

Infectious Diseases Expert Group (IDEG)  
Department of Health and Wellness

# Statement for Managing Lyme Disease in Nova Scotia

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## Executive Summary:

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In 2016, the Public Health Agency of Canada (PHAC) modified its surveillance case definition for Lyme disease. The new case definition refers to “risk areas” for acquiring Lyme disease, instead of “endemic areas for Lyme disease.” One reason for making the change in the definition is that not all places in Canada have systematic information from testing of ticks and other animals involved in the life cycle of Lyme disease. Accordingly, IDEG updated its *Statement for Managing Lyme disease in Nova Scotia* in 2017. The entire province is considered an at-risk area, with certain areas in the province at medium or higher risk of Lyme disease based on current tick and human data, and other areas at lower risk ([novascotia.ca/dhw/cdpc/lyme.asp](http://novascotia.ca/dhw/cdpc/lyme.asp)). The IDEG endorses the Infectious Diseases Society of America (IDSA) guidelines (2006) for the prevention and management of Lyme disease.<sup>1</sup> Although the guideline is currently being updated, recent review articles reflect its management recommendations.<sup>2,3</sup> IDEG continues to monitor developments in the management of Lyme disease and will update its guidance as new evidence becomes available. We highlight the following key points pertinent to the management of tick bites and Lyme disease in Nova Scotia (NS):

- Being at risk for Lyme disease requires outdoor activity in areas of long grass, brushes, or woods.
- The most reliable way to avoid getting Lyme disease is to prevent deer/blacklegged tick bites (see prevention measures [novascotia.ca/dhw/CDPC/lyme.asp](http://novascotia.ca/dhw/CDPC/lyme.asp)).
- Immediate and correct removal of an attached blacklegged tick is key to preventing the transmission of Lyme disease.
- Analysis of the blacklegged tick for the presence of infection with *Borrelia burgdorferi* does not reliably predict the risk of developing Lyme disease after a bite and is not recommended for management decisions.
- The risk of Lyme disease after a bite from an infected tick is low. Two of the most widely cited studies reported that the risk of Lyme disease in people who were found to have a blacklegged tick bite ranged from 1.2%–3.2%.<sup>4,5</sup> Further, most studies have found that the infected tick needs to be attached for at least 36 hours before it can transmit disease and the risk of transmission increases with prolonged attachment.<sup>1</sup>
- Routine use of antimicrobial prophylaxis for prevention of Lyme disease after a recognized blacklegged tick bite is not recommended but may be offered in specific circumstances (see Prophylaxis section).
- Serologic testing using the two-tiered algorithm described by the Centers for Disease Control and Prevention (CDC) and the Canadian Public Health Laboratory Network (CPHLN) is the only recommended method for making a serological diagnosis of Lyme disease.
- Sending specimens to laboratories that **1)** use interpretive criteria that are different from those of the CDC and Canadian Public Health laboratories, **2)** bypass the ELISA and use Western Blots alone, or **3)** perform IgM testing in the setting of suspected chronic infection is NOT recommended.
- Laboratory testing is not necessary in patients presenting with the typical erythema migrans (EM) rash (>5cm) who live in or have travelled to an area where there is a risk for Lyme disease during Lyme season (anytime temperature reaches > 4° C, with the greatest risk of transmission during summer months). In this situation, the diagnosis can be made based on the presence of EM alone and treatment started.
- Patients with symptoms and signs suggestive of early disseminated and late Lyme disease should have serologic testing.
- 95 percent of cases of Lyme disease are cured with 10 – 28 days of oral antibiotics.
- Studies have demonstrated that longer-term antibiotic treatment is no more effective than the standard recommended course of treatment and may be associated with complications. Longer-term antibiotics are not recommended.
- Patients who have lingering symptoms after the standard recommended treatment for Lyme disease should ask their physicians if the diagnosis was accurate or if they may have a different or new illness.

The following is a summary statement on Lyme disease, including appropriate laboratory testing and treatment.

For more information please refer to the 2006 IDSA Guidelines<sup>1,6</sup> and other recent reviews.<sup>2,3</sup>

## Introduction:

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Lyme disease is the most common tick-borne transmitted illness in NS. Factors considered by the NS Department of Health and Wellness in calling areas higher, medium, and lower risk for Lyme disease include the presence of blacklegged ticks in the area, active and passive surveillance for the presence of *B. burgdorferi* in blacklegged ticks, and the incidence of Lyme disease in humans. While *B. burgdorferi* has been found to be present in blacklegged ticks from many locations across mainland NS (e.g., parts of Pictou, Shelburne, Halifax, Lunenburg, Queens, and Yarmouth counties), there are some parts of NS for which that information is not available. However, we have information that blacklegged ticks are present in other areas of NS, and so we have to believe that the risk for Lyme disease exists, even in the absence of information on how often these ticks carry *B. burgdorferi*. We also have information about Lyme disease cases throughout the province and know where cases have occurred and what counties have the highest rates of human infection. Based on all of this information, a NS Lyme disease risk map has been produced: [novascotia.ca/dhw/CDPC/lyme.asp](http://novascotia.ca/dhw/CDPC/lyme.asp).

Blacklegged ticks are also capable of transmitting Powassan virus, *Anaplasma*, and *Babesia*. However, to date there has been only one case of human granulocytic anaplasmosis (HGA) acquired in NS and no human cases of babesiosis or Powassan infection.

The clinical presentation of Lyme disease varies and is divided into early and late disease. Early disease usually presents with an acute illness characterized by the presence of localized EM. This is sometimes followed by dissemination with multiple secondary annular lesions and systemic symptoms including fever, arthralgias, headache, and lymphadenopathy. Other manifestations of early disseminated infection can include Lyme carditis with conduction abnormalities and neuroborreliosis (neurologic Lyme), which may present as aseptic meningitis or with cranial nerve involvement (especially Bell's palsy). Late disease can present with chronic arthritis and/or chronic neuroborreliosis.

Depending on the stage and extent of the illness, there are differences in the investigations, treatment, and follow-up required.

## Diagnosis of Lyme Disease:

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Laboratory testing for Lyme disease in NS is done by the microbiology laboratory at the QEII HSC. It consists of first screening with an ELISA-based method to look for the presence of antibodies to specific *B. burgdorferi* proteins (VlsE1/pepC10 peptides). Specimens that screen positive or are indeterminate are forwarded to the National Microbiology Laboratory (NML) in Winnipeg for further testing using Western Blots. This "two tier" testing is consistent with the current recommendations from both the United States (US) CDC and the CPHLN. The Western Blots are scored based on the presence or absence of a certain number of bands. The criteria used by the CDC have been well validated. Current diagnostic guidelines apply to both pediatric and adult patients.

The sensitivity of this testing approach depends on the timing of the illness. In early, localized Lyme disease with EM, the sensitivity of the two tier testing is less than 50%, but increases with the duration of infection.<sup>7,8,9</sup> The sensitivity of testing for patients with early neuroborreliosis or Lyme arthritis in one study was 87% and 96% respectively.<sup>7</sup> History and clinical manifestations are important for estimating the likelihood of Lyme disease before the physician decides on proceeding with testing. If the pre-test probability for Lyme disease is low, there is a much higher likelihood that the positive result is a false positive test.

## IDEG Recommends:

1. Physicians need to be aware that the diagnosis of early Lyme disease with localized EM is a clinical one. Serological tests have poor sensitivity during the first four weeks of infection and are not recommended for management decisions.
2. Patients with an EM-like rash out of season (regardless of exposure area) should undergo serological testing using the two-tiered algorithm. If the test result is negative, serological testing should be repeated in 4–6 weeks.
3. Patients presenting with a nonspecific febrile illness, but no EM-like rash, AND a recent, clear exposure in an area at medium or higher risk for Lyme disease should be tested and monitored for other symptoms suggestive of Lyme disease. Repeat testing in 4–6 weeks is suggested if the first test is negative and another diagnosis has not been made.
4. Patients presenting with only a nonspecific febrile illness and exposure in an area at lower risk for Lyme disease should NOT be tested.
5. Patients with signs and symptoms suggestive of early disseminated and late Lyme disease should undergo serologic testing using the two-tiered algorithm. These presentations take time to manifest and may present out of season.
6. Patients in whom there is a concern for neuroborreliosis should undergo a lumbar puncture to look for cerebrospinal fluid abnormalities. Consultation with an infectious diseases physician or neurologist would be appropriate.

## IDEG Recommends AGAINST:

1. Testing in the absence of symptoms or signs consistent with Lyme disease: the value of serologic testing is limited in the absence of symptoms or signs that support a reasonable likelihood of infection. The diagnosis should NOT be based on positive serologic tests in the absence of **1)** consistent clinical findings and **2)** a plausible epidemiologic link.
2. Testing in asymptomatic patients who have had a blacklegged tick bite: antibodies to *B. burgdorferi* are not detected until a few weeks after infection. Thus, there is no point in testing at the time a tick is identified and/or removed. Even if the person does develop Lyme disease from the tick bite, the serology will be negative at the time the tick is removed.
3. Testing in patients with the typical EM rash (>5cm) during Lyme season (anytime temperature reaches >4°C, with greatest risk of transmission during summer months) and with appropriate outdoor exposure anywhere in NS or an area outside of NS that is identified as at risk for Lyme disease. The diagnosis should be made based on the presence of the EM and treatment started.
4. Repeat testing after treatment: laboratory testing cannot be used to determine “cure.” Like other infections, the antibodies remain positive even after effective treatment.
5. Sending specimens to laboratories that use interpretive criteria that are different from the CDC: the most common request that physicians get is to send the specimen to IGeneX, which has different interpretive criteria for their Western Blots, which may lead to false positive test results.<sup>10</sup>
6. Bypassing the ELISA and using Western Blots alone: Western Blots done in the absence of preceding ELISA testing have been associated with a reduction in specificity and are NOT recommended. Western Blots are semi-quantitative tests that can produce faint bands due to non-specific reactivity, which has been demonstrated in people with no history of exposure to ticks or Lyme disease or in illnesses other than Lyme disease.<sup>10</sup>
7. The use of PCR on blood, serum, or plasma or the use of urinary antigen as a diagnostic test: these tests have not been validated.

## Important Caveats to Testing:

1. Patients who are treated early for Lyme disease may have delayed seroconversion or never seroconvert (i.e., develop a positive IgG Western Blot).
2. Patients with Lyme disease who have had symptoms for greater than 4 weeks are very likely to have a positive IgG Western Blot. If the patient's symptoms have been present for greater than 4 weeks, a negative Lyme IgG Western Blot suggests that the symptoms the patient is experiencing are not due to Lyme disease.
3. Diagnosis of repeat infection is often difficult as Western Blots can remain positive for years despite appropriate treatment. Suspected repeat infections requiring serological testing should be discussed with a medical microbiologist or infectious disease specialist.
4. The *Borrelia* species that cause Lyme disease in Europe can be different from those that cause disease in North America. Confirmation testing may require the use of a Western Blot specific for those species. If the history suggests exposure in Europe, this should be documented on the requisition so that the appropriate confirmatory testing can be done.

## Treatment and Chemoprophylaxis of Lyme Disease:

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There have been a number of clinical trials that support treatment recommendations for Lyme disease. These form the basis for the IDSA treatment guidelines that were validated by the IDSA Lyme disease guideline review panel<sup>1,4</sup> and recent clinical reviews.<sup>2,3</sup>

### IDEG Recommends:

Lyme disease should be treated in accordance with the IDSA guidelines.

#### Treatment of adults and children older than 8 years with Lyme disease:

EM, Bell's palsy, and early disseminated disease without CNS involvement (other than Bell's palsy):

- Doxycycline 100 mg po bid X 14–21 days (contraindicated in pregnancy)\*
- Amoxicillin 500 mg po tid X 14–21 days
- Cefuroxime 500 mg po bid X 14–21 days

Early Lyme with CNS involvement:

- Ceftriaxone 2 g IV once daily X 14–28 days
- Pen G 4x10<sup>6</sup> units IV q4h X 14–28 days
- Doxycycline 100–200 mg po bid X 28 days (alternative if others not possible)\*

Early Lyme with carditis:

- Same treatment as early Lyme but use IV (as with CNS involvement) initially with high grade heart block and if admission to hospital is necessary

Late Lyme without CNS involvement:

- Doxycycline 100 mg po bid X 28 days\*
- Amoxicillin 500 mg po tid X 28 days
- Cefuroxime 500 mg po bid X 28 days

Late Lyme with CNS involvement (late neuroborreliosis) is treated the same as early Lyme with CNS involvement.

\* For children older than 8 years: Doxycycline, 4mg/kg/day orally divided into 2 doses (maximum 200 mg per day)

## Treatment of children 8 years or younger with Lyme disease:

Early localized disease:

- Amoxicillin 50 mg/kg per day, orally, divided into three doses (max 1.5g/day) for 14–21 days.
- For children allergic to penicillin, cefuroxime 30 mg/kg per day, orally, in two divided doses (maximum 1g/day) for 14–21 days.
- Macrolides (erythromycin and azithromycin) are less effective.

Early disseminated and late disease:

- Multiple erythema migrans: one of the antimicrobial regimens listed above for children for 21 days
- Isolated facial nerve palsy: one of the antimicrobial regimens listed above for children for 21–28 days
- First episode of arthritis: one of the antimicrobial regimens listed above for children for 28 days
- For persistent/recurrent arthritis, carditis, and meningitis/encephalitis, the regimens include the same drugs and durations as for adult guidelines but with pediatric dosing.

If there is recurrent or persistent joint swelling, repeat a 4-week course of oral antibiotic as recommended above. Use of IV ceftriaxone should be reserved for relapse or persistent joint swelling without improvement with oral treatment.

## IDEG recommends AGAINST:

Prolonged courses of antimicrobials for the treatment of Lyme disease that are not in keeping with courses recommended by the IDSA treatment guidelines.

## Prophylaxis of Lyme disease:

Prophylaxis is generally not recommended but may be offered to patients when all criteria are satisfied including:

1. The attached tick can be reliably identified as an adult or nymphal blacklegged tick that is estimated to have been attached for  $\geq 36$  h based on the degree of engorgement or by certainty about the time of tick acquisition.
2. Prophylaxis can be started within 72 h of tick removal.
3. Ecologic information indicates that the local rate of infection of these ticks with *B. burgdorferi* is  $\geq 20\%$ . There is insufficient information to provide a list of all counties in NS that meet this criterion. For the purposes of prophylaxis, physicians may wish to consider higher and medium risk areas to have tick infection rates in this range.
4. Doxycycline is not contraindicated.

Recommended prophylaxis, if above criteria are met:

- Adults and children >8 years of age: single dose doxycycline 200 mg po (4.4mg/kg for patients <45kg)
- There is no effective antibiotic for prophylaxis in children  $\leq 8$  years of age.

## References:

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1. Wormser GP, Dattwyler RJ, Shapiro ED, et al. The clinical assessment, treatment, and prevention of Lyme disease, human granulocytic anaplasmosis, and babesiosis: clinical practice guidelines by the Infectious Diseases Society of America. *Clin Infect Dis* 2006; 43:1089–134.
2. Hu LT. Lyme Disease. *Ann Intern Med* 2016;164:ITC 65–80.
3. Sanchez E, Vannier E, Wormser GP, Hu LT. Diagnosis, treatment, and prevention of Lyme disease, human granulocytic anaplasmosis, and babesiosis: A review. *JAMA* 2016;315:1767–77.
4. Shapiro ED, Gerber MA, Holabird ND, et al. A controlled trial of antimicrobial prophylaxis for Lyme disease after deer-tick bites. *N Engl J Med* 1992; 327:1769–73.
5. Nadelman RB, Nowakowski J, Fish D, et al. Prophylaxis with single dose doxycycline for prevention of Lyme disease after an Ixodes scapularis tick bite. *N Engl J Med* 2001; 345:79–84.
6. Lantos PM, Charini WA, Medoff G et al. Final report of the Lyme disease review panel of the Infectious Diseases Society of America. *Clin Infect Dis* 2010; 51:1–5.
7. Bacon RM, Biggerstaff BJ, Schriefer ME, et al. Serodiagnosis of Lyme disease by kinetic enzyme-linked immunosorbent assay using recombinant VlsE1 or peptide antigens of *Borrelia burgdorferi* compared with a 2-tiered testing using whole-cell lysates. *J Infect Dis* 2003; 187–99.
8. Moore A, Nelson C, Molins C, Mead P, Schriefer M. Current guidelines, common clinical pitfalls, and future directions for laboratory diagnosis of Lyme Disease, United States. *Emerg Infect Dis* 2016; 22:1169–77.
9. Molins CR, Delorey MJ, Sexton C, Schriefer ME. Lyme Borreliosis serology: Performance of several commonly used laboratory diagnostic tests and a large resource panel of well-characterized patient samples. *J Clin Microbiol* 2016; 54:2726–34.
10. Fallon BA, Pavlicova M, Coffino SW, Brenner C. A comparison of Lyme disease serologic test results from 4 laboratories in patients with persistent symptoms after antibiotic treatment. *Clin Infect Dis* 2014; 59:1705–10.

## Prepared by:

Dr. Ian Davis  
Dr. Todd Hatchette  
Dr. Tim Mailman

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B. Lynn Johnston for IDEG