MAYO CLINIC LABORATORIES

Test Definition: WNS

West Nile Virus Antibody, IgG and IgM, Serum

Overview

Useful For

Laboratory diagnosis of infection with West Nile virus using serum specimens

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
WNGS	West Nile Virus Ab, IgG, S	No	Yes
WNMS	West Nile Virus Ab, IgM, S	No	Yes
WNVSI	West Nile Serum Interpretation	No	Yes

Testing Algorithm

The following algorithms are available:

-Meningitis/Encephalitis Panel Algorithm

-Mosquito-borne Disease Laboratory Testing

Special Instructions

- Meningitis/Encephalitis Panel Algorithm
- Mosquito-borne Disease Laboratory Testing

Highlights

Detection of antibodies to West Nile virus (WNV) in serum can be used to support the diagnosis of recent WNV infection.

This test should be used for diagnostic purposes only.

Method Name

Enzyme Linked Immunosorbent Assay (ELISA)

NY State Available

No

Specimen

Specimen Type

Serum

Specimen Required

Supplies: Sarstedt Aliquot Tube 5 mL (T914)

Collection Container/Tube:

Preferred: Serum gel
Acceptable: Red top
Submission Container/Tube: Plastic vial
Specimen Volume: 0.5 mL
Collection Instructions: Centrifuge and aliquot serum into a plastic vial.

Forms

If not ordering electronically, complete, print, and send Infectious Disease Serology Test Request (T916) with the specimen.

Specimen Minimum Volume

0.4 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	Reject
Gross icterus	Reject
Heat Inactivated specimen	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	14 days	
	Frozen	14 days	

Clinical & Interpretive

Clinical Information

West Nile virus (WNV) is a mosquito-borne flavivirus (single-stranded RNA) that primarily infects birds and can also infect humans and horses. WNV was first isolated in 1937 from an infected person in the West Nile district of Uganda. Until the viral infection was recognized in 1999 in birds in New York City, WNV was found only in the Eastern Hemisphere, with wide distribution in Africa, Asia, the Middle East, and Europe.(1-3) In 2012, a total of 5674 cases of WNV were reported to the Centers for Disease Control and Prevention, among which 2873 (51%) were classified as neuroinvasive disease (eg, meningitis or encephalitis) and 286 (5%) cases resulted in death.(2)

Most people who are infected with WNV will not develop clinical signs of illness. It is estimated that about 20% of those who become infected will develop West Nile fever with mild symptoms, including fever, headache, myalgia, and occasionally a skin rash on the trunk of the body. Case fatality rates among patients hospitalized during recent outbreaks have ranged from 4% to 14%. Advanced age is the most important risk factor for death, and patients older than 70 years of age are at particularly high risk.(1)

Laboratory diagnosis is best achieved by demonstration of specific IgG and IgM class antibodies in serum specimens. Polymerase chain reaction (PCR) tests (WNVS / West Nile Virus, RNA, PCR, Molecular Detection, Serum) can detect WNV RNA in serum specimens from patients with recent WNV infection (ie, 3-5 days following infection) when specific antibodies to the virus are not yet present. However, the likelihood of detection is relatively low as the sensitivity of PCR detection is approximately 55% in cerebrospinal fluid and approximately 10% in blood from patients with known WNV infection.

Reference Values

IgG: negative
IgM: negative

Reference values apply to all ages.

Interpretation

The presence of IgG-class antibodies to West Nile virus (WNV) in serum indicates infection with WNV at some time in the past. By 3 weeks postinfection, virtually all infected persons should have developed IgG antibodies to WNV. If acute-phase infection is suspected, serum specimens collected within approximately 7 days postinfection should be compared with a specimen collected approximately 14 to 21 days postinfection to demonstrate rising IgG antibody levels between the 2 serum specimens.

Presence of specific IgM-class antibodies in a serum specimen is consistent with acute-phase infection with WNV. By the 8th day of illness, most infected persons will have detectable serum IgM antibody to WNV; in most cases it will be detectable for at least 1 to 2 months following disease resolution and, in some cases, will be detectable for 12 months or longer.

The absence of IgM antibodies to WNV is consistent with lack of acute-phase infection with this virus. Specimens collected too early in the acute phase (eg, before 8-10 days postinfection) may be negative for IgM-specific antibodies to WNV. If WNV is suspected, a second specimen collected approximately 14 days postinfection should be tested.

In the very early stages of WNV infection, IgM may be detectable in cerebrospinal fluid before it becomes detectable in serum.

Cautions

Test results should be used in conjunction with a clinical evaluation and other available diagnostic procedures.

The significance of negative test results in immunosuppressed patients is uncertain.

Positive test results may not be valid in persons who have received blood transfusions or other blood products within the past several months.

False-negative results due to competition by high levels of IgG, while theoretically possible, have not been observed.

False-positive results may occur in persons vaccinated for flaviviruses (eg, yellow fever, Japanese encephalitis, dengue)

False-positive results may occur in patients infected with other arboviruses, including flaviviruses (eg, dengue virus) and

alphaviruses (eg, LaCrosse [California] Encephalitis virus, Eastern or Western equine encephalitis virus, St. Louis virus) and in persons previously infected with West Nile virus.

Because closely related arboviruses exhibit serologic cross-reactivity, it sometimes may be epidemiologically important to attempt to pinpoint the infecting virus by conducting cross-neutralization tests using an appropriate battery of closely related viruses.

West Nile virus antibody results for cerebrospinal fluid (CSF) should be interpreted with caution. Complicating factors include low antibody levels found in CSF, passive transfer of antibody from blood, and contamination via a traumatic lumbar puncture.

Clinical Reference

1. Petersen LR, Marfin AA. West Nile Virus: a primer for the clinician. Ann Intern Med. 2002;137:173-179
2. Centers for Disease Control and Prevention (CDC). West Nile virus and other arboviral diseases-United States, 2012. MMWR Morb Mortal Wkly Rep. 2013;62(25):513-517
3. Brinton MA. The molecular biology of West Nile Virus: a new invader of the western hemisphere. Ann Rev Microbiol. 2002;56:371-402
4. Habarugira G, Suen WW, Hobson-Peters J, Hall RA, Bielefeldt-Ohmann H. West Nile Virus: An update on pathobiology, epidemiology, diagnostics, control and "One Health" Implications. Pathogens. 2020;9(7):589

Performance

Method Description

IgG:
Polystyrene microwells are coated with recombinant West Nile virus (WNV) antigen. Diluted serum specimens and controls are incubated in the wells to allow specific antibody present in the specimens to react with the antigen. Nonspecific reactants are removed by washing, and peroxidase-conjugated antihuman IgG is added and reacts with specific IgG. Excess conjugate is removed by washing. Enzyme substrate and chromogen are added, and the color is allowed to develop. After adding the Stop reagent, the resultant color change is quantified by a spectrophotometric reading of optical density (OD). Specimen OD readings are compared with reference cutoff readings to determine results.(Package insert: West Nile Virus IgG DxSelect. Focus Diagnostics; 05/08/2018)

IgM:
Polystyrene microwells are coated with the antihuman antibody specific for IgM (mu-chain). Diluted serum specimens and controls are incubated in the wells, and IgM present in the specimen binds to the antihuman antibody (IgM specific) in the wells. Nonspecific reactants are removed by washing. WNV antigen is then added to the wells and incubated. If anti-WNV IgM is present in the specimen, the WNV antigen binds to the anti-WNV in the well. Unbound WNV antigen is then removed by washing the well. Mouse anti-flavivirus conjugated with horseradish peroxidase (HRPO) is then added to the wells and incubated. If WNV antigen has been retained in the well by the anti-flavivirus in the specimen, the mouse anti-flavivirus:HRPO binds to WNV antigen in the wells. Excess conjugate is removed by washing. Enzyme substrate and chromogen are added, and the color is allowed to develop. After adding the Stop reagent, the resultant color change is quantified by a spectrophotometric reading of OD that is directly proportional to the amount of antigen-specific IgM present in the specimen. Specimen OD readings are compared with reference cutoff OD readings to

determine results.(Package insert: West Nile Virus IgM Capture DxSelect. Focus Diagnostics; 05/08/2018)

PDF Report
No

Day(s) Performed
Monday, Wednesday, Friday

Report Available
Same day/1 to 4 days

Specimen Retention Time
14 days

Performing Laboratory Location
Mayo Clinic Jacksonville Clinical Lab

Fees & Codes

Fees
- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification
This test has been cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information
IgG-86789
IgM-86788

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
WNS	West Nile Virus Ab, IgG and IgM, S	94854-7

Result ID	Test Result Name	Result LOINC® Value
WNGS	West Nile Virus Ab, IgG, S	29566-7
WNMS	West Nile Virus Ab, IgM, S	29567-5
WNVSI	West Nile Serum Interpretation	69048-7