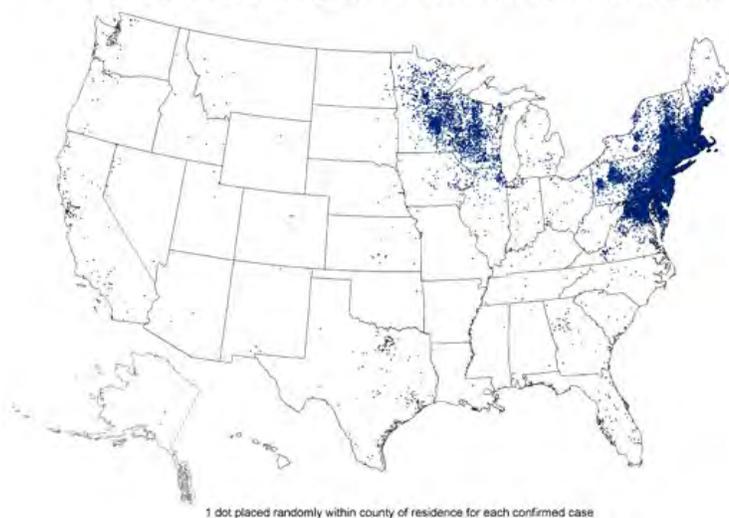


Lyme Disease in Vermont: An Important Emerging Infection

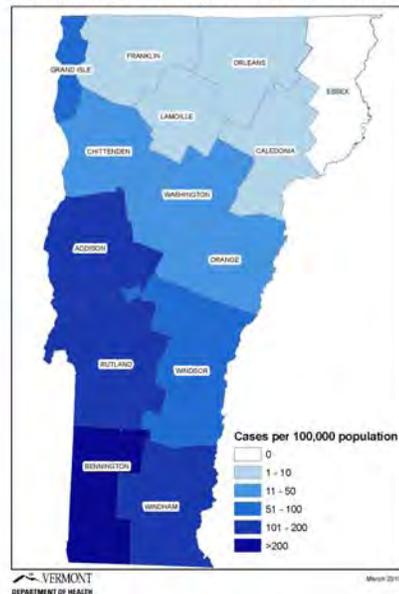
Epidemiology

- In 2000, 40 cases were reported to the Vermont Department of Health (VDH), 30% likely exposed in Vermont.
- In 2009, 322 confirmed and 85 probable cases were reported, 75% likely exposed in Vermont.
- Most cases occur in the southern part of the state, but over the years, cases have been reported from every county.
- New Hampshire and Maine have also seen similar increases in incidence. Indigenous transmission of Lyme disease has recently been confirmed in Quebec.

Reported Cases of Lyme Disease -- United States, 2008

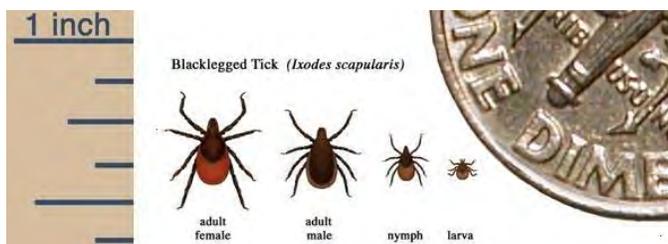


Lyme Disease in Vermont, 2009:
Incidence Rate of Confirmed & Probable Cases



Transmission

- In the northeast, *Borrelia burgdorferi*, the bacteria that causes Lyme disease, is transmitted by the black-legged tick, *Ixodes scapularis*, also known as the deer tick.
- Nymphs are responsible for most of the transmission of Lyme disease because they are small and often go unnoticed. Nymphs are most active during late spring and summer.



- Larvae are not infectious because there is no trans-ovarial transmission.
- The tick must attach and feed for many hours before the bacteria reach the salivary glands and be transmitted to a person. Ticks removed in less than 36 hours are unlikely to transmit Lyme disease.
- If acquired during pregnancy, *B. burgdorferi* may rarely infect the placenta and cause stillbirth. Treating infection in pregnant women with appropriate antibiotics is preventative.
- Lyme disease is not transmitted through breast milk.
- Pets, such as cats and dogs, can become infected with *B. burgdorferi*, but they are not infectious to people.

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Prophylaxis after a tick bite

In most cases, no treatment is needed after a tick bite unless symptoms develop. Routine use of antibiotics or serologic testing is not recommended for asymptomatic people. However, a single 200 mg dose of doxycycline may be offered to adults and children 8 years or older (4 mg/kg, up to a maximum of 200 mg) if all of the following conditions have been met:

1. The tick can be identified as a nymphal or adult deer tick (*Ixodes scapularis*), and it has likely been attached for more than 36 hours based on the degree of engorgement of the tick or the certainty of the time of exposure.
2. Prophylaxis can be taken within 72 hours of the time the tick was removed.
3. The local rate of infection of deer ticks with *B. burgdorferi* is greater or equal to 20%.

Note: Ecologic information on tick infection rates in Vermont is lacking. However, thirteen of Vermont's fourteen counties meet the CDC's 2008 definition of endemic for Lyme disease. The Lyme disease status of Essex County is largely unknown. In the thirteen counties where Lyme disease is endemic, healthcare providers could assume that at least 20% of deer ticks are infected.

4. Doxycycline is not contraindicated. There is no data to support using a short prophylactic course of any other antibiotics if doxycycline cannot be given.

Testing the tick is not recommended because of issues with sensitivity, specificity and timeliness of testing.

Symptoms

The symptoms of Lyme disease are quite variable and depend on the body system affected. The skin, joints, nervous system or cardiovascular system may be involved. Early symptoms are not always recognized, and many people will first present to a healthcare provider with disseminated or late disease.

Early symptoms (onset: 3 to 30 days, usually 7 to 10 days):

- Non-specific flu-like symptoms, such as fever, chills, myalgia, arthralgia, headache and fatigue are common. Lymphadenopathy may also occur.
- An erythema migrans rash (EM), although pathognomonic for Lyme disease, is not always present.
 - EM occurs in up to 80% of people.
 - The rash usually appears as a red ring-like or homogeneous expanding rash at or near the site of the tick bite; it is at least 5 cm in diameter; the classic "bull's-eye" appearance not always present.
 - It may be warm, but it is usually not painful or itchy. Vesicles or pustules may be present.
 - For pictures of EM rashes go to <http://www.aldf.com/EMPoster.shtml>

Note: The EM rash should be distinguished from a rash caused by an allergic reaction to a tick or insect bite. A rash due to an allergic reaction usually appears within a day or two after the bite, does not grow, and disappears within a couple of days.

Disseminated disease (onset: days to months):

- arthralgias, myalgias, headache, and fatigue - common
- multifocal EM rashes
- numbness and pain in the arms or legs
- cranial neuritis, commonly Bell's palsy, usually unilateral
- meningitis
- lymphocytic CSF pleocytosis – often occurs with meningitis; may occur with Bell's palsy
- atrioventricular heart block and/or myopericarditis
- arthritis
 - Up to 60% of people, who do not receive treatment, develop intermittent bouts of arthritis several months after infection. The arthritis is characterized by severe joint pain and swelling, usually of large joints, most commonly the knee.

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Late disease (onset: months to years):

- Chronic nervous system manifestations occur in approximately 5% of untreated patients.
 - Symptoms include shooting pains, numbness or tingling in the hands and feet, and problems with concentration and short term memory.

Diagnosis

- The diagnosis of Lyme disease is based on signs and symptoms; lab testing can support the clinical diagnosis.
- A history of a tick bite is not necessary for diagnosis. Many people with Lyme disease do not recall being bitten by a tick.
- An EM rash in a person who has recently been exposed to tick habitat in an endemic area is pathognomonic for Lyme disease, and laboratory evidence of infection is not necessary to confirm the diagnosis.

Laboratory testing: The CDC recommends 2 tier testing:

1. Screening test: IFA or ELISA. Samples positive or equivocal on this test are then subject to more specific confirmatory testing.
 2. Confirmatory tests: IgM and IgG Western blot
- Testing should be available through your usual reference laboratory.
 - Serology is often negative during the first 2 to 3 weeks after infection.
 - Most people with Lyme disease will seroconvert within 4 weeks and have detectable IgG by Western blot. Most people with neurologic symptoms, arthritis, or cardiac involvement are IgG positive by Western blot.
 - Early treatment with appropriate antibiotics may prevent seroconversion.
 - IgG, and even IgM, can persist for months or years after infection.

Treatment

- Most patients with early localized infection can be cured with a few weeks of oral antibiotics:
 - recommended: doxycycline, amoxicillin or cefuroxime axetil (duration: 14- 21 days)
 - Patients with certain neurologic or cardiac forms of illness may require intravenous antibiotics:
 - recommended: ceftriaxone or penicillin
 - Patients treated early and appropriately usually recover completely. A few patients may have recurrent or persistent symptoms and may benefit from an additional 4-week course of antibiotics.
 - Longer courses of antibiotics have not been proven to be effective and are not recommended¹.
- For detailed information about treatment please see the IDSA Guidelines at <http://www.journals.uchicago.edu/doi/full/10.1086/508667>.

Reporting Lyme Disease

- In Vermont, Lyme disease is reportable by both laboratories and healthcare providers.
- Most Lyme disease is reported to VDH by laboratories, but healthcare providers are encouraged to report, especially when the diagnosis is based on an EM rash and there may not be laboratory confirmation.
- When reporting Lyme disease, please fill out the case report form as completely as possible, including demographic information, onset date, and county of exposure.
- Reports to VDH can be made by fax or phone.
- Case report forms can be found on the VDH website at <http://www.healthvermont.gov/prevent/lyme/provider.aspx>.

¹ There is some debate in the medical community about the usefulness of long-term antibiotics. The positions of CDC, NIH and IDSA are that the evidence does not support the use of long-term antibiotics. However, some physicians and citizen groups disagree. In New Hampshire, a law was recently passed that establishes a committee to examine whether NH residents have sufficient access to alternative protocols while still being protected from unacceptable risks of further physical harm.

INFECTIOUS DISEASE BULLETIN- SPRING SUPPLEMENT ON LYME DISEASE

Other Tickborne Diseases: This table describes other tickborne diseases that may occur in Vermont residents.

Organism/Disease	Tick Vector	Transmission	Symptoms	Diagnostic Tests
<p><i>Babesia microti</i> (protozoan parasite that infects erythrocytes)</p> <p>Babesiosis</p>	<p>Deer tick <i>(Ixodes scapularis)</i></p> <p>Occurs mostly in coastal, Lyme-endemic areas, but much lower incidence than Lyme disease.</p> <p>Indigenous cases not yet reported in VT</p>	<p>Tick bite – most common</p> <p>Blood transfusion – emerging concern</p> <p>Incubation: Usually 1 to 4 weeks but can be longer; can be many months after a blood transfusion</p>	<p>Asymptomatic, or</p> <p>Non-specific flu-like symptoms</p> <p>Hemolytic anemia</p> <p>-more severe in elderly, immunocompromised, asplenic people, or those with underlying health conditions</p>	<p>Thin and thick blood smears</p> <p>PCR</p> <p>Antibody detection in acute and convalescent serums samples (single IgM not reliable)</p>
<p><i>Anaplasma phagocytophilum</i> (previously referred to as <i>Ehrlichia phagocytophilum</i>)</p> <p>Human granulocytic anaplasmosis (HGA): (previously referred to as human granulocytic ehrlichiosis or HGE)</p>	<p>Deer tick <i>(Ixodes scapularis)</i></p> <p>Occurs in Lyme endemic areas, but much lower incidence than Lyme disease.</p> <p>Indigenous cases not yet reported in VT</p>	<p>Tick bite</p> <p>Incubation: 5-10 days</p>	<p>Acute, febrile illness with headache, chills, malaise, myalgia, arthralgia, nausea and vomiting; rash uncommon</p> <p>Recovery is common but can occasionally be severe</p>	<p>PCR</p> <p>Antibody detection in acute and convalescent serums samples ➤ cross-reacts with ehrlichia species</p> <p>Microscopy: morulae in granulocytes (poor sensitivity)</p>
<p><i>Rickettsia rickettsii</i></p> <p>Rocky Mountain Spotted Fever (RMSF)</p>	<p>American dog tick <i>(Dermacentor variabilis)</i></p> <p>Although this tick is present throughout US, RMSF is uncommon in New England; most cases occur in southeastern and south central states.</p>	<p>Tick bite</p> <p>Incubation: 2-14 days (usually 1 week)</p>	<p>Fever, myalgia, severe headache, nausea, vomiting, abdominal pain, diarrhea</p> <p>Rash (absent in 20%)</p> <p>Can be severe</p>	<p>Antibody detection in acute and convalescent serums samples</p>
<p><i>Ehrlichia chaffeensis</i></p> <p>Human monocytic ehrlichiosis (HME)</p>	<p>Lone Star tick <i>(Amblyomma americanum)</i></p> <p>This tick is widely distributed in southeastern US and is becoming more common in southern CT, RI and MA. Tick not yet established in Vermont</p>	<p>Tick bite</p> <p>Incubation: 5-10 days</p>	<p>Acute, febrile illness with headache, chills, malaise, myalgia, arthralgia, nausea and vomiting; rash in about 60% of children and 25% of adults</p> <p>Recovery is common but illness can be severe</p>	<p>PCR</p> <p>Antibody detection in acute and convalescent serums samples ➤ cross-reacts with other ehrlichia species and <i>A. phagocytophilum</i></p> <p>Microscopy: morulae in monocytes (poor sensitivity)</p>

The *Infectious Disease Bulletin* can be viewed at: <http://healthvermont.gov/pubs/IDB/index.aspx>
For questions & comments, please contact Erica Berl at (802) 863-7240