MAYO CLINIC LABORATORIES

Test Definition: POWV

Powassan Virus, IgM, Enzyme-Linked Immunosorbent Assay, Serum

Overview

Useful For

Diagnosis of Powassan virus infection.

This test **should not be used** as a screening procedure for the general population.

This test **should not be used** as a "test of cure."

Testing Algorithm

For information see the following:
-Meningitis/Encephalitis Panel Algorithm
-Acute Tickborne Disease Testing Algorithm

Special Instructions

- Acute Tickborne Disease Testing Algorithm
- Meningitis/Encephalitis Panel Algorithm

Highlights

This test should be used for patients with at least 7 days of symptoms consistent with Powassan virus (POWV) infection and exposure history.

Specimens positive for POWV may require confirmatory testing by a POWV neutralization assay.

Method Name

Enzyme-Linked Immunosorbent Assay (ELISA)

NY State Available

Yes

Specimen

Specimen Type

Serum

Ordering Guidance

For patients with less than 7 days of symptoms, the recommended testing is molecular analysis for detection of Powassan virus (POWV) RNA. Contact either a local Public Health Laboratory or the Centers for Disease Control and Prevention.

Specimen Required

Supplies: Sarstedt 5 mL Aliquot Tube (T914)
Collection Container/Tube:
Preferred: Serum gel
Acceptable: Red top
Submission Container/Tube: Plastic vial
Specimen Volume: 0.6 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

0.5 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	30 days	

Clinical & Interpretive

Clinical Information

Powassan virus (POWV) is an emerging tick-borne virus, harbored by *Ixodes* species ticks, which are the same ticks that transmit Lyme disease (*Borrelia* spp.), *Babesia* spp., and *Anaplasma phagocytophilum*, among other pathogens. POWV is a member of the *Flavivirus* genus, which includes other arthropod-borne viruses (arboviruses) such as West Nile virus and St. Louis encephalitis virus. Two lineages of POWV have been identified, sharing approximately 94% amino acid sequence identity, including Lineage 1, which is the prototypical POWV lineage transmitted by *Ixodes marxi* and *Ixodes cookei*, and Lineage 2, which includes deer tick virus and is transmitted by *Ixodes scapularis.* POWV is maintained in the environment in groundhogs, skunks, squirrels, and white footed mice. Unlike other tick-borne pathogens, following tick attachment to a host, POWV can be transmitted in as little as 15 minutes.

Following infection, the incubation period can last anywhere from 4 to 14 days, after which approximately 66% of patients will remain asymptomatic. Symptomatic patients may present with a nonspecific influenza-like illness, including high fever, fatigue, malaise, and myalgia. Approximately 30% of symptomatic patients will progress to develop neurologic manifestations, most commonly encephalitis. While some patients may recover, over 50% of individuals will have persistent neurologic sequelae. POWV has been associated with an overall mortality rate of 10%. Although there is no targeted antiviral therapy and treatment is entirely supportive care, diagnosis is important for a number of reasons, including the ability to discontinue empiric antibiotics and to provide prognostic information for patients and families.

Reference Values

Negative
Reference values apply to all ages.

Interpretation

Negative:
No antibodies to Powassan virus detected. Negative results may occur in samples collected too soon following infection, prior to the development of a robust immune response, or in immunocompromised patients.

Positive:
Antibodies to Powassan virus detected. Confirmatory testing through a local public health laboratory and/or the Centers for Disease Control and Prevention is recommended. False positive results may occur in patients with current or prior infection with other flaviviruses (West Nile virus, Zika virus, dengue virus, etc).

Cautions

False-negative results may occur in severely immunosuppressed individuals who are unable to mount a detectable humoral immune response. False-negative results may also occur in samples collected too soon following infection (<7 days post-symptom onset).

False-positive results may occur in patients with prior or current infection with other flaviviruses. Contact your local public health laboratory to determine whether confirmatory testing via a neutralization assay is required or recommended.

This test should not be used as a "test of cure" as antibodies to Powassan virus (POWV) may persist for months to years after resolution of the infection.

This test should be ordered in patients with suspected, symptomatic disease who have had recent exposure to ticks in geographic regions endemic for POWV, including Minnesota, Wisconsin, and the northeast United States. POWV is also prevalent in ticks in Russia and certain regions of Asia.

False-positive results may occur in patients screened for POWV who are not at sufficient risk or do not have an exposure history to suggest infection.

Clinical Reference

1. Centers for Disease Control and Prevention, National Center for Emerging and Zoonotic Infectious Diseases (NCEZID), Division of Vector-Borne Diseases (DVBD): Powassan virus disease. CDC; Updated January 10, 2019. Available at www.cdc.gov/ticks/tickbornediseases/powassan.html

2. Kemenesi G, Banyai K: Tick-borne Flaviviruses, with a focus on Powassan virus. Clinical Microbiology Reviews. 2019;32(1):e00106-00117

Performance

Method Description
The test uses microtiter strips, each with 8 break-off reagent wells coated with recombinant Powassan virus antigens. In the first reaction step, diluted patient samples are incubated in the wells. In the case of positive samples, specific IgM (also IgA and IgG) antibodies will bind to the antigens. To detect the bound antibodies, a second incubation is carried out using an enzyme-labelled anti-human IgM (enzyme conjugate) catalyzing a color reaction.(Unpublished Mayo method)

PDF Report
No

Day(s) Performed
Tuesday, Thursday

Report Available
Same day/1 to 6 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 was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. It has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information
86790

LOINC® Information

MAYO CLINIC LABORATORIES

Test Definition: POWV

Powassan Virus, IgM, Enzyme-Linked Immunosorbent Assay, Serum

Test ID	Test Order Name	Order LOINC® Value
POWV	Powassan Virus, IgM, ELISA, S	29855-4

Result ID	Test Result Name	Result LOINC® Value
POWV	Powassan Virus, IgM, ELISA, S	29855-4