

West Nile Encephalomyelitis Virus

Agent: West Nile Virus (WNV) is a member of the Flaviviridae family of viruses and is closely related to St. Louis Encephalitis and the Japanese Encephalitis Viruses. WNV has been found in Africa, Eastern Asia, the Middle East, the Northern Mediterranean region of Europe, Puerto Rico, the Dominican Republic, Jamaica, Guadeloupe, El Salvador, and the United States. It was first found in the United States in 1999 in New York City. The first cases of WNV were confirmed in Georgia in 2001. Currently, West Nile Virus has been seen in all 48 continental states, 7 Canadian provinces, Mexico, and the District of Columbia.

Confirmed West Nile Virus Cases, 2001 – 2006

Year	Horse	Human
2006	0	8
2005	1	24
2004	3	23
2003	61	55
2002	175	44
2001	68	6

Brief Description: Clinical signs of WNV infection in horses include ataxia (stumbling or incoordination), depression or apprehension, hyperesthesia, weakness of limbs, lethargy, partial paralysis, muscle twitching, recumbency, or death. Neurological signs may present asymmetrically. Fever is not often observed. During clinical outbreaks of WNV, approximately 33% of the horse cases were fatal.

WNV has been detected in at least 138 species of birds in the United States. Most birds are infected subclinically. Jays, ravens, and crows are notable exceptions in that they often become ill and die. Some birds such as geese transmit the disease laterally to other geese in close contact. Direct transmission in chickens and turkeys does not occur. Bird deaths are often precursors to clinical infection in horses.

Dogs, cats, bats, chipmunks, skunks, squirrels, and rabbits may become infected with WNV but rarely develop clinical signs. In Florida, some farmed American alligators (*Alligator mississippiensis*) were subclinically affected while others developed clinical signs of WNV inclusive of death.

Differential Diagnoses:

- Rabies
- Botulism
- Equine Protozoal Myeloencephalitis (EPM)
- Cervical Vertebral Myelopathy (CVM, Wobblers)
- Equine Degenerative Myelopathy (EDM)
- Other Viral Encephalitides: WEE, EEE, and VEE, Aujeszky's Disease, Borna Disease, Equine Herpes Virus 1 (EHV1)
- Bacterial Meningitis
- Listeriosis
- Leukoencephalomalacia

Reservoir/Host Species: Birds are infected most commonly and serve as the reservoir for the virus. Illness associated with WNV infection is observed most frequently in horses, birds, and humans. Horses and humans are dead-end hosts in that they do not transmit the virus.

Mode of Transmission: WNV is transmitted by mosquitoes that obtain the virus while taking a blood meal from an infected bird. The WNV is spread by an infectious mosquito to a horse or human. Many species of mosquitoes can carry the virus; however even in areas where the virus is present, very few mosquitoes are infected with the virus

Incubation Period: The incubation period in horses ranges from 3 to 14 days.

Case Definition: Clinical signs must include ataxia (including stumbling, staggering, wobbly gait, or incoordination) or at least 2 of the following: circling, hind limb weakness, inability to stand, multiple limb paralysis, muscle fasciculation's, proprioceptive deficits, blindness, lip droop/ paralysis, teeth grinding, or death. Laboratory confirmation of at least one of the following in addition to clinical signs:

- Detection of IgM antibody to WNV by IgM-capture ELISA in serum or cerebrospinal fluid (CSF)
- Isolation of WNV from tissues ¹
- An associated 4-fold or greater change in a Serum neutralization test to WNV in an appropriately-timed ², paired sera
- Positive polymerase chain reaction (PCR) for WNV genomic sequences in tissues ¹

¹ Preferred diagnostic tissues from equine are brain and spinal cord; although tissues may include blood or CSF, the only known reports of WNV isolation or positive PCR from equine blood or CSF have been related to experimentally infected animals.

² The first serum should be drawn as soon as possible after onset of clinical signs and the second sample drawn 10-14 days later. Remember that it takes 7-10 days after infection before the IgM capture ELISA will be positive.

Case Classification:

- **Confirmed:** a case that meets the case definition.
- **Suspect:** a clinically compatible case occurring with a negative IgM- capture ELISA and a positive serum neutralization test in a non-vaccinate or unknown vaccinate status.

Diagnosis: Virus isolation from brain, spinal cord, blood, and other tissues is used to diagnose WNV. RT-PCR (Reverse Transcription Polymerase Chain Reaction) and immunohistological staining are used to detect viral RNA and antigens. Preferably, brain specimens should be kept refrigerated or on ice, neither frozen nor chemically fixed. If brain samples will not arrive at the laboratory within 48 hours of collection, then freeze and send on dry ice. It is recommended that half the brain be sent separately to the appropriate laboratory for rabies diagnosis. Appropriate protective gear should be used when extracting specimens for laboratory submission to reduce exposure to potentially infectious material. Other specimens should be submitted on ice packs and via courier (ex. FedEx, UPS) within 24 hours of collection, neither frozen nor chemically fixed. Serological assays include a serum neutralization test and an IgM capture ELISA. IgM may be low or undetectable in some recently infected horses. Vaccination will not cause a false positive IgM ELISA test, but may result in a false positive serum neutralization test. WNV IgM ELISA tests are set up on Mondays and Wednesdays in Tifton with test results available in 2 days. Serum neutralization tests are set up on Tuesdays and Fridays and require 3 – 5 days to complete. If the brain is submitted for Rabies testing, then the remaining samples will be held until completion of Rabies testing. See page 6: “Decision Tree for Diagnosis of West Nile Virus (WNV)”

Suggestive Necropsy Findings: A moderate to severe meningoencephalitis associated with hemorrhages may be seen in the brainstem and the ventral horns of the lumbosacral spinal cord.

Prevention Measures: A combination of personal protective and vector control measures are undertaken to prevent the disease.

Environmental:

- Aerate or drain standing water to reduce mosquito breeding habitats.
- When draining standing water is impractical, consider using Mosquito Dunks containing (BTI) *Bacillus thuringiensis israeliensis* or *Bacillus sphaericus*, mosquito larvicides. Follow label directions carefully. http://www.ent.uga.edu/publications/control_mosquitoes.htm

For Equine Use:

- Vaccinate horses with a licensed WNV vaccine in accordance with the label instructions and veterinary recommendations.
- Thoroughly clean watering troughs every 3 - 4 days. Use either Mosquito Dunks or fish in water tanks that are impractical to drain.
- Stable your horse from dawn to dusk and use window screens and fans to reduce mosquitoes' feeding on horses.
- Numerous insecticides and repellents are labeled for use on horses and/or barns. Using insect repellents may help decrease exposure of horses to adult mosquitoes. Synthetic pyrethroid compound (such as permethrin) kill as well as repel mosquitoes. Use repellents and other pesticides according to label instructions.
http://www.ent.uga.edu/pmh/Com_Animals&Bees.pdf

For Human Use:

- Apply insect repellents containing DEET or Picaridin being careful to follow the label instructions. http://www.cdc.gov/ncidod/dvbid/westnile/qa/insect_repellent.htm
<http://www.cdc.gov/ncidod/dvbid/westnile/RepellentUpdates.htm>
- Consider staying indoors during peak exposure times of dawn, dusk, and the early evening. If outdoors during peak exposure times, wear long sleeved shirts and long pants sprayed with a permethrin product.
- Install or repair window and door screens to reduce indoor mosquitoes.

Additional recommendations can be found in the electronic references.

Vaccine: There are three manufacturers of equine WNV vaccines: Merial, Fort Dodge, and Intervet. The Merial product is a canarypox virus vectored vaccine and has no age restrictions. The Fort Dodge product is a DNA WNV vaccine. The Intervet product uses a live, attenuated strain of the human vaccine yellow fever virus as the backbone. The Merial and Fort Dodge vaccines must be initially given in a two dose series, three to six weeks apart; however, the Intervet vaccine is a one dose vaccine. Horses should be revaccinated annually or more often as recommended by a veterinarian. Vaccination should be completed at least three weeks prior to mosquito season. There is no vaccine commercially available for humans at this time.

Zoonotic Risk: West Nile Virus can be transmitted from an infected bird to a human via an infected mosquito. Animal-to-animal and animal-to-human spread is not known to occur. However, people should avoid bare-handed contact when handling any dead animals. Less than 1% of people infected with WNV have severe illness; however, risk increases with age and with underlying medical conditions. Human infections have been spread by blood transfusions, organ transplantation, and breast-feeding, but person-to-person spread through either casual or sexual contact does not occur.

Reporting Requirements: Acute arboviral infections in humans, including WNV, are reportable in the state of Georgia.

Any person who makes a laboratory confirmation of West Nile Virus in an animal shall report it by the close of the next business day, to the State Veterinarian's office at (404) 656-3667 or (404) 656-3671 in Atlanta, or 1-800-282-5852 outside of Atlanta, or to the USDA Area Veterinarian in Charge at (770) 922-7860.

Electronic References:

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http://www.ent.uga.edu/pmh/Com_Animals&Bees.pdf

Merial. Recombitek® Equine West Nile Virus Vaccine.
<http://www.equinewnv.com>

Intervet. PreveNile West Nile Virus Vaccine.
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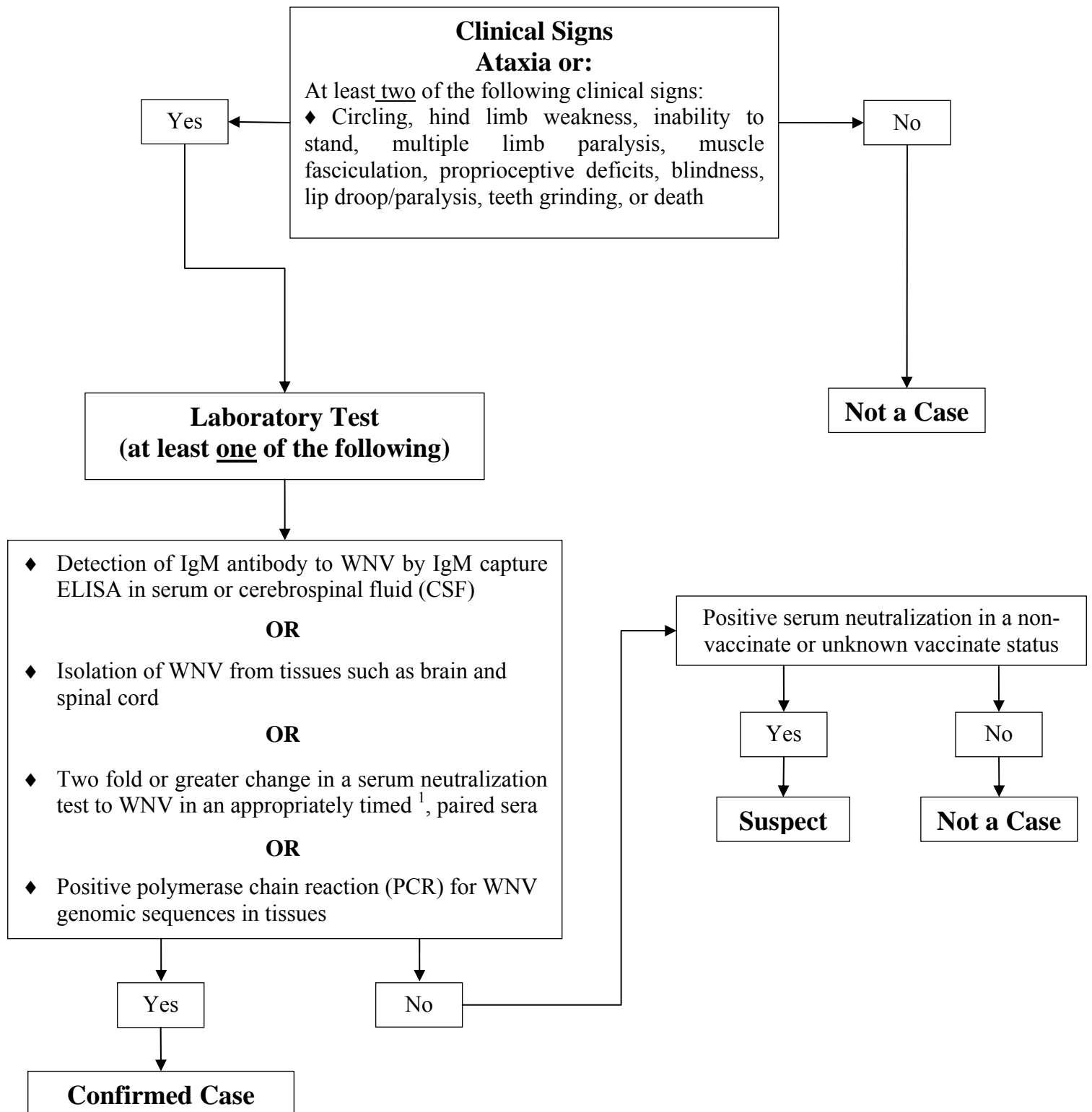
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Decision Tree for Diagnosis of West Nile Virus (WNV)



¹The first serum should be drawn as soon as possible after onset of clinical signs and the second sample drawn 10-14 days later. It takes 7-10 days after infection before the IgM capture ELISA will be positive.