Overview

Useful For
Aiding in the diagnosis of dengue virus infection

Highlights
Detection of antibodies to dengue virus is suggestive of recent exposure and/or infection with dengue virus.

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>
</tr>
</thead>
<tbody>
<tr>
<td>DENG</td>
<td>Dengue Virus Ab, IgG, S</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>DENM</td>
<td>Dengue Virus Ab, IgM, S</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>DNABI</td>
<td>Dengue Ab Interpretation</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Testing Algorithm
See Mosquito-borne Disease Laboratory Testing in Special Instructions.

Special Instructions
- Mosquito-borne Disease Laboratory Testing

Method Name
Enzyme-Linked Immunosorbent Assay (ELISA)

NY State Available
Yes

Specimen

Specimen Type
Serum

Specimen Required
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.
Test Definition: DENG M
Dengue Virus Ab, IgG and IgM, S

Specimen Minimum Volume
0.4 mL

Reject Due To

<table>
<thead>
<tr>
<th>Condition</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross hemolysis</td>
<td>Reject</td>
</tr>
<tr>
<td>Gross lipemia</td>
<td>Reject</td>
</tr>
<tr>
<td>Gross icterus</td>
<td>Reject</td>
</tr>
<tr>
<td>Heat-Inactivated specimen</td>
<td>Reject</td>
</tr>
</tbody>
</table>

Specimen Stability Information

<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>Temperature</th>
<th>Time</th>
<th>Special Container</th>
</tr>
</thead>
<tbody>
<tr>
<td>Serum</td>
<td>Refrigerated (preferred)</td>
<td>14 days</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Frozen</td>
<td>14 days</td>
<td></td>
</tr>
</tbody>
</table>

Clinical and Interpretive

Clinical Information

Dengue virus (DV) is a globally distributed flavivirus with 4 distinct serotypes (DV-1, -2, -3, -4) and is primarily transmitted by the *Aedes aegypti* mosquito, which is found throughout the tropical and subtropical regions of over 100 countries. DV poses a significant worldwide public health threat with approximately 2.5 to 3 billion people residing in DV endemic areas, among whom 100 to 200 million individuals will be infected and approximately 30,000 patients will succumb to the disease annually.

Following dengue infection, the incubation period varies from 3 to 7 days and, while some infections remain asymptomatic, the majority of individuals will develop classic dengue fever. Symptomatic patients become acutely febrile and present with severe musculoskeletal pain, headache, retro-orbital pain, and a transient macular rash, most often observed in children. Fever defervescence signals disease resolution in most individuals. However, children and young adults remain at increased risk for progression to dengue hemorrhagic fever and dengue shock syndrome, particularly during repeat infection with a new DV serotype.

Dengue virus (DV) is a globally distributed flavivirus with 4 distinct serotypes (DV-1, -2, -3, -4) and is primarily transmitted by the *Aedes aegypti* mosquito, which is found throughout the tropical and subtropical regions of over 100 countries. DV poses a significant worldwide public health threat with approximately 2.5 to 3 billion people residing in DV endemic areas, among whom 100 to 200 million individuals will be infected and approximately 30,000 patients will succumb to the disease annually.

Following dengue infection, the incubation period varies from 3 to 7 days and, while some infections remain asymptomatic, the majority of individuals will develop classic dengue fever. Symptomatic patients become acutely febrile and present with severe musculoskeletal pain, headache, retro-orbital pain, and a transient macular rash, most often observed in children. Fever defervescence signals disease resolution in most individuals. However, children and young adults remain at increased risk for progression to dengue hemorrhagic fever and dengue shock syndrome, particularly during repeat infection with a new DV serotype.

Detection of dengue-specific IgM and IgG-class antibodies remains the most commonly utilized diagnostic method. Seroconversion occurs approximately 3 to 7 days following exposure and, therefore, testing of acute and convalescent sera may be necessary to make the diagnosis. As an adjunct to serologic testing, identification of early DV infection may be made by detection of the DV nonstructural protein 1 (NS1) antigen. NS1 antigenemia is detectable within 24 hours of infection and up to 9 days following symptom onset. The DV NS1 antigen can be detected by ordering DNSAG / Dengue Virus NS1 Antigen, Serum.

Reference Values

IgG: negative

IgM: negative

Reference values apply to all ages.
**Interpretation**

The presence of IgG-class antibodies to dengue virus (DV) is consistent with exposure to this virus sometime in the past. By 3 weeks following exposure, nearly all immunocompetent individuals should have developed IgG antibodies to DV.

The presence of IgM-class antibodies to DV is consistent with acute-phase infection.

IgM antibodies become detectable 3 to 7 days following infection and may remain detectable for up to 6 months or longer following disease resolution.

The absence of IgM-class antibodies to DV is consistent with lack of infection. However, specimens collected too soon following exposure may be negative for IgM antibodies to DV. If DV remains suspected, a second specimen, collected approximately 10 to 12 days following exposure should be tested.

**Cautions**

Test results should be used in conjunction with clinical evaluation, including exposure history and clinical presentation.

False-positive results, particularly with the dengue virus (DV) IgG enzyme-linked immunosorbent assay (ELISA), may occur in persons infected with other flaviviruses, including Zika virus, West Nile virus, and St. Louis encephalitis virus. Obtaining a detailed exposure history and further laboratory testing may be necessary to determine the infecting virus.

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

The significance of a negative result in an immunosuppressed patient is unclear.

**Supportive Data**

A total of 200 prospective serum samples submitted for dengue virus (DV) IgM and IgG testing by the Focus Diagnostics DV IgM and IgG EIAs were also tested by the InBios IgM and IgG DV assays. The results were compared and the data summarized in Tables 1 and 2.

<table>
<thead>
<tr>
<th>Table 1. Comparison of the InBios and Focus Diagnostics DV IgM Ela</th>
</tr>
</thead>
<tbody>
<tr>
<td>Focus Diagnostics DV IgM EIA</td>
</tr>
<tr>
<td>-----------------------------</td>
</tr>
<tr>
<td>InBios</td>
</tr>
<tr>
<td>Positive</td>
</tr>
<tr>
<td>Negative</td>
</tr>
<tr>
<td>Equivocal</td>
</tr>
</tbody>
</table>

Sensitivity: 87.5% (14/16); 95% CI: 62.7%-97.7%

Specificity: 100% (184/184); 95% CI: 97.5%-100%

Agreement: 99% (198/200); 95% CI: 96.1%-99.9%
Table 2. Comparison of the InBios and Focus Diagnostics DV IgG EIA

<table>
<thead>
<tr>
<th></th>
<th>Focus Diagnostics DV IgG EIA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td>InBios DV IgG EIA</td>
<td></td>
</tr>
<tr>
<td>Positive</td>
<td>34</td>
</tr>
<tr>
<td>Negative</td>
<td>0</td>
</tr>
<tr>
<td>Equivocal</td>
<td>2</td>
</tr>
</tbody>
</table>

Sensitivity: 94.4% (34/36); 95% CI: 80.9%-99.4%

Specificity: 100% (164/164); 95% CI: 97.2%-100%

Agreement: 99% (198/200); 95% CI: 96.1%-99.9%

An additional 42 serum samples positive for IgG-class antibodies to West Nile virus (n=24), St. Louis encephalitis virus (n=9), and California (LaCrosse) virus (n=9) were also tested by the InBios DV IgG EIA and the data are summarized below in Table 3.

Table 3. Cross-reactivity of the InBios DV IgG EIA with antibodies to West Nile virus, St. Louis encephalitis virus, and California (LaCrosse) virus

<table>
<thead>
<tr>
<th></th>
<th>West Nile Virus IgG Positive</th>
<th>St. Louis Encephalitis Virus Positive</th>
<th>California (LaCrosse) Virus Positive</th>
</tr>
</thead>
<tbody>
<tr>
<td>InBios DV IgG EIA</td>
<td>Positive</td>
<td>18</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>Equivocal</td>
<td>4</td>
<td>2</td>
</tr>
</tbody>
</table>

Note that the InBios DV IgG EIA shows significant cross-reactivity with antibodies to West Nile virus and St. Louis encephalitis virus.

Clinical Reference


Method Description

Dengue virus IgM:

In this enzyme-linked immunosorbent assay (ELISA), samples and controls are diluted in sample dilution buffer and incubated in microtiter wells coated with antihuman IgM antibodies. This incubation is followed by incubation with dengue-derived recombinant antigens (DENRA) and normal cell antigen (NCA) separately. After incubation and washing, the wells are treated with a DEN-specific monoclonal antibody labeled with horseradish peroxidase (HRP). After a second incubation and washing step, the wells are incubated with tetramethylbenzidine (TMB) substrate. Acid stop is added and absorbance at 450 nm is read. Ratio of absorbencies of the DENRA and the control antigen wells determine whether the result is positive or negative. (Package insert: InBiOS DENV Detect IgM CAPTURE ELISA. InBios International, Inc; Revision 10/1/2015)

Dengue virus IgG:

In this ELISA assay, controls and diluted samples are incubated in microtiter wells coated with monoclonal antibody bound to DENRA. After incubation and washing, wells are treated with IgG antibody labeled with HRP. After a second incubation and washing, wells are incubated with TMB substrate. Acid stop is added and absorbance at 450 nm is measured. Ratio of the absorbencies of the DENRA and the control wells determines whether a result is positive or negative. (Package insert: InBiOS DENV Detect IgG ELISA. InBios International, Inc; Revision 2/18/2015)

PDF Report

No

Day(s) and Time(s) Test Performed

Tuesday; 9 a.m.

Analytic Time

Same day/1 day

Maximum Laboratory Time

7 days

Specimen Retention Time

14 days

Performing Laboratory Location

Rochester

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 was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with
Test Definition: DENG M
Dengue Virus Ab, IgG and IgM, S

CLIA requirements. This test has not been cleared or approved by the U.S. Food and Drug Administration.

CPT Code Information
IgM-86790
IgG-86790

LOINC® Information

<table>
<thead>
<tr>
<th>Test ID</th>
<th>Test Order Name</th>
<th>Order LOINC Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DENG M</td>
<td>Dengue Virus Ab, IgG and IgM, S</td>
<td>87546-8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Result ID</th>
<th>Test Result Name</th>
<th>Result LOINC Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>DENG</td>
<td>Dengue Virus Ab, IgG, S</td>
<td>29661-6</td>
</tr>
<tr>
<td>DENM</td>
<td>Dengue Virus Ab, IgM, S</td>
<td>29663-2</td>
</tr>
<tr>
<td>DNABI</td>
<td>Dengue Ab Interpretation</td>
<td>69048-7</td>
</tr>
</tbody>
</table>