

Overview

Useful For

Aiding in the diagnosis of dengue virus infection

Testing Algorithm

See [Mosquito-borne Disease Laboratory Testing](#) in Special Instructions.

Special Instructions

- [Mosquito-borne Disease Laboratory Testing](#)

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.

Profile Information

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

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.

Reject Due To

Gross hemolysis Reject
Gross lipemia Reject
Gross icterus Reject

Specimen Minimum Volume

0.4 mL

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) and is primarily transmitted by the *Aedes aegypti* mosquito, 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 (DENG M / 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 Table 1 below. Discordant samples were also tested by the Platelia™ NS1 Ag enzyme immunoassay (EIA) (BioRad Laboratories).

Table 1. Comparison of the InBios NS1 EIA to RT-PCR for DV detection			
		Focus Diagnostics DV RT-PCR	
		Positive	Negative
InBios	Positive	24	7(b)
	Negative	1(a)	43
DV NS1 EIA	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. Bhatt S, Gething PW, Brady OJ, et al: The global distribution and burden of dengue. *Nature*. 2013;496:504-507
2. Dengue--an infectious disease of staggering proportions. *Lancet*. 2013 Jun 22;381(9884):2136
3. Rigau-Perez JG, Clark GG, Gubler DJ, Reiter P, Sanders EJ, Vorndam AV: Dengue and dengue haemorrhagic fever. *Lancet* 1998;352:971-977
4. Tang KF, Ooi EE: Diagnosis of dengue: an update. *Expert Rev Anti Infect Ther*. 2012;10:895-907

5. Guzman MG, Kouri G: Dengue diagnosis, advances and challenges. Int J Infect Dis. 2004;8:69-80

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. Testing is performed according to manufacturer's instructions on the Triturus automated EIA analyzer. 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 reincubated. Wells are subsequently washed and 3,3',5,5'-tetramethylbenzidine substrate is added and incubated in the dark at room temperature. Stop solution is added next and the optical density (OD) of the reaction is measured at 450/620 nm. The immune status ratio (ISR) 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 Detect™ NS1 ELISA; InBios International, Inc; Revision 1/26/2015)

PDF Report

No

Performing Laboratory Location

Rochester

Fees & Codes

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-NS1 Ag

LOINC® Information

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

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