

West Nile Virus

Definition

West Nile virus (WNV) is a mosquito-borne flavivirus that was first diagnosed in North America in the New York City area in 1999.

WNV primarily causes disease in birds, humans and horses and is transmitted by many different species of mosquitoes.

Since 1999, over 16,000 U.S. horses have been confirmed for WNV encephalomyelitis.

During 2002, over 15,000 horses were affected with an approximately 30% mortality rate.

WNV is now considered endemic with yearly activity in the United States, Canada, Mexico and the Caribbean.

Clinical Signs

Mild low-grade fever 101.9-103.5°F (38.83-39.72)

Inappetance

Lethargy/somnolence

Neurologic signs

Onset of neurologic disease is frequently sudden and progressive and characterized by problems in maintaining balance and strength.

Periods of hyperexcitability, apprehension and/or somnolence

Fine tremors and fasciculations of the face and neck muscles

Cranial nerve paralysis-- facial paralysis and weakness of the tongue very common

Complete paralysis of one or more limbs

Expect clinical signs to be most severe in the young and old

About 1/3 of WNV cases experience an increase in severity of clinical signs within 7-10 days of onset, sometimes after initial clinical signs have abated.

Incubation

7-10 days

Transmission

Mosquito vector

Only birds appear to develop significant levels of virus and serve as a source of infection.

An infected WNV horse is not infectious and poses no risk to other horses, humans or birds.

Diagnostic Testing

MAC-ELISA test: Single serum sample (red top tube)

Positive test: Antibodies detected at or above 1:400 serum dilution

A positive test is considered confirmatory in horse exhibiting clinical signs consistent with WNV.

Plaque Reduction Neutralization Test (PRNT) paired serum antibody titers

Collect samples 2-4 weeks apart (red top tube)

Four-fold change in PRNT titers between samples is considered confirmatory in horse exhibiting clinical signs consistent with WNV in horse that has not been vaccinated recently.

Send serum overnight at refrigerator temperature on a cold pack to laboratory.

CSF Analysis: elevated mononuclear cell count and/or high total protein

CSF WBC Count: Highly variable range, when abnormal, CSF WBC is usually ≥ 7 cells/ul.

Protein Level: Highly variable range, when abnormal, CSF protein is usually ≥ 70 mg/dl.

PCR can be attempted on CSF of clinically affected horses, however, there is limited sensitivity.

Note: CSF fluid should be evaluated immediately. If evaluation cannot be performed, a direct smear can be made and the CSF and slide sent to laboratory overnight at refrigerator temperature on a cold pack.

Post-mortem

A rabies protocol should be followed for ALL horses demonstrating encephalitis that undergo a post-mortem. Most causes of viral encephalitis in the horse are also zoonotic for humans.

Post-mortem sample collection requires appropriate precautions to avoid exposure.

[Click here for necropsy procedure for suspected cases of zoonotic disease.](#)

Histopathology: Fix at least one-half of the brain for histopathology. Fresh brain should be submitted for concomitant virus isolation, immunochemistry, and rabies testing. [Click here for document on brain removal.](#)

Shedding Time of Organism Past Resolution of Clinical Signs

While horses do become mildly viremic 3-5 days post challenge, they do not shed virus nor do they develop adequate viremia to serve as a source of virus to insect vectors.

Environmental Persistence

This enveloped virus is susceptible to drying, ultraviolet light, and detergent.

Specific Control Measures

Prevention

Vaccination—killed or modified live vaccine:

Initial injection of either vaccine is followed in 3 to 6 weeks with a booster. The primary series must occur to elicit optimal antibody production. Vaccination should be initiated before the mosquito season as data illustrates that the development of neutralizing antibody response is slow. It is not expected that the initial series will provide long-term protection.

Vaccine manufacturers recommend subsequent boosters be administered twice yearly in epidemic or endemic areas.

Many pregnant mares have been safely vaccinated with currently marketed products. {Vest, D., Cohen, N., Berezowski, C., et al., JAVMA 225(12) December 15, 2004, 1894-1897.}

No information is available regarding long-term immunity.

Vector management

Use insect repellents frequently; re-apply after rain.

Keep horses in at night when possible, or apply insect repellent.

Use fans and air movement to decrease mosquito feeding activity.

Eliminate or minimize standing water.

Stock tanks or ponds should be stocked with mosquito-feeding fish.
Eliminate brush piles, gutters, old tires and litter.
Remove all equipment in which standing water can collect.

Release of Animals from Isolation

No restrictions need be placed on affected or recovered animals.

Biosecurity Issues for Receiving Animals

None.

Zoonotic Potential

While not a source of virus to insect vectors, an equine case of WNV may be an early warning signal to humans that there are infected mosquitoes present.

The most serious risk to humans in regards to WNV horses is during work with WNV-infected brain and/or cerebrospinal fluid. Appropriate barrier clothing must be worn and exposure precautions taken.

Link to A Review of Equine Zoonotic Diseases: Risks in Veterinary Medicine (J.S. Weese):

<http://www.aaep.org/proceedings/02proceedings/910102000362.pdf>