syndrome in neonatal/young foals



<b>Incubation Period</b>	The incubation period following respiratory spread is 2–3 days. Post venereal spread the incubation period is usually 6–8 days but may be up to 14 days in some cases.
<b>Risk Factors</b>	Inapparent carrier stallions shed virus constantly in their semen. Fresh cooled or frozen semen is highly infectious. Acutely infected shedding mares and stallions (first-time vaccinated mares bred to infected stallions can experience a limited reinfection cycle and shed EAV).
<b>Transmission</b>	<p><b>Respiratory</b> (most common)</p> <ul style="list-style-type: none"> <li>• Droplet spread of respiratory secretions from acutely infected horses and congenitally infected newborn foals</li> <li>• Contact with placental membranes, fetal fluids and tissues from cases of EAV abortion</li> </ul> <p><b>Venereal transmission</b> Acutely infected stallions or mares.</p> <ul style="list-style-type: none"> <li>• Virus present in infective fresh, cooled, or frozen semen</li> <li>• Carrier stallions act as a reservoir of EAV and can become chronic carriers and maintain the virus in the horse population</li> <li>• There is limited evidence of transmission by embryo transfer from a donor mare inseminated with EAV-infective semen</li> </ul> <p><b>Indirect transmission</b></p> <ul style="list-style-type: none"> <li>• Fomites such as breeding shed equipment, phantoms, contaminated twitches, head-collars, clothing, and the hands of animal care personnel</li> <li>• Artificial insemination</li> <li>• Semen</li> <li>• Vaginal secretions</li> <li>• Urine</li> <li>• Feces</li> </ul> <p><b>Congenital</b></p> <ul style="list-style-type: none"> <li>• Infection in foals born to mares infected in late gestation</li> </ul>
<b>Diagnostic Sampling, Testing and Handling</b>	<p>Diagnosis based on clinical signs is problematic due to the wide array of clinical signs, the similarity of presentation to those of certain other diseases, and the frequency of inapparent infection/horses mildly affected with disease.</p> <p>Equine arteritis virus should be suspected whenever high fever, peripheral edema, and signs of upper respiratory infection (oculonasal discharge) are present. Diagnosis cannot be based purely on clinical signs alone as they are non-specific.</p> <p>Differential diagnoses include EHV-1 &amp; 4, equine influenza, equine rhinitis virus A &amp; B infections, purpura hemorrhagica, equine infectious anemia, allergic reactions, and toxicosis from ingesting hoary alyssum (<i>Berteroa incana</i>). Subclinical EAV infection is difficult to determine.</p>



### Sampling, Testing, and Handling

Sample	Test	Shipping	Handling
Nasopharyngeal washings or swabs	RT-PCR and/or viral isolation	Leakproof container	Chilled overnight
EDTA or citrated whole blood (no heparin)	RT-PCR and/or viral isolation	Leakproof container	Chilled overnight
Semen	RT-PCR and/or viral isolation	Leakproof container	Chilled or frozen overnight
Fetal membranes or fetal tissues (lung, liver, kidney, spleen)	RT-PCR and/or viral isolation; FA	Leakproof container	Chilled or frozen overnight
Sera (paired) Acute and convalescent	Virus neutralization	Red top tube or leakproof container	Chilled overnight

Diagnosis is made based on laboratory testing (virus isolation, RT-PCR testing, and/or serological examination of paired sera).

- Sampling for virus detection should be initiated as early as possible after onset of fever and/or other clinical signs. EAV is stable at refrigeration or lower temperatures. With exception of unclotted blood samples, specimens should be refrigerated or frozen and shipped on frozen freezer packs. Unclotted bloods should be kept cold but not frozen in transit to the laboratory
- Paired (acute and convalescent) sera should be collected over an interval of 2–4 weeks. Previous vaccination history against EVA should be considered when interpreting positive titers. Vaccinated individuals may develop a serologic response or a rapid rise in titer in response to natural exposure to infection

#### Post-mortem Examination

EAV infection rarely results in a fatal outcome in horses; however, it can be associated with isolated cases or outbreaks of multiple cases of abortion. Evidence suggests lethal EAV infection of the fetus is the cause of abortion. Because the aborted fetus contains high levels of virus, all appropriate biosecurity precautions should be taken to limit spread of the virus. Detailed instructions on collection and submission of samples associated with equine abortion can be found on the Animal Health Diagnostic Center at Cornell University website. [Equine Abortion Kit and Instructions](#)

#### Treatment

- No specific antiviral treatment for EVA is currently available



- Symptomatic treatment is indicated in moderate to severe clinical cases of the disease, and is especially important in affected stallions
- Elimination of carrier state is problematic. Non-surgical strategies to promote the elimination of the carrier state in the stallion are not yet fully validated. Use of GnRH antagonist may facilitate clearance in some stallions

Immunization with GnRH has been associated with elimination of the carrier state in some animals.

**Shedding of  
Virus  
Following  
Resolution of  
Clinical Signs**

Carrier stallions shed EAV constantly in semen, but not via the respiratory tract, in urine, nor is it present in blood. Only stallions and sexually mature colts can develop the carrier state.

**Environmental  
Persistence**

The virus is heat sensitive but can persist at freezing temperatures for extended periods of time.

**Specific Control  
Measures**

[Biosecurity Guidelines](#)

Control measures are primarily directed at restricting viral spread in breeding populations to a) minimize risk of virus-related abortions, deaths in young foals and b) prevent establishment of the carrier state in stallions and sexually mature colts.

Specific measures to prevent/control EVA on breeding farms include:

- Identify of any carrier stallions
- Separately manage any carrier stallions
- Vaccinate non-carrier stallions annually
- Restrict breeding carrier stallions to EVA vaccinated mares or mares naturally seropositive for antibodies to EAV
- Isolate mares bred with infective semen for the first time from EAV seronegative horses for 3 weeks.
- Screen semen intended for AI use for virus, particularly if imported
- Observe sound management practices, especially of pregnant mares
- Vaccinate colt (male) foals between 6 and 12 months of age to prevent possible development of carrier state later in life
- Under circumstances of intensive management and limited facilities, it is advisable to consider vaccination of all at-risk animals

**In the Event of an Outbreak at a Performance Event**

Although there have been a number of extensive occurrences of EVA at racetracks, shows, etc., these have been so infrequent that no control programs have been developed specifically to prevent the introduction and spread of EAV in such situations.



### [Biosecurity Tool Kit Recommendations for Equine Events](#)

Where outbreaks occur at performance events, clinically normal horses housed within the primary perimeter may be permitted segregated exercise periods outside the perimeter. Precautions should be taken, and may include:

- Exercise scheduled *after* general population's exercise period to avoid potential virus transfer to unaffected horses/barns by exercise riders
- Access to starting gate or similar equipment denied
- Restricted use of ponies/out-riders' horses- horses housed within the primary perimeter may only be escorted by horses housed within the same facility
- Direct horse-to-horse contact is to be avoided
- Prompt post-contact use of hand sanitizer or hand washing with soap by any individual who has had contact with horses during exercise

### **Vaccination**

The vaccine has been used successfully to curtail the spread of EVA in large outbreaks of the disease. In the face of an outbreak, vaccination of exposed but clinically normal horses can be resorted to as a part of a control program.

#### Considerations:

- Primary vaccination provides protection from clinical disease for at least 1–3 years. First time vaccination may not prevent re-infection or potential replication of challenge virus
- Revaccination results in an enhanced serologic response
- It is recommended that at-risk stallions be re-vaccinated annually
- Stallions **must** be screened serologically before primary vaccination  
Implications regarding export must be considered when vaccinating at-risk horses
- Currently it is not possible to differentiate a vaccinated horse from one naturally infected via serology
- All teaser stallions and nurse mares should be vaccinated
- 'Pony' horses/outriders' horses/catch horses (or those with close contact to multiple horses) should be vaccinated or withdrawn from use until vaccinated

Note: Approximately 50% of vaccinated horses may experience a brief period of viremia during the week following vaccination and some may shed low levels of virus into the respiratory tract for a few days. Risk of respiratory transmission of vaccine virus is very minimal.

### **Release of Animals from Isolation**

Release of animals from isolation can be considered 4 weeks after the last case of EVA or confirmed case of EAV infection. Animals can be released if virus detection tests (nasal/pharyngeal swab and blood) are negative. After all animals have been released from isolation, thorough disinfection of the area holding facility should be undertaken.



<b>Biosecurity Issues for Receiving Animals</b>	<p>For horses having been housed within the primary perimeter: Certificate of Veterinary Inspection w/ affidavit indicating that within the previous 21 days the horse has not exhibited signs of EVA, has not been exposed to nor housed with horses that exhibited signs of the disease, or were suspected or confirmed as being infected with EAV.</p> <p>For other horses: Require health certificate w/disease specific disclaimer and proof of vaccination.</p> <p>Breeding farms: Mares or fillies shipping from a premise of exposure should follow the requirements as listed for exposed and unexposed individuals as above.</p> <p>Colts and stallions should also follow these restrictions (in addition to any State veterinary restrictions) if these animals are to enter the breeding population.</p>
<b>Zoonotic Potential</b>	None known.