Update: Tick-borne Disease Surveillance in Massachusetts

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Tick-borne Diseases Transmitted by *Ixodes scapularis*

- **Lyme Disease** (*Borrelia burgdorferi*)
  - Early and late manifestations, persistent symptoms in some

- **Babesiosis** (*Babesia microti*)
  - Red blood cell parasite: fever, chills, anemia

- **Anaplasmosis** (*Anaplasma phagocytophilum*)
  - Bacteria that invades white blood cells: fever, headache, muscle aches, chills, sweating, nausea, and vomiting

- **Borrelia miyamotoi**
  - Newly recognized bacteria as a human pathogen, relapsing fever

- **Powassan/Deer Tick Virus**
  - Flavivirus related to WNV
Confirmed and Probable Cases of Lyme Disease, Anaplasmosis and Babesiosis by Year, Reported to MDPH

* Indicates an increase in cases.
Incidence Rates for Babesiosis and Anaplasmosis MA 2012-2016
Reported Cases of Lyme Disease (divided by 10), Babesiosis and Anaplasmosis, by Month, MA
Borrelia miyamotoi

- species of spiral-shaped bacteria that is closely related to the one that causes tick-borne relapsing fever (TBRF)
- distantly related to the bacterium that causes Lyme disease
- first identified in 1995 in ticks from Japan
- detected in the black-legged or “deer” tick (Ixodes scapularis)
- fever, chills, and headache, body and joint pain and fatigue; rash reported less commonly than with Lyme
- responds to doxycycline
- knowledge evolving – likely incomplete reporting
Confirmed and Probable Cases *B. miyamoto* by Month of Onset Massachusetts, 2014-2016
Reported Confirmed and Probable *B. miyamotoi* Infection Cases by Age Group in Years, Massachusetts, 2014-16
<table>
<thead>
<tr>
<th>SIGN/SYMPTOM</th>
<th>Number of MA Reports</th>
<th>MA % (n=28)</th>
<th>Published % (n=51)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FEVER</td>
<td>26</td>
<td>93%</td>
<td>96%</td>
</tr>
<tr>
<td>HEADACHE</td>
<td>26</td>
<td>93%</td>
<td>96%</td>
</tr>
<tr>
<td>FATIGUE</td>
<td>23</td>
<td>82%</td>
<td>82%</td>
</tr>
<tr>
<td>MYALGIA</td>
<td>19</td>
<td>68%</td>
<td>84%</td>
</tr>
<tr>
<td>SWEATS</td>
<td>18</td>
<td>64%</td>
<td></td>
</tr>
<tr>
<td>CHILLS</td>
<td>17</td>
<td>61%</td>
<td></td>
</tr>
<tr>
<td>ARTHRALTGIA</td>
<td>17</td>
<td>61%</td>
<td>76%</td>
</tr>
<tr>
<td>RASH</td>
<td>10</td>
<td>36%</td>
<td>8%</td>
</tr>
<tr>
<td>NECK PAIN</td>
<td>9</td>
<td>32%</td>
<td></td>
</tr>
<tr>
<td>ANEMIA</td>
<td>2</td>
<td>7%</td>
<td></td>
</tr>
<tr>
<td>THROMBOCYTOPENIA</td>
<td>2</td>
<td>7%</td>
<td>60%</td>
</tr>
<tr>
<td>ELEVATED LFTs</td>
<td>2</td>
<td>7%</td>
<td>82%</td>
</tr>
<tr>
<td>ABDOMINAL PAIN/NAUSEA</td>
<td>2</td>
<td>7%</td>
<td>6%</td>
</tr>
<tr>
<td>SYNCOPE</td>
<td>2</td>
<td>7%</td>
<td>6%</td>
</tr>
<tr>
<td>ENCEPHALITIS</td>
<td>1</td>
<td>4%</td>
<td>8%</td>
</tr>
</tbody>
</table>

Hospitalized: MA = 2%  Published = 24%

Cases by County

B. miyamotoi
• North American flavivirus
• High seroprevalence in burrowing mammals in New England
• Rare disease in humans – but
  – severe illness associated with marked neurological sequelae
  – 10-15% case-fatality rate in recognized cases
• Increased recognition with increased evaluation of encephalitis because of WNV
Powassan Cases Reported Nationally, 2004-2013

Powassan virus neuroinvasive disease cases reported by year, 2004–2013

Source: ArboNET, Arboviral Diseases Branch, Centers for Disease Control and Prevention
Confirmed Powassan Virus Infection Reported in Massachusetts

- Made reportable in 2013
  - 2013 – 1 case
  - 2014 – 4 cases
  - 2015 – 3 cases
  - 2016 – 5 cases
- All encephalitis/meningoencephalitis
- Male 12/female 1
- Ages 21-82 years (mean 64)
- 3 fatalities
- Powassan Encephalitis in New England
  - CID 2016:62 (15 March) 707
Cases by County

Powassan
New Approaches to Lyme Disease Surveillance

• Estimates based on laboratory test reports
• Evaluation of alternate data sets
  – Insurance data sets
• Electronic Health Record extracts (ESPNet)
  – in initial evaluation stages
Massachusetts *Ixodes scapularis* Ticks Tested in the Laboratory of Medical Zoology, 2015-2016, Percent Positive by PCR
(N=3,783 ticks tested, except Powassan=85)

https://www.tickreport.com/
But there are simple risk reduction tools…..

- Awareness
- Repellents
- Showers/Clothes in Dryer
- Tick Checks
- Removal
- Identification
- Healthcare Provider
- Habitat Modification
- And don’t forget your pets