



Healthy Insights

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Prevention news for the medical community of New Hampshire

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Arboviral Diseases in New Hampshire: Strategies for Prevention and Diagnosis

1. Vigilance is needed during the summer months to consider mosquito-borne diseases, including West Nile Virus (WNV) and Eastern Equine Encephalitis (EEE) in patients with compatible clinical features.
2. Prevention measures include avoiding mosquito bites with the use of protective clothing and insect repellents, and environmental reduction of mosquito populations.
3. Equine vaccines for EEE and WNV are available and should be used to protect horses. There are no recommended vaccines available for humans.
4. Suspected and confirmed cases of mosquito-borne diseases should be reported to NH DPHS Infectious Disease Investigation Section and Surveillance at 603-271-4496 (after hours 800-852-3345 ext. 5300).

Arboviruses in NH include West Nile virus (WNV) and Eastern Equine Encephalitis (EEE) virus, both transmitted to humans through the bite of an infected mosquito. The viruses are maintained in a bird-mosquito cycle with humans considered incidental hosts. The time of highest risk for human infection in NH has been identified between July and October. Year-round transmission is possible in some geographic locations in the U.S.

During last season (2010), there were 381 human cases of WNV reported in the US. Neuroinvasive Disease (meningitis and/or encephalitis) was recorded in 217 cases, while 164 cases were diagnosed with milder West Nile fever. In NH, one human case of WNV was reported (the first human case reported since 2003) as well as positive mosquito batches. For EEE, there was a single positive veterinary case reported in 2010. During 2007, 3 human EEE cases were reported and in 2009, 1 human case was reported.

When to Suspect Arboviral Illness

The incubation period following the bite of an infected mosquito ranges from 3 to 14 days. Most arboviral infections are mild and non apparent. Mild forms of disease normally present as a febrile illness but sudden onset of symptoms can be seen with headache, myalgias and arthralgias. Approximately 20% of those infected with WNV develop a mild illness known as West Nile Fever.

The more severe forms of arboviral infection include altered mental status and/or neurological dysfunction (cranial and peripheral neuritis or other neuropathies, including acute flaccid paralysis

syndrome). A minority of patients with severe disease develop a diffuse maculopapular or morbilliform rash. Approximately 1 in 150 WNV infections will result in severe neurological disease with encephalitis more common than meningitis. Older patients are at additional risk of developing severe West Nile Virus infections. For EEE, approximately one-third of all people who develop clinical encephalitis will die from the disease. Among those who recover, many suffer from permanent brain damage and severe disease can be seen in any age group, including children.

The typical laboratory findings are normal or elevated total leukocyte counts, lymphocytopenia and anemia, and hyponatremia in peripheral blood. Examination of cerebrospinal fluid (CSF) shows pleocytosis (usually with a predominance of lymphocytes), elevated protein, and normal glucose levels. For about one-third of WNV patients, magnetic resonance imaging (MRI) shows enhancement of the leptomeninges, the periventricular areas, or both, while MRI of EEE patients often reveal abnormalities of the basal ganglia and thalami.

Treatment is supportive, often involving hospitalization, intravenous fluids, respiratory support, and prevention of secondary infections for patients with severe disease.

When to Report Suspected Cases of Arboviral Illness

Clinicians, hospitals, and laboratories should report within 24 hours any patient meeting the following criteria:

1. Any patient with encephalitis or meningitis from July through November, who meet criteria a, b and c below without an alternative diagnosis:
 - a. Fever \geq 38.0 C or 100 F, and
 - b. CNS involvement including altered mental status (altered level of consciousness, confusion, agitation, lethargy) and/or other evidence of cortical involvement (e.g., focal neurologic findings, seizures), and
 - c. Abnormal CSF profile suggesting a viral etiology (a negative bacterial stain and culture) showing pleocytosis with predominance of lymphocytes. Elevated protein and normal glucose levels.

How to Report Suspect Cases of Arboviral Illness

All suspected arboviral cases should first be reported to the New Hampshire Division of Public Health Services by telephone. A completed case report form (attached) must be faxed to the NH Infectious Disease Investigation Section (603-271-0545) *and* a copy submitted with the laboratory specimen(s) to the NH Public Health Laboratories. DPHS staff members are available 24/7 to help determine if the clinical presentation meets the case criteria for viral meningoencephalitis and whether further testing would be appropriate. Specimen submission guidelines are attached as well.

For additional information on arboviral illness and maps of recent activity, please visit the NH DHHS website at <http://www.dhhs.nh.gov/dphs/cdcs/arboviral/results.htm>. For fact sheets on WNV and EEE, go to <http://www.dhhs.nh.gov/dphs/cdcs/arboviral/publications.htm>

A toll free information line is also available for the public during the summer months: 1-866-273-NILE (6453).

Attachments:

- 1) Laboratory Submission Guidelines for Arboviral Testing
- 2) NH Arboviral Case Report Form





STATE OF NEW HAMPSHIRE

DEPARTMENT OF HEALTH AND HUMAN SERVICES

29 HAZEN DRIVE, CONCORD, NH 03301-6527
603-271-4496 1-800-852-3345 Ext. 4496
Fax: 603-271-0545 TDD Access: 1-800-735-2964



Nicholas A. Toumpas
Commissioner

José Thier Montero
Director

NH Public Health Laboratories

How to Collect and Submit Clinical Specimens for Arboviral Testing

All suspect arbovirus cases should be reported to the Communicable Disease Control Section at 1-800-852-3345, ext. 4496 or the Public Health Laboratories at (603) 271-4661 before specimens are submitted.

Diagnostic testing: The arboviral testing panel is a serological test for West Nile virus (WNV), Eastern Equine Encephalitis virus (EEE), St. Louis Encephalitis virus (SLE), and may include Powassan virus (depending on availability of reagents).

- The most efficient diagnostic method measures IgM antibodies in CSF or serum collected within 8 days of illness onset. The PHL uses the Microsphere Immunoassay (MIA) for detection of IgM antibody.
Since the MIA is a preliminary test, Plaque Reduction Neutralization test (PRNT) is required for case confirmation.
The IgM antibody does not cross the blood-brain barrier; IgM antibody in CSF strongly suggests central nervous system infection.
Serologic tests have a lower sensitivity due to cross-reactivity to related flaviviruses (e.g., yellow fever, Japanese encephalitis, dengue) and the persistence of WNV IgM antibodies in serum for 6 months or longer after infection.

Fee Schedule:

Table with 2 columns: TEST, CPT. Rows include Eastern Equine Encephalitis (EEE) virus antibodies, IgM (86652), St. Louis Encephalitis virus antibodies, IgM (86653), and West Nile Virus (WNV) antibodies, IgM (86788).

All specimens submitted to the Public Health Laboratories will be screened for EEE, SLE, and WNV.

The Total Cost Per Screen is \$105.00.

Note: All spinal fluid submissions must be accompanied by a corresponding serum sample. There will be only a single charge for the paired specimens.

Specimens:

Cerebrospinal fluid (CSF): As early as the first few days of illness, IgM antibody can be demonstrated in CSF by MIA.

Since other viruses can cause encephalitis, culture for additional viruses (other arboviruses, enteroviruses, and herpesviruses) may be performed at the discretion of the laboratory.

Submit 2-5 ml in sterile, empty, screw-capped container.

- **Serum:** Acute serum (3ml) should be collected and sent immediately to PHL for testing. Serum will be tested for IgM arboviral antibody. If specimen is IgM positive, then a convalescent specimen will be requested to determine the timing of infection.

Ideal timing of specimens for serology:

Specimen	Timing
Acute	3 to 10 days after onset of symptoms
Convalescent	2-3 weeks after acute sample

All spinal fluid submissions must be accompanied by a corresponding serum sample.

The following information is critical for accurate interpretation of test results and should be recorded on the accompanying case report form:

- Date of onset of disease symptoms
- Date of specimen collection
- Unusual immunological status of patient (e.g. immunosuppression)
- Brief clinical summary including suspected diagnosis (e.g., encephalitis or meningoencephalitis)
- Current address and travel history to flavivirus-endemic areas
- History of prior vaccination against flavivirus disease (e.g., yellow fever, Japanese encephalitis, or Central European encephalitis)
- Disease history (e.g., previous history of viral encephalitis or Dengue fever)

Procedure for submission of serum or CSF:

1. Perform lumbar puncture or venipuncture (SST or whole blood tube) by standard aseptic technique.
2. Label the specimen tubes with patient's full name and the date of collection.
3. If possible, centrifuge blood to separate serum.
4. For CSF, tightly seal cap and then wrap parafilm around seal to provide additional protection from leakage during transport.
5. Fill out requisition form completely, being sure to request "arboviral serology"
6. Place CSF inside zip-lock biohazard bag and seal.
7. Place blood tube inside inner metal liner. Be sure there is enough absorbent material to cushion tubes in transit or to absorb liquid in case of leaking or broken tubes. Cap liner tightly.
8. Wrap the requisition form around the OUTSIDE of the inner metal liner.
9. Insert the metal liner into the outer cardboard container, and cap tightly. Make certain that the mailing container is labeled with the name and address of the NH PHL.
10. Mail first class or hand/courier deliver to the PHL. For emergency pickup after hours, contact the PHL at 1-800-852-3345. Refrigerate at 2-8° C if it is not possible to send specimen immediately.

The arboviral collection kit consists of:

- ❖ A labeled cardboard outer mailing container
- ❖ An aluminum inner liner
- ❖ An SST vacutainer blood collection tube
- ❖ A polypropylene tube and parafilm for transport of CSF
- ❖ Absorbent material
- ❖ Requisition form

To order specimen collection kits, please call 271-4661, or 1-800-852-3345, extension 4661. For further technical information regarding diagnostic testing, please call Denise Bolton, at 271-3684, or 1-800-852-3345, extension 3684.

**New Hampshire Case Report
Arboviral Infection
Encephalitis/Meningitis**

This form must be faxed to the NH DHHS Infectious Disease Control and Surveillance Section (603-271-0545) and a copy submitted with the laboratory specimen(s) to the NH Public Health Laboratories

PATIENT INFORMATION

Name: _____ Date of Birth: ____/____/____ Male Female
Last First MI mm dd yy

Home Address: _____ Homeless Yes No
Street City State Zip

Phone (H) _____ (W) _____ (Cell) _____

RACE White Black/African American Asian Native Hawaiian/Pacific Islander American Indian/Alaska Native Unknown
 ETHNICITY Unknown Hispanic Non-Hispanic

CLINICAL INFORMATION

Current Diagnosis: Encephalitis Meningitis Other _____

Hospitalized? Yes No If yes, Hospital: _____

Date of Admission: ____/____/____ Date of Discharge/Transfer: ____/____/____

Physician/Provider: _____ Phone: _____

SYMPTOMS: Date of first symptoms ____/____/____ Date of first *neurological* symptoms ____/____/____

	Yes	No	Unk		Yes	No	Unk		Yes	No	Unk
Fever \geq 100°F	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Disorientation	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Rigidity	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Highest Temp. (if known): _____°F				Delirium	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Cranial Nerve Palsy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Headache	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Lethargy	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Rash	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Stiff Neck	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Stupor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Location: _____			
Tremor	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Coma	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Convulsion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Vomiting/Nausea	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Muscle Weakness	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Paralysis	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Confusion	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hyperreflexia	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Hemorrhage	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Seizures	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Muscle Pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	Joint Pain	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Other: _____											

OUTCOME Recovered Residual Symptoms Died Unknown If patient died, date of death ____/____/____

LABORATORY INFORMATION/TEST RESULTS (attach laboratory sheets)

Acute specimens (serum or CSF) must be collected within 3 to 10 days after onset of symptoms. Convalescent specimens should be collected 2-3 weeks after acute sample. If CSF is collected and submitted, please include serum sample.

CSF (specify units) Date ____/____/____ Abnormal? Yes No Unknown Glu _____ Prot _____ RBC _____

WBC _____ Diff. Segs% _____ Lymphs% _____ Gram stain _____ Bacterial Culture _____

Fungal/Parasitic tests _____ Viral test results (Culture/Serology/PCR) _____

CBC (specify units) Date ____/____/____ WBC _____ Diff.Segs% _____ Lymphs% _____

MRI Date ____/____/____ Result _____

CT Date ____/____/____ Result _____

EMG Date ____/____/____ Result _____

ANTIVIRAL TREATMENT Yes No Unk If Yes, list below. **Date Started**
____/____/____

REPORTED BY: _____ **DATE OF REPORT:** ____/____/____

Phone _____ Pager _____