

What is West Nile Virus?

West Nile Virus (WNV) is an arbovirus (a virus carried by arthropods) that was first identified in the West Nile region of Uganda in 1937. It belongs to the family of viruses termed Flaviviridae and it is similar to other arboviruses such as St. Louis encephalitis virus and Yellow Fever virus. The virus first appeared in the United States in 1999 in the New York City area. Human cases in Iowa have been reported every year since 2002, suggesting the disease has become endemic here.

How is the virus transmitted?

The principal transmission cycle of WNV involves several species of mosquitoes and birds. Humans are incidental hosts that acquire the WNV infection primarily by the bite of an infected mosquito. However, several atypical modes of WNV transmission have been described: organ transplant, receipt of blood products, breastfeeding and intrauterine transmission. These modes of transmission are expected to occur infrequently. There is no evidence that WNV can be spread by person-to-person contact.

What are the signs and symptoms of WNV?

Approximately 80% of persons bitten by an infected mosquito will develop no symptoms at all. A mild disease, termed "West Nile fever, occurs in 20% of those infected and is characterized as a febrile illness of sudden onset. Less than one percent of those infected will develop a severe neurological form of the disease (West Nile encephalitis, meningitis). Poliomyelitis, a flaccid paralysis syndrome associated with WNV infection, is less common than meningitis or encephalitis. This syndrome is generally characterized by the acute onset of asymmetric limb weakness or paralysis in the absence of sensory loss is easily confused with Guillain-Barré syndrome. Pain sometimes precedes the paralysis. The paralysis can occur in the absence of fever, headache, or other common symptoms associated with WNV infection. Involvement of respiratory muscles, leading to acute respiratory failure, can sometimes occur.

Clinical Features of Mild Infection: Fever, headache, fatigue, skin rash on the trunk of the body, swollen lymph glands, eye pain, anorexia, or vomiting.

Clinical Features of Severe Infection: Fever, gastrointestinal symptoms, weakness, change in mental status, or a maculopapular or morbilliform rash involving the neck, trunk, arms, or legs.

Neurological presentations include:

- Ataxia and extrapyramidal signs
- Seizures
- Polyradiculitis
- Although not observed in recent outbreaks, myocarditis, pancreatitis, and fulminant hepatitis have been described.
- Optic neuritis
- Myelitis
- Flaccid paralysis is sometimes seen.

What is the incubation period and how long do symptoms last?

The incubation period for WNV infection is about 2 to 14 days, although longer incubation periods have been documented in immunosuppressed persons. Symptoms of mild disease usually last 3 to 6 days, however, WNV sequela may include mild weakness and memory loss lasting several weeks, and the CDC reports neurological effects may be permanent in those who had the severe form of the disease.

Who is at high risk for acquiring WNV?

Persons over the age of 50 appear to be at greatest risk for a WNV infection progressing to the more serious encephalitis/meningitis, although WNV can infect persons of all ages.

How is WNV diagnosed?

- The most efficient diagnostic method is detection of IgM antibody to WNV in serum collected within 8 to 14 days of illness onset or CSF collected within 8 days of illness onset using an enzyme immunosorbent assay (EIA).

- IgM antibody does not cross the blood-brain barrier; IgM antibody in CSF strongly suggests central nervous system infection.
- WNV-specific IgM has persisted in patients for >500 days. Positive serologic tests must be correlated with clinical presentation, season and potential exposure to WNV.
- A positive IgG antibody test from a single sample is **not** diagnostic for acute infection. IgG may be present in blood for reasons not related to a recent WNV infection, such as yellow fever vaccination, infection with a virus related to WNV, or evidence of a past exposure to a related virus. The test is less specific, i.e. may produce false-positive results.
- Serological tests for WNV can cross react with other closely related flaviviruses (Japanese encephalitis, St. Louis encephalitis, yellow fever, dengue). Patients who have been recently vaccinated against or recently infected with related flaviviruses may have positive WNV results.

Is a convalescent specimen necessary?

Collection of a convalescent specimen at least 2 weeks post onset should be considered on patients with clinical symptoms consistent with WNV infection where the acute sample was collected less than 8 days post symptom onset and tested negative for IgM antibody; or where the acute specimen yielded an equivocal or indeterminate result.

What are the indications for testing for WNV?

- Clinically compatible illness during transmission season. In Iowa, transmission is likely to occur from June through October, with peak activity in August to mid-September.
- Providers should consider if there is any clinical value in testing patients with mild fevers of unknown origin in the absence of neurological signs.
- Encephalitis cases of unknown etiology.
- Aseptic meningitis cases, although at this time of year, such cases may be caused by enteroviruses; CSF testing by PCR for enterovirus is recommended.
- Patients with flaccid paralysis or neurological symptoms following a febrile illness.
- Pregnant or breast-feeding women with a compatible febrile illness and exposure history.
- Patients with onset of compatible illness within 2 weeks of receiving blood products or having donated blood.

How is WNV treated?

No specific treatment for WNV is currently available and there are no vaccines for human use. Treatment for mild illness is usually not necessary. In severe cases, treatment consists of supportive care that often involves hospitalization, intravenous fluids, respiratory support, and prevention of secondary infections.

What specimens need to be submitted to test for WNV?

- WNV testing for patients with encephalitis or meningitis can be obtained at the State Hygienic Laboratory (SHL). Acute serum is best collected at 8 days following symptom onset and convalescent serum from 14 - 21 days following symptom onset. Specimens must be submitted with the current SHL version request form (SHL website at www.uhl.uiowa.edu or (319) 335-4500 for request forms and shipping instructions).
- For mild illness (West Nile fever), WNV testing is available at most commercial laboratories. Please contact your clinical laboratory for information.

How should a case of WNV be reported?

Please contact the Iowa Department of Public Health at (800) 362-2736 to report a case.

Where can additional information regarding WNV be found?

- The Iowa Department of Public Health, Center for Acute Disease Epidemiology at (800) 362-2736 or www.idph.state.ia.us
- State Hygienic Laboratory (SHL): www.uhl.uiowa.edu
- Iowa State University's Department of Entomology: www.ent.iastate.edu/
- Centers for Disease Control and Prevention: www.cdc.gov