2009-2013 Surveillance Highlights

- Between 2009 and 2013, there were 24,687 confirmed and probable cases of Lyme disease, and 1,084 confirmed and probable cases of babesiosis reported in Massachusetts.
- There were 294 *Borrelia burgdorferi/Babesia microti* co-infections identified in Massachusetts; 171 of these patients met the case definition for both diseases (symptomatic co-infection).
- The highest incidence rates of *B. burgdorferi/B. microti* co-infection occurred in Dukes and Nantucket counties (67 and 197 per 100,000 residents). Some risk of co-infection exists throughout Massachusetts.
- The majority of *B. burgdorferi/B. microti* co-infections occurred in June, July and August.
- Patients with Lyme disease and babesiosis symptomatic co-infection were more likely to be reported with joint pain, muscle pain, headache and cardiac manifestations than patients with either Lyme disease or babesiosis alone.
- 36% of patients with Lyme disease and babesiosis symptomatic co-infection were hospitalized, which is similar to 39% of patients with babesiosis alone.
- 35% of reported babesiosis cases in children less than 10 years old had Lyme disease symptomatic co-infection.
- 45% of *B. burgdorferi/B. microti* co-infections occurred in 50-69 year olds.
- 15% of patients 50 years and older with confirmed or probable babesiosis had Lyme disease symptomatic co-infection; 1% of patients in this age group with confirmed or probable Lyme disease had babesiosis symptomatic co-infection.

**MAP**: Reported babesiosis cases overlaid on reported Lyme disease cases to demonstrate areas with higher risk of co-infection. (NOTE: these cases are reported by city/town of residence, not necessarily place of exposure).

**TABLE**: Actual counts and incidence rates of patients with confirmed or probable Lyme disease and laboratory evidence of *B. microti* infection.

<table>
<thead>
<tr>
<th>County</th>
<th>B. burgdorferi/B. microti co-infection (N=294)</th>
<th>Co-infection 5 year incidence rate (per 100,000)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Barnstable</td>
<td>65</td>
<td>30</td>
</tr>
<tr>
<td>Berkshire</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Bristol</td>
<td>20</td>
<td>4</td>
</tr>
<tr>
<td>Dukes</td>
<td>11</td>
<td>67</td>
</tr>
<tr>
<td>Essex</td>
<td>34</td>
<td>5</td>
</tr>
<tr>
<td>Franklin</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Hampden</td>
<td>12</td>
<td>3</td>
</tr>
<tr>
<td>Hampshire</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Middlesex</td>
<td>45</td>
<td>3</td>
</tr>
<tr>
<td>Nantucket</td>
<td>20</td>
<td>197</td>
</tr>
<tr>
<td>Norfolk</td>
<td>23</td>
<td>3</td>
</tr>
<tr>
<td>Plymouth</td>
<td>48</td>
<td>10</td>
</tr>
<tr>
<td>Suffolk</td>
<td>5</td>
<td>1</td>
</tr>
<tr>
<td>Worcester</td>
<td>6</td>
<td>1</td>
</tr>
</tbody>
</table>
Figure 2: Number of confirmed and probable cases of babesiosis and cases of babesiosis with Lyme disease symptomatic co-infection in Massachusetts by age: 2009-2013

- The greatest proportion of babesiosis cases with Lyme disease symptomatic co-infection occurred in children less than 10 years of age (35%).
- A large number of the symptomatic co-infection cases occurred in the 50 - 79 year age range.
- 15% of patients 50 years and older, with confirmed or probable babesiosis had Lyme disease symptomatic co-infection. Only 1% of patients in this age group, with confirmed or probable Lyme disease had babesiosis symptomatic co-infection.

Table 3: Percent of particular reported signs and symptoms among probable and confirmed cases of Lyme disease, babesiosis, and Lyme disease/babesiosis symptomatic co-infection reported in Massachusetts: 2009-2013

<table>
<thead>
<tr>
<th>Sign or Symptom</th>
<th>Lyme (n=24,687)</th>
<th>Babesiosis (n=1,084)</th>
<th>Lyme/Babesiosis Symptomatic co-infection (n=171)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Percent</td>
<td>Percent</td>
<td>Percent</td>
</tr>
<tr>
<td>Rheumatologic</td>
<td>55</td>
<td>47</td>
<td>75</td>
</tr>
<tr>
<td>Arthritis</td>
<td>23</td>
<td>0</td>
<td>12</td>
</tr>
<tr>
<td>Joint pain</td>
<td>43</td>
<td>46</td>
<td>58</td>
</tr>
<tr>
<td>Neck pain</td>
<td>14</td>
<td>2</td>
<td>12</td>
</tr>
<tr>
<td>Cardiac</td>
<td>2</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>Fatigue</td>
<td>36</td>
<td>79</td>
<td>82</td>
</tr>
<tr>
<td>Fever</td>
<td>34</td>
<td>83</td>
<td>85</td>
</tr>
<tr>
<td>Gastrointestinal</td>
<td>1</td>
<td>44</td>
<td>37</td>
</tr>
<tr>
<td>Muscle Pain</td>
<td>42</td>
<td>50</td>
<td>58</td>
</tr>
<tr>
<td>Headache</td>
<td>25</td>
<td>50</td>
<td>59</td>
</tr>
<tr>
<td>Neurological</td>
<td>14</td>
<td>1</td>
<td>14</td>
</tr>
<tr>
<td>Cognitive impairment</td>
<td>5</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
<td>Erythema migrans</td>
<td>49</td>
<td>1</td>
<td>39</td>
</tr>
</tbody>
</table>

- Reported signs and symptoms of Lyme disease include arthritis; cardiac abnormalities such as arrhythmia, AV block and palpitations; neurological (auditory impairment, Bell’s palsy, lymphocytic meningitis, paresthesia, radiculoneuropathy, and visual and cognitive impairment); rash (including erythema migrans); and headache.

- Reported signs and symptoms of babesiosis include joint pain and muscle ache; fatigue and malaise; fever (fever, chills and sweats); headache; and gastrointestinal symptoms (anorexia and nausea).

- Reported cases with Lyme disease and babesiosis symptomatic co-infection were more likely to experience joint pain, muscle pain, headache and cardiac manifestations than patients with either Lyme disease or babesiosis alone (p<0.05 for each of these signs or symptoms).