

Encephalitis Virus Infections

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Arboviral Encephalitis (inflammation of the brain)

“Arboviral” is a shortened form of the phrase “arthropod borne,” meaning viral infections that are transmitted by arthropod vectors, which most commonly are mosquitoes. Therefore, arboviral encephalitis refers to mosquito-carried viral infections that cause inflammation of the brain. These viruses are maintained in nature by transmission between vertebrate hosts and blood-feeding arthropods such as mosquitoes and ticks.

Arboviral infections are zoonotic (transmissible between animals and humans). Vertebrate hosts for the viruses in the upper Midwest are often bird populations that serve as a source of virus-containing blood meals for the arthropod vectors. Humans and domestic animals then are bitten by the mosquito and become “dead-end” or accidental hosts for the virus. As such, humans and domestic animals do not contribute to the transmission cycle of the virus, but they sometimes will develop the disease as a result of the infection.

Important viral agents of arboviral encephalitis in the U.S. are eastern equine encephalitis virus (EEE), western equine encephalitis virus (WEE), St. Louis encephalitis virus (SLE), La Crosse (LAC) encephalitis virus and West Nile virus (WNV). Clinical cases typically occur in the summer months when arthropods are active and able to feed on the reservoir that contains the virus.

The Disease in Animals

Although arboviral disease can occur in a wide variety of vertebrate animals, clinical disease most often is associated with horses. Horses with central nervous system disease caused by this group of viruses

may show signs of stumbling, weakness and limb incoordination. Fever may or may not be present.

A horse with a strong immune system that has been exposed to a low dose of virus may show no clinical signs or only mild disease. However, some animals may show acute, fatal neurologic disease that affects the brain and spinal cord. Surviving horses develop good immunity.

Many good vaccines that will prevent these infections in horses are available. Talk to your veterinarian about which vaccine is best for your horse.

The Disease in Humans

Most human infections are asymptomatic. In some cases, an affected individual may develop flulike symptoms. Clinical signs such as fever, headache, flulike muscle pain and fatigue may occur. If an infection progresses to inflammation of the brain, death is possible. These types of cases are unusual.

Treatment involves supportive care. No human vaccines for arboviral infections are available. A person experiencing signs of neurologic disease should consult his or her physician immediately.

The Disease in Birds (primarily reservoir)

In birds that develop the disease, the brain and heart are the tissues most commonly affected. Birds dying of arboviral infections most commonly are found dead, sometimes in significant numbers.

Patterns of bird movement (migration between hemispheres, birds displaced by storms, legal/illegal importation of birds) likely play an important part in the spread of the disease because the stress of movement facilitates viral replication in birds.

The virus is maintained in the bird population by mosquitoes that feed on infected birds, a process that amplifies the virus available to transmit dead-end infections to humans and horses.

Diagnosis

Diagnosis of arboviral infections can be managed by analysis of a blood sample and/or isolating the virus from body fluids or mosquitoes.

Risk of Exposure

Because vaccines are not available in humans, eliminating exposure is the main method of control. For instance, individuals can reduce exposure to mosquitoes by limiting dusk activity, wearing protective clothing and spraying for the vector.

Prevention

(from NDSU Extension Service publication E472, "Mosquito Management")

Steps to consider in managing mosquitoes near buildings:

- Remove water-holding containers
- Trim shrubs and greenery
- Cover trash containers
- Clean gutters and drain flat roofs
- Empty wading pools frequently
- Care for backyard pools properly
- Change water in birdbaths and fountains
- Consider stocking ornamental ponds with fish
- Fill in or drain low areas to eliminate puddles
- Ensure proper drainage (drains, ditches, culverts)
- Repair leaky plumbing

Here are other tips to avoid being bitten by mosquitoes:

- Limit activity at dawn/early morning/dusk; mosquitoes are most active during these times.
- Implement mosquito control measures; mosquitoes are attracted by perspiration, warmth, body odor, carbon dioxide and incandescent light.
- Use insect repellents.
- Wear long-sleeved shirts and pants.
- Spray clothing with repellents (permethrin or DEET). Spray skin with repellent (35 percent DEET).
- Make sure your home has tight screening.

Exposure Point!

The only way a person, horse or bird can become infected with these types of viruses is through the bite of an infected vector, such as a mosquito.

Even in endemic areas, less than 1 percent of mosquitoes are infected, and less than 1 percent of people bitten by an infected mosquito become infected.

- The virus is not transmitted person to person.
- The virus is not transmitted horse to person.
- The virus is not transmitted horse to horse.
- The virus is not transmitted bird to person.
- The virus is not transmitted bird to horse.

North Dakota is endemic (the virus is found here naturally) for EEE, WEE and WNV.

* Remember:

Rabies always should be a consideration in animals that show changes in behavior or signs of nervous system disease.

Do not come in contact with the mouth or saliva of an animal that fits this description.

Contact your veterinarian about how to test for rabies.

For more information on this and other topics, see www.ag.ndsu.edu

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