

## Equine Infectious Anemia

Equine infectious anemia (EIA) is an infectious and potentially fatal viral disease of members of the horse family. The equine infectious anemia virus (EIAV) is categorized as a lentivirus: it contains genetic RNA material, which it uses to produce DNA. This DNA is then incorporated into the genetic makeup of infected cells. Identified in France in 1843 and first tentatively diagnosed in the United States in 1888, EIA has commanded a great deal of attention over the years. No vaccine or treatment exists for the disease. It is often difficult to differentiate from other fever-producing diseases, including anthrax, influenza, and equine encephalitis.

EIA is significant historically because it is the first disease of horses proven to be caused by a “filterable virus”—one that can survive a special laboratory filtering procedure and remain infectious. EIAV is the first lentivirus-induced disease proven to be transmitted by insects. And EIA is the first persistent virus for which antigenic drift was defined. (Antigenic drift is the virus’ ability to change its form sufficiently so that it is no longer vulnerable to existing antibodies.) Finally, EIA is the first lentivirus-induced disease for which a diagnostic test was approved.

### Degrees of Infectiousness

**Acute**—When horses are exposed to EIAV, they may develop severe, acute signs of disease and die within 2 to 3 weeks. This form of the disease is the most damaging and the most difficult to diagnose because the signs appear rapidly, and often only an elevated body temperature is noted. One-fifth of a teaspoon of blood from a horse with acute EIA contains enough virus to infect 1 million horses.

The clinical signs of the acute form of EIA are nonspecific; in mild cases, the initial fever may be short lived (often less than 24 hours). As a result, horse owners and veterinarians may not observe this initial sign when a horse is infected with EIAV. These infected horses often recover and continue to move freely in the population. The first indication that a horse was exposed to, and infected with, EIAV may well be a positive result on a routine annual test.

**Chronic**—If the horse survives this first acute bout, it

may develop a recurring clinical disease with these signs:

- **Fever**—An infected horse’s temperature may rise suddenly to about 105 F or, rarely, as high as 108F. Then it may drop back to normal for an indeterminate period until the onset of another episode.
- **Petechial hemorrhages**—Minute blood-colored spots appear on the mucous membranes.
- **Depression**—The horse appears more or less dejected (head hangs low) and generally listless.
- **Weight loss**—The horse may refuse feed or may eat an inordinate amount but still continues on an obvious decline from normal weight.
- **Dependent edema**—The horse may develop swelling, which is evidence of fluid collecting under the skin in the legs and under the chest and other underbody surfaces.
- **Anemia**—The horse’s blood may experience a marked drop in its red corpuscle count and appear thin and watery. The animal may also have an irregular heartbeat, and a jugular pulse may become evident.

The horse with chronic EIA is the classic “swamper” who has lost condition, is lethargic and anorexic, has a low hematocrit, and demonstrates a persistent decrease in the number of blood platelets, especially coincident with fever induced by EIAV. One-fifth of a teaspoon of blood from a chronic case during a feverish episode contains enough virus to infect 10,000 horses.

**Inapparent**—By far the majority of horses are inapparent carriers: they show no overt clinical abnormalities as a result of infection. They survive as reservoirs of the infection for extended periods. Inapparent carriers have dramatically lower concentrations of EIAV in their blood than horses with active clinical signs of the disease. Only 1 horsefly out of 6 million is likely to pick up and transmit EIAV from this horse. All horses infected with EIAV are thought to remain virus carriers for life. The inapparent form may become chronic or acute due to severe stress, hard work, or the presence of other diseases.

### Transmission

EIA is considered a classic bloodborne infection. People have played an important role in EIAV transmission over the years by using blood-contaminated materials on different horses. The EIAV most

frequently is transmitted between horses in close proximity by large biting insects, such as horseflies and deerflies. The bites from these flies stimulate defensive movement by the horse, which often results in an interruption of the blood-feeding. When interrupted, the fly is motivated to complete the feeding as soon as possible. It then attacks the same or a second host and feeds to repletion. In this manner, any infective material from the blood of the first host that is present on the mouthparts of the insect can be mechanically transmitted to the second host.

Insect transmission of EIAV is dependent on the number and habits of the insects, the density of the horse population, the number of times the insect bites the same and other horses, the amount of blood transferred between horses, and the level of virus in the blood of the infected horse from which the initial blood meal was obtained. The rate of transmission cannot be predicted accurately because of these variables.

### **Preventing the Spread**

Diagnosis of EIA and of infections with EIAV was not possible until an effective test for antibodies specific to EIAV was described in 1970 by Leroy Coggins. The agar-gel immunodiffusion (AGID) or Coggins test was shown to correlate with horse inoculation test results for EIAV and, therefore, could be used to identify EIAV carriers. Although other serologic tests have been defined and approved for the diagnosis of EIA, the AGID test is recognized internationally as the "gold-standard" serologic test. The use of AGID and additional tests has assisted in the control of EIA.

Controlling the spread of EIAV involves minimizing or eliminating contact of horses with the secretions, excretions, and blood of EIAV-infected horses. This has been carried out in most areas of the world by testing and segregating test-positive horses from those with negative test results. Once the reservoirs of EIAV are identified, separated, and maintained a safe distance from the other horses, the transmission of EIAV is broken. Until all horses are tested, one must assume that each horse is a potential reservoir of EIAV and take precautions to see that his or her horses commingle only with horses with impeccable backgrounds (i.e., they came from farms with only test-negative horses and have never been exposed to test-positive horses).

### **What Equine Owners Can Do To Help**

Horse owners can take a number of precautions to reduce the risk of infection:

- Use disposable syringes and needles. Follow the rule of one horse-one needle.
- Clean and sterilize all instruments thoroughly after each use.
- Keep stables and immediate facilities clean and sanitary. Remove manure and debris promptly,

and ensure that the area is well drained.

- Implement insect controls. The local veterinarian or animal health official can provide information about approved insecticides and other insect-control measures. Avoid habitats favorable to insect survival.
- Do not intermingle infected and healthy animals. Do not breed EIAV-positive horses.
- Isolate all new horses, mules, and asses brought to the premises until they have been tested for EIA.
- Obtain the required certification of negative EIA test status for horse shows, county fairs, race-tracks, and other places where many animals are brought together.
- Abide by State laws that govern EIA.

The major regulatory actions to control EIA are carried out by the States. States' rules, while encompassing a much broader scope of EIA concerns, vary considerably and lack uniformity among individual State control programs. USDA created a Uniform Methods and Rules (UMR) to facilitate the development of a uniform control program for EIA and the interstate movement of horses.

### **Report Suspicious Cases**

Veterinarians and horse owners who suspect an animal may have EIA should immediately contact State or Federal animal health authorities.

### **Additional Information**

For more information, contact  
USDA, APHIS, Veterinary Services  
National Animal Health Program  
4700 River Road, Unit 43  
Riverdale, MD 20737-1231  
Telephone (301) 851-3569  
Fax (301) 734-7974

or visit our Web site at

<http://www.aphis.usda.gov/vs/ceah/index.htm>

---

The U.S. Department of Agriculture (USDA) prohibits discrimination in all its programs and activities on the basis of race, color, national origin, age, disability, and where applicable, sex, marital status, familial status, parental status, religion, sexual orientation, genetic information, political beliefs, reprisal, or because all or part of an individual's income is derived from any public assistance program. (Not all prohibited bases apply to all programs.) Persons with disabilities who require alternative means for communication of program information (Braille, large print, audiotape, etc.) should contact USDA's TARGET Center at (202) 720-2600 (voice and TDD). To file a complaint of discrimination, write to USDA, Director, Office of Civil Rights, 1400 Independence Avenue, S.W., Washington, D.C. 20250-9410, or call (800) 795-3272 (voice) or (202) 720-6382 (TDD). USDA is an equal opportunity provider and employer.