Update: Tick-borne Disease Surveillance in Massachusetts

Catherine M. Brown, DVM, MSc, MPH
State Epidemiologist and
State Public Health Veterinarian
Department of Public Health
Bureau of Infectious Disease and
Laboratory Sciences

Massachusetts State Public Health Laboratory
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

*Image of Blacklegged Tick (I. scapularis)*
People Tested with a Positive Result for Lyme Disease, and Confirmed and Probable HGA and Babesiosis Cases
Monthly Tickborne Disease Reports

Monthly Tick Reports show seasonal trends in reported tick bites and tick-borne disease diagnoses in Massachusetts residents.

Highlights

Highlights from the reports:

- Tick activity and tick-borne diseases like Lyme disease, anaplasmosis, babesiosis, Borrelia miyamotoi and Powassan virus, occur year-round in Massachusetts.
- Although tick activity is weather dependent, there are two peaks during the year; the first begins in March/April and lasts through August, and the second occurs in October-November.
- The majority of cases of tick-borne disease occur in June through August.
- Tick-borne diseases are most frequently diagnosed in children and older adults.
- Although not every tick is carrying a disease, it is important to take steps to avoid all tick bites.
- Tick-borne disease prevention includes the use of repellents that contain an EPA-registered active ingredient like permethrin or DEET, wearing light colored clothing to more easily spot ticks, doing daily tick checks and promptly and properly removing any attached ticks.
- Additional information is available at [www.mass.gov/dph/tick](https://www.mass.gov/dph/tick).

https://www.mass.gov/lists/monthly-tickborne-disease-reports
Tick Exposure Syndrome:
Percent of total ED visits captured by MDPH SyS with tick exposure syndrome by week and year

Legend
- 2020 to date
- Maximum, 2017-2019
- Minimum, 2017-2019
Map: Cumulative

Rate of Tick Exposure Visits per 10,000 Population by Massachusetts County of Residence, 2020 to Date

Legend
Rate per 10,000 population
- <2.5
- 2.5-7.5
- 7.5-15
- >15

*Data as of 15 June 2020 and are subject to change.
Surveillance Highlights – *B. miyamotoi*

- 136 confirmed and probable cases of Borrelia miyamotoi were reported between 2014 and 2018. Overall, 306 suspect cases of Borrelia miyamotoi were investigated.

- Middlesex County led the state with 31 confirmed or probable cases, followed by Plymouth County (28) and Barnstable County (16).

- The majority of cases occurred in June July, August and September, only 35% of cases reported awareness of a recent tick bite.

- The most commonly reported symptoms include: fever (91%), fatigue (87%), muscle aches/pain (85%), headache (82%), chills (82%), joint aches/pains (78%), and sweats (57%). There were no known fatalities.

- People age 50 years and older continue to be at greatest risk for clinical disease (57% of patients identified with Borrelia miyamotoi were 50 or older) and 51% of the cases were male.
**Borrelia miyamotoi**

Table 1: *B. miyamotoi* case counts and proportions by county of residence, Massachusetts, 2018.

<table>
<thead>
<tr>
<th>County</th>
<th>2018 Cases Confirmed and Probable</th>
<th>Frequency (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barnstable</td>
<td>3</td>
<td>5%</td>
</tr>
<tr>
<td>Berkshire</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Bristol</td>
<td>9</td>
<td>15%</td>
</tr>
<tr>
<td>Dukes</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Essex</td>
<td>2</td>
<td>3%</td>
</tr>
<tr>
<td>Franklin</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Hampden</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Hampshire</td>
<td>1</td>
<td>2%</td>
</tr>
<tr>
<td>Middlesex</td>
<td>17</td>
<td>28%</td>
</tr>
<tr>
<td>Nantucket</td>
<td>0</td>
<td>0%</td>
</tr>
<tr>
<td>Norfolk</td>
<td>8</td>
<td>13%</td>
</tr>
<tr>
<td>Plymouth</td>
<td>9</td>
<td>15%</td>
</tr>
<tr>
<td>Suffolk</td>
<td>6</td>
<td>10%</td>
</tr>
<tr>
<td>Worcester</td>
<td>3</td>
<td>5%</td>
</tr>
<tr>
<td><strong>State Total</strong></td>
<td><strong>60</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

Data as of August 1, 2019 and are subject to change.
**Borrelia miyamotoi**

**Figure 2.**
Number of confirmed and probable cases of *B. miyamotoi* by age group, Massachusetts, 2014-2018

- 2019: 33 confirmed and probable cases
- 88 suspect cases not investigated

**Figure 3.** Number of confirmed and probable *B. miyamotoi* cases, by year, Massachusetts, 2014-2018
Surveillance Highlights - POWV

- Although at least one case of Powassan virus was identified in Massachusetts before 2013, testing for the disease became more common in 2013.
- Between 2013 and 2018, 23 cases of Powassan virus infection were detected in Massachusetts residents.
- Twenty-one of those cases (91%) were between the ages of 51 and 82. Twenty (87.0%) of cases were male.
- Fifteen (65%) cases were diagnosed with encephalitis, six (26%) with meningoencephalitis and 2 (9%) cases with meningitis.
- Sixteen (69.0%) cases reported known tick-bites before the onset of symptoms. This is in contrast to other tick-borne diseases where tick bites are not usually recognized.
- All 23 cases required hospitalization and there were 6 deaths.
Map 1 and Table 1: Number of Powassan virus disease cases in Massachusetts residents reported between 2013 and 2018 by county of residence.
Powassan virus

2019:
8 confirmed cases

Table 2: Frequency of symptoms reported among Powassan virus disease cases, Massachusetts 2013-2018
Umass Amherst – Tick Reports

Proportion of ticks carrying pathogen

- Borrelia burgdorferi: 30%
- Anaplasma phagocytophilum: 5%
- Babesia microti: 3%
- Borrelia miyamotoi: 1%
- Powassan virus: 0%

https://www.tickreport.com/stats