Overview

Useful For
Laboratory diagnosis of infection with West Nile virus in serum specimens

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.

Profile Information

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Reporting Name</th>
<th>Available Separately</th>
<th>Always Performed</th>
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</thead>
<tbody>
<tr>
<td>WNGS</td>
<td>West Nile Virus Ab, IgG, S</td>
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<tr>
<td>WNMS</td>
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<tr>
<td>WNVSI</td>
<td>West Nile Serum Interpretation</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Testing Algorithm
The following algorithms are available in Special Instructions:

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

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

Method Name
Enzyme-Linked Immunosorbent Assay (ELISA)

NY State Available
Yes

Specimen

Specimen Type
Serum

Specimen Required
Collection Container/Tube:

Preferred: Serum gel
Acceptable: Red top

Specimen Volume: 0.5 mL

Forms
If not ordering electronically, complete, print, and send a Microbiology Test Request (T244) with the specimen.

Specimen Minimum Volume
0.4 mL

Reject Due To

<table>
<thead>
<tr>
<th>Gross hemolysis</th>
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<tbody>
<tr>
<td>Gross lipemia</td>
<td>Reject</td>
</tr>
<tr>
<td>Gross icterus</td>
<td>Reject</td>
</tr>
<tr>
<td>Other</td>
<td>Heat Inactivated specimen</td>
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Specimen Stability Information

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<tr>
<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
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<tbody>
<tr>
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<td></td>
</tr>
<tr>
<td></td>
<td>Frozen</td>
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Clinical and Interpretive

Clinical Information
West Nile virus (WNV) is a mosquito-borne flavivirus (single-stranded RNA) that primarily infects birds but 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) Most recently, in 2012, a total of 5,674 cases of WNV were reported to the Centers for Disease Control and Prevention (CDC), among which 2,873 (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. PCR tests (WNVP / West Nile Virus (WNV), Molecular Detection, PCR, Plasma) can detect WNV RNA in plasma specimens from patients with recent WNV infection (ie, 3 to 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
IgG:
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 drawn within approximately 7 days postinfection should be compared with a specimen drawn approximately 14 to 21 days postinfection to demonstrate rising IgG antibody levels between the 2 serum specimens.

IgM:
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 antibodies 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 drawn too early in the acute phase (eg, before 8 to 10 days postinfection) may be negative for IgM-specific antibodies to WNV. If WNV is suspected, a second specimen drawn approximately 14 days postinfection should be tested.

In the very early stages of WNV infection, IgM may be detectable in cerebrospinal fluid (CSF) 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 (WNV).

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.
WNV 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

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: Flavivirus [West Nile] ELISA IgG. Focus Technologies, Cypress, CA. 10/16/2012)

IgM:
Polystyrene microwells are coated with the antihuman antibody specific for IgM (u-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 antiflavivirus conjugated with horseradish peroxidase (HRPO) is then added to the wells and incubated. If WNV antigen has been retained in the well by the antiflavivirus in the specimen, the mouse antiflavivirus: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: Flavivirus [West Nile] IgM Capture ELISA. Focus Technologies, Cypress, CA. 6/1/2015)

PDF Report
No

Day(s) and Time(s) Test Performed
Monday, Wednesday, Friday; 9 a.m.
**Test Definition: WNS**
West Nile Virus Ab, IgG and IgM, S

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**Analytic Time**
Same day/1 day

**Maximum Laboratory Time**
4 days

**Specimen Retention Time**
14 Days

**Performing Laboratory Location**
Rochester

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**Fees and 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 Regional Manager. For assistance, contact Customer Service.

**Test Classification**
This test has been cleared or approved by the U.S. 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**

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