MAYO CLINIC LABORATORIES

Test Definition: DNSAG

Dengue Virus NS1 Antigen, Serum

Overview

Useful For

Aiding in the diagnosis of dengue virus infection

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
DENS1	Dengue NS1 Ag, S	No	Yes
DNAGI	Dengue Ag Interpretation	No	Yes

Testing Algorithm

For more information see:

-Mosquito-borne Disease Laboratory Testing

-Assessment for Dengue Virus Infection

Special Instructions

- Mosquito-borne Disease Laboratory Testing
- Assessment for Dengue Virus Infection

Highlights

Detection of the dengue virus nonstructural protein 1 (NS1) antigen is suggestive of recent exposure and/or acute infection with dengue virus.

This test should be used for diagnostic purposes only.

Dengue NS1 antigenemia overlaps with dengue virus viremia and can be used as an acute phase marker for infection.

Method Name

Enzyme-Linked Immunosorbent Assay (ELISA)

NY State Available

Yes

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 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

Specimen Stability Information

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

Clinical & Interpretive

Clinical Information

Dengue virus (DV) is a globally distributed flavivirus with 4 distinct serotypes (DV-1, -2, -3, -4). It 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 the DV nonstructural protein 1 (NS1) has emerged as an alternative biomarker to both serologic and molecular based techniques for diagnosis of acute DV infection. NS1 antigenemia is detectable within 24 hours and up to

9 days following symptoms onset. This overlaps with the DV viremic phase, and NS1 is often detectable prior to IgM seroconversion. Concurrent evaluation for the NS1 antigen alongside testing for IgM- and IgG-class antibodies to DV (DENGM / Dengue Virus Antibody, IgG and IgM, Serum) provides optimal diagnostic potential for both early and late dengue disease.

Reference Values

Negative
Reference values apply to all ages.

Interpretation

Positive:
The presence of dengue nonstructural protein 1 (NS1) antigen is consistent with acute-phase infection with dengue virus.

The NS1 antigen is typically detectable within 1 to 2 days following infection and up to 9 days following symptom onset.

NS1 antigen may also be detectable during secondary dengue virus infection, but for a shorter duration of time (1-4 days following symptom onset).

Negative:
The absence of dengue NS1 antigen is consistent with the lack of acute-phase infection.

The NS1 antigen may be negative if specimen is collected immediately following dengue virus infection (<24-48 hours) and is rarely detectable following 9 to 10 days of symptoms.

Cautions

Results should be used in conjunction with clinical presentation and exposure history.

Though uncommon, false-positive nonstructural protein 1 (NS1) results may occur in individuals with active infection due to other flaviviruses, including West Nile virus and yellow fever virus.

Negative NS1 antigen results may occur if the specimen was collected greater than 7 days following symptom onset. Serologic testing for the presence of IgM and IgG antibodies to dengue virus is recommended in such cases.

Supportive Data

The presence of nonstructural protein 1 (NS1) antigen overlaps with the dengue virus (DV) viremic phase for the first 4 to 5 days following infection and therefore, the performance characteristics of the InBios DV NS1 enzyme-linked immunosorbent assay (ELISA) were compared to the Focus Diagnostics DV real-time polymerase chain reaction (RT-PCR), which detects RNA from all 4 DV serotypes. Seventy-seven serum samples previously evaluated by the Focus Diagnostics RT-PCR assay were also tested by the InBios DV NS1 ELISA and the results are compared in the Table. Discordant samples were also tested by the PlateliaTM NS1 Ag enzyme immunoassay (EIA) (BioRad Laboratories).

Table. Comparison of the InBios NS1 EIA to RT-PCR for DV detection

InBios DV NS1 EIA	**Focus Diagnostics DV RT-PCR**	
	Positive	Negative
Positive	24	7(b)

Negative	1(a)	43
Equivocal	0	2(c)

a. This sample was negative by the Platelia NS1 EIA
b. Five samples were also positive by the Platelia NS1 EIA
c. One sample was negative, and one sample was indeterminate by the Platelia NS1 EIA

Sensitivity: 96% (24/25); 95% CI: 79.1%-100%
Specificity: 82.7% (43/52); 95% CI: 70.1%-90.9%
Overall Agreement: 87.1% (67/77); 95% CI: 77.6%-93%

Clinical Reference

1. Centers for Disease Control and Prevention (CDC). Clinical Testing Guidance for Dengue. Updated August 26, 2024. Accessed December 11, 2024, Available at www.cdc.gov/dengue/hcp/diagnosis-testing/index.html
2. Dengue: Guidelines for Diagnosis, Treatment, Prevention and Control. Geneva: World Health Organization; 2009
3. Khan MB, Yang ZS, Lin CY, et al. Dengue overview: An updated systemic review. J Infect Public Health. 2023;16(10):1625-1642. doi:10.1016/j.jiph.2023.08.001

Performance

Method Description

The InBios NS1 enzyme-linked immunosorbent assay (ELISA) is a 2-step sandwich-format colorimetric immunoassay for qualitative detection of nonstructural protein 1 (NS1) antigen in serum. Diluted patient samples and controls are incubated in wells coated with purified capture antibody, specific for the dengue NS1 antigen. Following incubation, wells are washed, incubated with a horseradish peroxidase-conjugated polyclonal antibody specific to NS1 antigen and re-incubated. Wells are subsequently washed and 3,3',5,5'-tetramethlbenzidine substrate is added and incubated at room temperature in the dark. Stop solution is added next and the optical density (OD) of the reaction is measured at 450/620 nm. The immune status ratio for each sample is calculated from the ratio of the OD obtained with the test sample divided by the OD from the calculated cutoff value (determined by the cutoff control sample).(Package insert: InBios DENV DetectTM NS1 ELISA. InBios International, Inc; Revision 01/2019)

PDF Report

No

Day(s) Performed

Tuesday

Report Available

Same day/1 to 7 days

Specimen Retention Time

14 days

Performing Laboratory Location

Mayo Clinic Laboratories - Rochester Superior Drive

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

86790

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
DNSAG	Dengue Virus NS1 Ag, S	75377-2

Result ID	Test Result Name	Result LOINC® Value
DENS1	Dengue NS1 Ag, S	75377-2
DNAGI	Dengue Ag Interpretation	69048-7