



ENCEPHALITIS, Arboviral

(See also ENCEPHALITIS, Acute Viral.)

1. **Agent:** A group of acute inflammatory viral diseases involving brain, spinal cord and meninges caused by specific viruses. St. Louis encephalitis virus (SLE), West Nile virus (WNV), Western equine encephalitis virus (WEE), and California encephalitis (CE) virus are found in California.
2. **Identification:**
 - a. **Symptoms:** Acute meningoencephalitis with variations in severity, ranging from asymptomatic to mild (fever and headache, aseptic meningitis) to severe (acute onset of headache, high fever, meningeal signs, altered level of consciousness, tremors, muscle rigidity, muscle weakness, paralysis, convulsions, coma and death). SLE, WNV, and WEE more likely to produce clinical disease in elderly while CE is more common in children. WEE and WNV may affect all age groups.
 - b. **Differential Diagnosis:** Other infectious causes of meningoencephalitis (e.g., tuberculosis, other bacteria, and fungi, certain parasites), stroke, systemic lupus and other autoimmune processes.
 - c. **Diagnosis:** Viral-specific IgM antibodies in cerebrospinal fluid or acute-phase serum suggests recent infection. A 4-fold rise in viral-specific antibodies in paired acute and convalescent sera by neutralization, complement fixation, indirect fluorescent antibody, ELISA, or other serologic tests. Isolation of virus from brain tissue, or rarely, from blood or CSF, demonstration of viral antigen in brain tissue by immunofluorescence or demonstration of specific nucleic acid sequencing by PCR.
3. **Incubation:** Usually 5-15 days. (SLE 4-21 days, WEE 5-10 days, CE 5-15 days, WNV 3-15 days). Incubation period can be prolonged for up to 30 days for individuals with underlying immunocompromising conditions.
4. **Reservoir:** Dependent on specific virus; amphibians, bats, birds, reptiles, rodents, and others. Birds are the primary reservoir for SLE, WEE, and WNV viruses.
5. **Source:** Infective arthropod, usually a mosquito. WNV is also potentially transmitted through infected blood products and organ tissue.
6. **Transmission:** Bite of infective arthropod.
7. **Communicability:** Not transmitted person to person.
8. **Specific Treatment:** Supportive.
9. **Immunity:** Permanent for specific virus.

REPORTING PROCEDURES

1. **Reportable.** (Title 17, Section 2500 *California Code of Regulations*). Telephone report of case or suspect case to ACDC and Morbidity Unit.

2. **Report Form:**

[WEST NILE VIRUS INFECTION CASE REPORT FORM \(CDPH 8687\)](#)

3. **Epidemiologic and Clinical Data:**

- a. If case was bitten by mosquitoes or was in a mosquito-infested area during incubation period, identify as precisely as possible (address, city, zip) the area where the exposure occurred. Note outdoor activities during dusk.
- b. Increased mortality of horses in area may indicate the presence of WEE; increased mortality of crows or other corvid species may indicate WNV.
- c. Presence of other human cases.
- d. Travel up to 3 weeks prior to onset.
- e. Occupation and hobbies.



- f. Results of the first spinal tap (CSF). Note the total WBC with differential, total RBC, and total protein and glucose and Gram stain.
- g. Results of any viral studies performed including antibody tests (serum and CSF), PCR-based diagnostics of CSF, and viral and bacterial cultures of CSF if completed.
- h. History of organ transplantation or receipt or donation of blood products within 4 weeks of symptom onset.
- i. Results of WNV, WEE, SLE serum and CSF antibodies, if available.

CONTROL OF CASE, CONTACTS & CARRIERS

Investigate within 3 days. If encephalitis is due to arboviral etiology (e.g., WNV), ACDC will alert appropriate mosquito abatement district where case resides.

CASE: No restrictions.

CONTACTS: No restrictions.

CARRIERS: Not applicable.

PREVENTION-EDUCATION

1. Prevent mosquito bites by using screens on windows, and wear protective clothing and repellents if outdoor activity in areas with mosquito infestation is necessary.
2. Eliminate mosquito-breeding sites by emptying containers with stagnant water (i.e., bird baths, old tires, planters and other containers).
3. Control adult mosquito population by applying appropriately labeled pesticides. Control of larva and eliminating large breeding areas should be referred to mosquito abatement agencies.
4. Proper use of DEET-based insect repellent—no more than 35% DEET for adults and 10% for children. DEET based products are safe for children ages 2 months and older. Parents should apply insect repellent to their children. Picaridin and oil of lemon eucalyptus

have also shown to offer long-lasting protection against mosquito bites (approved for children ages 3 years and above).

DIAGNOSTIC PROCEDURES

Clinical and epidemiologic history required to aid the laboratory in test selection. WNV serum serology is widely commercially available. The Public Health Laboratory (PHL) will provide confirmatory testing for WNV serum serology. PHL will also provide serologic evaluation for other arboviral causes of encephalitis. WNV CSF serology is not performed by the PHL.

1. **Antibodies:** Paired acute and convalescent sera required; CSF (SLE and WEE only).

Container: Serum separator tube (SST).

Test Requisition and Report Form H-3021

Test requested: Arbovirus Serology. (SLE, WEE, WNV)

Material: Whole clotted blood, CSF.

Amount: 8-10 ml of blood, 1-2 ml. CSF.

Storage: Refrigerate immediately.

Remarks: Collect first (acute) blood specimen as soon as possible. Collect second (convalescent) blood approximately 2 weeks after the first. Send each specimen to Public Health Laboratory as soon as it is collected.

2. **Culture:** Arbovirus isolation not offered. See **ENCEPHALITIS, Acute Viral** for isolation of other potential viral agents.

All CSF specimens for arboviral testing must be accompanied by serum specimens.

3. **PCR:** Useful for the diagnostic of enteroviruses and herpes viruses (including HSVI, HSVII, varicella) which can cause acute viral encephalitis.

Container: sterile test tube.

Laboratory Form: Test Requisition and Report Form H-3021 or online request if electronically linked to the Public Health laboratory.



Examination Requested: PCR of CSF for enterovirus, HSVI, HSVII or varicella.

Material: 1-2 cc CSF (no preservatives).