Epidemiology of WNV and EEE

Massachusetts Department of Public Health
Division of Epidemiology and Immunization
Arbovirus

- A group of viruses that are transmitted to humans by arthropods

- An arthropod is a phylum of the animal kingdom which includes arachnids, crustaceans, and insects

- West Nile Virus (WNV) and Eastern Equine Encephalitis (EEE) virus are the two most common arboviruses spread by mosquitoes in MA
WNV/EEE virus Transmission Cycle

Mosquito vector

Bird reservoir hosts

Incidental infections

Incidental infections
The Role of Epidemiologists

- Surveillance (can be active or passive) for human cases of arboviral infection
  - Investigate human cases
  - Monitor for clusters and outbreaks
- Public health and prevention education
- Communicate with LBOH; results, etc.
  - Serve as resource
- Work with lab and other experts to assess risk to humans at a given point in time
West Nile Virus (WNV)

- WNV is a single-stranded RNA virus, of the family Flaviviridae, genus flavivirus
- WNV was first documented in the US in NY in 1999 and in MA in 2000
- In addition to mosquitoes, WNV also has been shown to be spread through blood transfusions, organ transplants, breastfeeding, occupational exposure and transplacentally
WNV Symptoms

- Incubation period of 3-15 days
- Infection but no symptoms (~80%)
- West Nile “fever”: generally mild symptoms such as fever, headache, body aches, rash, swollen lymph glands (~20%)
- More serious infections like meningitis, encephalitis, meningo-encephalitis (~ < 1%)
Severe complications include acute aseptic meningitis or encephalitis, or acute flaccid paralysis

- Death rate among those with encephalitis/meningitis: 7%-10%

Elderly appear to be at higher risk for more severe complications

- Most fatal cases >50 years old {MA—6 fatalities—70 years and older}
2008 West Nile Virus Activity in the United States
Human West Nile Virus Cases Identified in Massachusetts by Date of Onset, 2001-2008

Note: There were no WNV cases reported in MA in 2004

N=62
Specimens Tested and WNV Positive in Massachusetts by Type, 2004-2008

### Specimens Tested and WNV Positive by Year, 2004-2008*

<table>
<thead>
<tr>
<th>Species</th>
<th>2004</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Tested</td>
<td>Positive</td>
<td>Tested</td>
<td>Positive</td>
<td>Tested</td>
</tr>
<tr>
<td>Birds</td>
<td>86</td>
<td>8</td>
<td>303</td>
<td>57</td>
<td>313</td>
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<tr>
<td>Mosquito Pools</td>
<td>7200</td>
<td>15</td>
<td>8136</td>
<td>99</td>
<td>9344</td>
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<tr>
<td>Horses</td>
<td>19</td>
<td>0</td>
<td>12</td>
<td>0</td>
<td>16</td>
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<tr>
<td>Humans</td>
<td>440</td>
<td>0</td>
<td>544</td>
<td>6</td>
<td>649</td>
</tr>
</tbody>
</table>

* One MA case exposed out-of-state. Two out-of-state cases exposed in their home states are not included.

†‡Avian testing criteria varied year to year.
Eastern Equine Encephalitis (EEE)

- Member of the family Togaviridae, genus *Alphavirus*

- First documented in the US in a horse with encephalitis in New Jersey in 1933. First human case occurred in MA in 1938.

- Most pathogenic arbovirus in the US
EEE Symptoms

- Incubation period of 2-10 days
  - Headache
  - High fever (103-106 degrees)
  - Nausea, vomiting, diarrhea
  - Lack of energy
  - Seizures
  - Coma

- 2 out of 3 people infected will either not survive or suffer severe neurological complications
2008 EEE Virus Activity in the United States

### Specimens Tested and EEE Virus Positive in Massachusetts by Type, 2004-2008

<table>
<thead>
<tr>
<th>Specimen Type</th>
<th>2004 +/-Tested</th>
<th>2005 +/-Tested</th>
<th>2006 +/-Tested</th>
<th>2007 +/-Tested</th>
<th>2008 +/-Tested</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mosquito Samples</td>
<td>39/7730</td>
<td>45/8136</td>
<td>157/9344</td>
<td>31/7271</td>
<td>13/4575</td>
</tr>
<tr>
<td>Humans</td>
<td>4/389</td>
<td>4/540</td>
<td>5/649</td>
<td>0/392</td>
<td>1/385*</td>
</tr>
<tr>
<td>Horses</td>
<td>7/34</td>
<td>4/12</td>
<td>6/16</td>
<td>0/8</td>
<td>1/14</td>
</tr>
</tbody>
</table>

**EEE virus positive results were also recorded in one emu in 2003; one emu and one alpaca in 2004, and one emu in 2005**