

Eastern Equine Encephalitis (EEE) in Massachusetts

An Update for Health Care Providers

Massachusetts Department of Public Health (MDPH)

Division of Epidemiology and Immunization

Background

EEE is caused by the most neuropathogenic arbovirus transmitted in the United States. EEE is relatively rare, since the EEE virus was first identified in Massachusetts in 1938, 99 cases have occurred with exposure in the state. However, the mortality rate for those affected is high, and survivors often suffer severe neurological sequelae.

The virus is maintained in nature in a bird-mosquito cycle that occasionally spills over into mammals, including humans. Humans are considered incidental hosts and do not perpetuate the cycle.

Since 2000, most cases have occurred in Bristol and Plymouth counties. However, during 2012, spillover of EEE to humans and animals also occurred in Essex, Middlesex, Worcester, Franklin and Hampshire counties. The greatest risk for EEE occurs from late July through September. People under 15 years of age or over 50 years of age are at greatest risk for serious illness.

EEE in Massachusetts Residents by Year, 1938-2012		
Years not shown had no reported cases		
Year(s)	Number of Confirmed Human Cases	Number of Deaths
1938-39	35	25
1955-1965	16	9
1970	1	0
1973-75	6*	4
1982-84	10**	3
1990	3	1
1992	1	0
1995	1	1
1997	1	0
2000	1	0
2001	1	0
2004	4	2
2005	4	2
2006	5	2
2008	1	1
2010	2***	0
2011	2***	1
2012	7	3
Total	99	54

* One case in 1973 consistent with exposure in NH

** One case in 1984 consistent with exposure in NJ

*** One case in 2010 and one in 2011 occurred in out-of-state residents

When to Suspect EEE

Central nervous system infection with EEE virus most commonly presents as encephalitis. The symptoms may present acutely or sub-acutely, but typically include fever, headache, alterations in level of consciousness, lethargy, confusion and seizures. Since encephalitis can coexist with inflammation of the meninges, symptoms of meningitis, such as headache and stiff neck, may predominate. **Suspect cases of encephalitis or meningitis, regardless of etiology, should be reported as soon as possible to the local board of health and the MDPH, Division of Epidemiology and Immunization, at 1-617-983-6800 or 1-888-658-2850.**

Prevention Messages for Your Patients

- Use an **EPA approved mosquito repellent** according to the instructions on the product label. Review the MDPH Fact Sheet on Mosquito Repellents online at www.mass.gov/dph/mosquito. Additional information, including repellent selector tools, is available at <http://cfpub.epa.gov/oppref/insect/> and <http://pi.ace.orst.edu/repellents/>.
- Wear long pants, a long-sleeved shirt and socks to reduce exposed skin outdoors, weather permitting.
- Keep mosquitoes out of the house by repairing any holes in screens and making sure they are tightly attached to all doors and windows.
- When elevated EEE risk exists in an area, people in that area should be encouraged to avoid outdoor events between dusk and dawn when mosquitoes most likely to carry EEE are most active.

Hinton State Laboratory Institute

Diagnostic Testing for Arboviruses in Humans

How to Test for EEE

In order to confirm suspect cases of EEE, it is vital that you send the appropriate samples to the MDPH Hinton State Laboratory Institute (HSLI) for testing.

Serologic tests and viral culture are available for diagnostic testing for evidence of infection with West Nile virus (WNV), eastern equine encephalitis (EEE) virus and other arboviruses. PCR is also available for detection of RNA of WNV and EEE virus. Multiple tests will be performed to identify viral infection and/or confirm exposure to virus. Testing may require that follow up (convalescent) specimens be submitted.

The following information is critical for accurate interpretation of test results:

- Date of onset of disease symptoms
- Date of specimen collection
- Unusual immunological status of patient (e.g. immunosuppression)
- Travel history (e.g., travel to flavivirus-endemic areas)
- Vaccination history (e.g., vaccination against yellow fever, Japanese encephalitis or Central European encephalitis)
- Disease history (e.g., previous history of viral encephalitis or dengue fever)
- Brief clinical summary including suspected diagnosis (e.g., encephalitis or meningitis)

Specimen types and amounts

Acute serum (≥ 3 ml) and CSF (≥ 1 ml) should be collected within the first 14 days following onset of symptoms and sent immediately to the HSLI. IgM antibody in serum is present in the majority of infected individuals by day 8, but may be present earlier. By 3 weeks after onset (often earlier), virtually all infected individuals will have IgG antibody by enzyme immunoassay (EIA) and plaque reduction neutralization assay (PRNT). In general, convalescent specimens should be drawn approximately 10-14 days after acute phase specimens.

CSF, brain and other tissues will be evaluated by cell culture and, if a sufficient specimen is available, by PCR. Specimens submitted for viral isolation within 48 hrs should be stored and shipped at 4°C. If already frozen, specimens should be shipped on dry ice.

Clinical specimens should be submitted using the State Laboratory Institute's clinical specimen submission form (SS-SL-1-05) (<http://www.mass.gov/eohhs/docs/dph/laboratory-sciences/general-submission-form.pdf>).

Additional arboviral information can be found on MDPH's arbovirus website:

(<http://www.mass.gov/dph/mosquito>).

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MDPH Arbovirus Website

