

Overview

Useful For

Aiding the diagnosis of arboviral encephalitis (California [LaCrosse], St. Louis, eastern equine and western equine encephalitis)

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](#)

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
CAVP	Calif Virus (LaCrosse)IgG and IgM,S	Yes	Yes
EEEP	East Equine Enceph Ab, IgG and IgM, S	Yes	Yes
STLP	St. Louis Enceph Ab, IgG and IgM, S	Yes	Yes
WEEP	West Equine Enceph Ab,IgG and IgM,S	Yes	Yes

Method Name

Immunofluorescence Assay (IFA)

NY State Available

Yes

Specimen

Specimen Type

Serum

Ordering Guidance

This panel tests for 4 arboviruses; to test for a specific arbovirus, the following tests are individually orderable:

-CAVP / California Virus (La Crosse) Encephalitis Antibody Panel, IgG and IgM, Serum

-EEEP / Eastern Equine Encephalitis Antibody Panel, IgG and IgM, Serum

-STLP / St. Louis Encephalitis Antibody Panel, IgG and IgM, Serum

-WEEP / Western Equine Encephalitis Antibody Panel, IgG and IgM, 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

Specimen Minimum Volume

0.15 mL

Specimen Stability Information

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

Clinical & Interpretive**Clinical Information**

California (LaCrosse) Virus:

California (LaCrosse) virus is a member of the Bunyaviridae family and is one of the arthropod-borne encephalitides. It is transmitted by various *Aedes* and *Culex* mosquitoes and is found in such intermediate hosts as the rabbit, squirrel, chipmunk, and field mouse. California meningoencephalitis is usually mild and occurs in late summer. Ninety percent of

infections are seen in children less than 15 years of age, usually from rural areas. The incubation period is estimated to be 7 days, and acute illness lasts 10 days or less in most instances. Typically, the first symptoms are nonspecific, lasting 1 to 3 days, and are followed by the appearance of central nervous system (CNS) signs and symptoms such as stiff neck, lethargy, and seizures, which usually abate within 1 week. Symptomatic infection is almost never recognized in those over 18 years old. The most important sequela of California virus encephalitis is epilepsy, which occurs in about 10% of children; almost always in patients who have had seizures during the acute illness. A few patients (estimated 2%) have persistent paresis. Learning disabilities or other objective cognitive deficits have been reported in a small proportion (no more than 2%) of patients. Learning performance and behavior of most recovered patients are not distinguishable from comparison groups in these same areas.

Eastern Equine Encephalitis:

Eastern equine encephalitis (EEE) is within the alphavirus group. It is a low prevalence cause of human disease in the eastern and Gulf Coast states. EEE is maintained by a cycle of mosquito/wild bird transmission, peaking in the summer and early fall, when man may become an adventitious host. The most common clinically apparent manifestation is a mild undifferentiated febrile illness, usually with headache. CNS involvement is demonstrated in only a minority of infected individuals, it is more abrupt and more severe than with other arboviruses, with children being more susceptible to severe disease. Fatality rates are approximately 70%.

St. Louis Encephalitis:

Areas of outbreaks of St. Louis encephalitis (SLE) since 1933 have involved the western United States, Texas, the Ohio-Mississippi Valley, and Florida. The vector of transmission is the mosquito. Peak incidence occurs in summer and early autumn. Disease onset is characterized by generalized malaise, fever, chills, headache, drowsiness, nausea, and sore throat or cough, followed in 1 to 4 days by meningeal and neurologic signs. The severity of illness increases with advancing age; persons over 60 years have the highest frequency of encephalitis. Symptoms of irritability, sleeplessness, depression, memory loss, and headaches can last up to 3 years.

Western Equine Encephalitis:

The virus that causes western equine encephalitis (WEE) is widely distributed throughout the United States and Canada; disease occurs almost exclusively in the western states and Canadian provinces. The relative absence of the disease in the eastern United States probably reflects a paucity of the vector mosquito species, *Culex tarsalis*, and possibly a lower pathogenicity of local virus strains. The disease usually begins suddenly with malaise, fever, and headache, often with nausea and vomiting. Vertigo, photophobia, sore throat, respiratory symptoms, abdominal pain, and myalgia are also common. Over a few days, the headache intensifies; drowsiness and restlessness may merge into a coma in severe cases. In infants and children, the onset may be more abrupt than for adults. WEE should be suspected in any case of febrile CNS disease from an endemic area. Infants are highly susceptible to CNS disease, with about 20% of cases under 1 year of age. There is an excess of males with WEE clinical encephalitis, averaging about twice the number of infections detected in females. After recovery from the acute disease, patients may require from several months to 2 years to overcome the fatigue, headache, and irritability. Infants and children are at higher risk of permanent brain damage after

recovery than adults.

Reference Values

CALIFORNIA VIRUS (La CROSSE) ENCEPHALITIS ANTIBODY

IgG: <1:10

IgM: <1:10

Reference values apply to all ages.

EASTERN EQUINE ENCEPHALITIS ANTIBODY

IgG: <1:10

IgM: <1:10

Reference values apply to all ages.

ST. LOUIS ENCEPHALITIS ANTIBODY

IgG: <1:10

IgM: <1:10

Reference values apply to all ages.

WESTERN EQUINE ENCEPHALITIS

IgG: <1:10

IgM: <1:10

Reference values apply to all ages.

Interpretation

In patients infected with these or related viruses, IgM class antibody is reliably detected within 1 to 3 weeks of onset, peaking and rapidly declining within 3 months. Results from a single serum specimen can differentiate early (acute) infection from past infection with immunity if IgM is positive (suggests acute infection).

IgG antibody is generally detectable within 1 to 3 weeks of onset, peaking within 1 to 2 months, and declining slowly thereafter. A single serum specimen IgG of 1:10 or greater indicates exposure to the virus. A 4-fold or greater rise in IgG antibody titer in acute and convalescent sera indicates recent infection.

In the United States, it is unusual for any patient to show positive reactions to more than 1 of the arboviral antigens, although Western equine encephalitis and Eastern equine encephalitis antigens will show a noticeable cross-reactivity.

Cautions

All results must be correlated with clinical history and other data available to the attending physician.

Specimens collected within the first 2 weeks after onset are variably negative for IgG antibody and should not be used to exclude the diagnosis of arboviral disease. If arboviral infection is suspected, a second specimen should be collected and tested 10 to 21 days later.

Since cross-reactivity with dengue fever virus does occur with St. Louis encephalitis antigens and, therefore, cannot be differentiated further. The specific virus responsible for such a titer may be deduced by the travel history of the patient, along with available medical and epidemiological data, unless the virus can be isolated.

Eastern and western equine encephalitis viruses show some cross-reactivity; however, antibody response to the infecting virus is typically at least 8-fold higher.

Clinical Reference

1. Gonzalez-Scarano F, Nathanson N: Bunyaviruses. In: Fields BN, Knipe DN, eds. *Fields Virology*. Vol. 1. 2nd ed. Raven Press; 1990:1195-1228
2. Donat JF, Hable-Rhodes KH, Groover RV, Smith TF: Etiology and outcome in 42 children with acute nonbacterial meningo-encephalitis. *Mayo Clin Proc*. 1980;55:156-160
3. Tsai TF: Arboviruses. In: Murray PR, Baron EJ, Pfaller MA, et al: eds. *Manual of Clinical Microbiology*. 7th ed. American Society for Microbiology; 1999:1107-1124
4. Calisher CH: Medically important arboviruses of the United States and Canada. *Clin Microbiol Rev*. 1994;7:89-116

Performance**Method Description**

Dilutions of test sera are prepared and allowed to react with substrate cells infected with the appropriate arbovirus. If IgG antibodies to this virus are present in the serum of the patient, an antigen-antibody complex will develop that can be detected by a fluorescein-labeled antibody directed to human globulin. (Tsai TF: Arboviruses. In: Murray PR, Baron EJ, Pfaller MA, et al: eds. Manual of Clinical Microbiology. 7th ed. American Society for Microbiology; 1999:1107-1124; Beaty BJ, Casals J, Brown KL, et al: Indirect fluorescent-antibody technique for serological diagnosis of LaCrosse [California] virus infections. J Clin Microbiol. 1982;15:429-434; Bennett JE, Dolin R, Blaser MJ, eds. Mandell, Douglas, and Bennett's Principles and Practice of Infectious Diseases. 9th ed. Elsevier; 2020)

PDF Report

No

Specimen Retention Time

2 weeks

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

86651 x 2-California virus (La Crosse) encephalitis antibody, IgG and IgM

86652 x 2-Eastern equine encephalitis antibody, IgG and IgM

86653 x 2-St. Louis encephalitis antibody, IgG and IgM

86654 x 2-Western equine encephalitis antibody, IgG and IgM

LOINC® Information

Test Definition: ARBOP

Arbovirus Ab Panel IgG and IgM, S

Test ID	Test Order Name	Order LOINC Value
ARBOP	Arbovirus Ab Panel IgG and IgM, S	49093-8

Result ID	Reporting Name	LOINC®
8764	Calif (LaCrosse) Enceph Ab, IgG, S	10904-1
87280	Calif (LaCrosse) Enceph Ab, IgM, S	10905-8
83354	East Equine Enceph Ab, IgG, S	10896-9
83355	East Equine Enceph Ab, IgM, S	10898-5
8182	St. Louis Enceph Ab, IgG, S	10906-6
87268	St. Louis Enceph Ab, IgM, S	10907-4
8193	West Equine Enceph Ab, IgG, S	6957-5
87279	West Equine Enceph Ab, IgM, S	6958-3