

EASTERN EQUINE ENCEPHALITIS (EEE)

Animal Group(s) Affected	Transmission	Clinical Signs	Severity	Treatment	Prevention and Control	Zoonotic
Birds, equids, and occasionally other mammals	Mosquito (<i>Culiseta melanura</i>)	Febrile, altered mentation, neurologic abnormalities, seizures, paresis, paralysis, death	Equine fatality rate is up to 90%; survivors usually exhibit long-term neurologic signs; human fatality rate – 50-75%	Supportive care	Formalin-inactivated whole viral vaccine, insect control	Yes; however, not believed to transmit from horses as viremia is too low

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Susceptible Animal Groups: Birds are the principal reservoir hosts. Clinical cases occur in equids and occasionally other mammals, including rodents and opossums. Mammals are almost always dead-end hosts. Snakes are suspected to be an amplifier or over-wintering reservoir.

Causative Organism: Eastern equine encephalomyelitis virus (Family Togaviridae, genus Alphavirus). North American variant is more virulent than South or Central American variants.

Zoonotic Potential: Mosquito bites from *Culiseta melanura* is the important vector in the maintenance cycle in birds. Mosquitoes (e.g., some *Aedes*, *Coquillettidia*, and *Culex* species) can transmit to humans.

Distribution: Western Hemisphere - North American variant is found in eastern Canada, all states east of the Mississippi River, Arkansas, Minnesota, South Dakota, Texas, and the Caribbean islands. The South American variant is confined to central and South America.

Incubation Period: 4 to 10 days, and rarely up to 3 weeks.

Clinical Signs:

Equids frequently include altered mentation, impaired vision, aimless wandering, head pressing, circling, anorexia, grinding of teeth, esophageal paralysis, irregular or ataxic gait, paresis, paralysis, seizures, coma and death. Many horses progress to recumbency within 12-18 hours of onset of neurological abnormalities. Most deaths occur within 2-3 days after onset of signs. Mortality of equids with clinical signs is 50-90%.

Humans with systemic infection have a sudden onset malaise, fever, chills, and myalgia lasting one to two weeks. Recovery is complete if no CNS involvement. Encephalitic illness can be present after a few days of systemic illness, which includes systemic clinical signs in addition to anorexia, vomiting, diarrhea, cyanosis, altered reflexes, convulsions, and coma. One third of all EEE human cases die within 2 to 10 days after onset of symptoms. Those persons who recover have irreversible neurological damage.

Birds: Most cases are asymptomatic but fatal outbreaks have occurred in emus, game birds such as pheasants, whooping cranes, passerines and psittacines.

Post mortem, Gross or Histological Findings: Gross lesions are rare but congestion may be present in the meninges of acutely affected animals. Histologic findings are typical of encephalomyelitis which include severe gliosis with necrosis of the neuropil in the cerebrum and through the corona radiate to the thalamus and perivascular cuffing throughout the mid and hindbrain and cervical spinal cord.

Diagnosis: Clinical presentation in an endemic area, EEEV-specific IgM antibody in serum or CSF, and confirmed by neutralizing antibody testing of acute and convalescent phase serum specimens.

Material Required for Laboratory Analysis: Serum and cerebrospinal fluid samples are collected from live

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<p>animals. Brain, spinal cord, and other tissues may also be collected from necropsied animals.</p>
<p>Relevant Diagnostic Laboratories: State Health Departments - http://www.cdc.gov/ncidod/dvbid/westnile/city_states.htm</p>
<p>Treatment: Supportive and symptomatic care.</p>
<p>Prevention and Control: Reducing exposure to mosquitoes, mosquito control, and vaccination in equids. Vaccination of captive, at risk bird species birds in areas high virus activity is often practiced.</p>
<p>Suggested Disinfectant for Housing Facilities: Clean infected environment with an approved EPA disinfectant.</p>
<p>Notification: Suspected cases are reported according to individual State procedure, typically by notification of the State Arboviral Coordinator or State Animal Health Official. Reports of positive equine cases of arboviral disease are reported to ArboNET, an internet-based arbovirus surveillance and reporting system managed by state health departments and the Centers for Disease Control and Prevention. ArboNET captures laboratory-confirmed positive cases in humans, horses, other mammals, birds, and mosquitoes across the U.S. Equine cases vary by state, but those reported to ArboNET are confirmed by State Veterinarians prior to reporting.</p>
<p>Measures Required under the Animal Disease Surveillance Plan: In most states, reporting is mandatory.</p>
<p>Measures Required for Introducing Animals to Infected Animal: Maintain infected animal in a quarantine situation. Do not introduce infected animal to an animal with a compromised immune system.</p>
<p>Conditions for Restoring Disease-Free Status after an Outbreak: Clean infected environment with diluted bleach to the extent possible. Minimize contact of infected staff with animal.</p>
<p>Experts Who May Be Consulted: USDA, APHIS, Veterinary Services 4700 River Road, Unit 41 Riverdale, MD 20737-1231 Telephone (301) 734-8093 Fax (301) 734-7817 www.aphis.usda.gov/animal_health/index.shtml</p>
<p>References:</p> <ol style="list-style-type: none"> 1. Case Definition for Eastern Equine Encephalitis. 2011. USDA/APHIS /VSCEAH – National Surveillance Unit. http://www.aphis.usda.gov/vs/nahss/equine/ee/case_definition_eastern_equine_encephalitis_01_18_11.pdf 2. Centers for Disease Control and Prevention National Center for Emerging and Zoonotic Infectious Diseases. Eastern Equine Encephalitis. 2010. http://www.cdc.gov/EasternEquineEncephalitis/index.html. Accessed online 3 July 2013. 3. Franklin, R.P., H. Kinde, M.T. Jay, L.D. Kramer, E.G.N. Green, R.E. Chiles, E. Ostlund, S. Husted, J. Smith, and M.D. Parker. 2002. Eastern equine encephalomyelitis virus infection in a horse from California. <i>Emerg. Infect. Dis.</i> 8(3): 283-88. 4. Graham, S.P., H.K. Hassan, T. Chapman, G. White, C. Guyer, and T.R. Unnasch. 2012. Serosurveillance of eastern equine encephalitis virus in amphibians and reptiles from Alabama, USA. <i>Am. J. Trop. Med. Hyg.</i> 86(3): 540-4. 5. Kahn, C.M., and S. Line. 2010. Equine viral encephalomyelitis. <i>In: The Merck Veterinary Manual</i>; 10th, Merck & Co., Inc, Whitehouse Station, NJ. Pp. 1183-1189. 6. Nandalur, M., and A.W. Urban. 2010. Eastern equine encephalitis. http://emedicine.medscape.com/article/233442-overview

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