

# LYME DISEASE

## Case definition

The Lyme disease case definition can be found in the NS Surveillance Guidelines found here: <https://novascotia.ca/dhw/populationhealth/surveillanceguidelines.asp>

## Causative agent

A spirochete, *Borrelia burgdorferi* (*B. burgdorferi*).

## Source

The *Ixodes scapulari*, commonly known as the blacklegged (BLT) or deer tick, and the *I. pacificus* ticks are the vectors. Deer and wild rodents are the reservoir for these ticks. Adult blacklegged ticks normally feed on deer while nymphs primarily feed on small rodents such as mice and squirrels. *I. scapulari* have been found in areas in Nova Scotia.

Blacklegged ticks survive best in areas that provide a moist habitat, such as wooded or forested areas, because the trees provide shade, and leaves provide protective ground cover.

Migrating birds can also carry blacklegged ticks into other areas of Nova Scotia. Nova Scotia has a suitable climate for tick populations.

## Incubation

From tick bite to appearance of single or multiple erythema migrans (EM) 1-32 days with a mean of 11 days. Late manifestation occurs months later.

## Transmission

Tick-borne; transmission occurs after the infected nymphal, larval or adult blacklegged tick has been attached for 24-36 hours.

- The risk of Lyme disease increases in areas that are known to have established populations of blacklegged ticks that carry the bacteria that can cause Lyme disease.
- Patients with active disease should not donate blood because spirochetemia occurs in early Lyme disease.
- Other ticks in NS, such as the common dog tick, cannot transmit Lyme disease.

## Communicability

There is no evidence of natural person-to-person transmission. Rare cases of congenital transmission have been documented but epidemiological studies have not shown any links between maternal Lyme disease and adverse outcomes of pregnancy.

## Symptoms

The clinical information presented below is not intended to describe the complete range of signs and symptoms that may be used in a clinical diagnosis of Lyme disease. Symptoms of early or late disseminated Lyme disease are described in the 2006 clinical practice guidelines of the Infectious Diseases Society of America. Other symptoms that are, or have been suggested to be associated with Lyme disease (including those of suggested “chronic” Lyme disease and post-Lyme disease syndromes) are considered too non-specific to define cases for surveillance purposes, whether or not they may be caused by *B. burgdorferi* infection. The following signs and symptoms constitute objective clinical evidence of illness for surveillance purposes for Lyme disease:

### **Objective evidence of Lyme disease includes the following when an alternative explanation is not found:**

In simple terms Lyme disease has three stages if left untreated:

- i) Early Lyme disease characterised by a red rash (>5cm; called erythema migrans or EM) that spreads from the site of the tick rash (as described below).
- ii) Early disseminated Lyme disease characterised by multiple EM rashes and/or neurological (facial paralysis or meningitis-like) manifestations and/or heart problems (palpitations caused by heart block) which may last several weeks to months; and
- iii) Late disseminated Lyme disease which is most commonly intermittent arthritis and may last months to over a year. In detail the manifestations are:
  - Erythema migrans: a round or oval expanding erythematous area of the skin greater than 5 cm in diameter and enlarging slowly over a period of several days to weeks. It appears one to two weeks (range 3-30 days) after infection and persists for up to eight weeks. Some lesions are homogeneously erythematous, whereas others have prominent central clearing or a distinctive target-like appearance.
  - On the lower extremities, the lesion may be partially purpuric. Signs of acute or chronic inflammation are not prominent. There is usually little pain, itching, swelling, scaling, exudation or crusting, erosion or ulceration,

except that some inflammation associated with the tick bite itself may be present at the very centre of the lesion.

- **Note:** An erythematous skin lesion present while a tick vector is still attached or that has developed within 48 hours of detachment is most likely a tick bite hypersensitivity reaction (i.e. a non-infectious process), rather than erythema migrans. Tick bite hypersensitivity reactions are usually < 5 cm in largest diameter, sometimes have an urticarial appearance and typically begin to disappear within 24-48 hours. Diagnosis of EM requires careful examination by a physician to eliminate alternative types of skin rash. Note that it is recommended that physicians would normally treat patients with EM without recourse to serological testing as specific antibodies are often not detectable in early Lyme disease.

**OR**

**Objective evidence of disseminated Lyme disease includes any of the following when an alternative explanation is not found:**

- **Multiple erythema migrans:** EM lesions, similar to the single erythema migrans lesions described above, but in multiple locations on the body and may be smaller [< 5cm].
- **Neurological** – Early neurological Lyme disease: acute peripheral nervous system involvement, including radiculopathy, cranial neuropathy and mononeuropathy multiplex (multifocal involvement of anatomically unrelated nerves), and CNS involvement, including lymphocytic meningitis and, rarely, encephalomyelitis (parenchymal inflammation of brain and/ or spinal cord with focal abnormalities). Late neurologic Lyme disease may present as encephalomyelitis, peripheral neuropathy or encephalopathy.
- **Musculoskeletal** – Lyme arthritis is a monoarticular or oligoarticular form of arthritis most commonly involving the knee, but other large joints or the temporomandibular joint may be involved. Large effusions that are out of proportion to the pain are typical. Lyme arthritis is often intermittent if untreated, with episodes of joint inflammation spontaneously resolving after a few weeks to a few months. Persistent swelling of the same joint for 12 months or more is not a usual presentation.
- **Cardiac** – Cardiac involvement associated with Lyme disease includes intermittent atrioventricular heart block often involving the atrioventricular node (although heart block may occur at multiple levels) and sometimes associated with myopericarditis. Carditis can occur in the early stages of the disease.

## Diagnostic testing

Serologic testing for Lyme disease follow the 2-tier approach recommended by the NML, the Canadian Public Health Laboratory Network (CPHLN) and the U.S. Centers for Disease Control involving an approved screening enzyme immunoassay (EIA) and more specific confirmatory testing by Western Blot. Testing for Lyme disease in humans in Nova Scotia is performed at the Queen Elizabeth Health Sciences Centre (QEII) in Halifax, NS using an EIA method. Positive or indeterminate specimens are forwarded to the NML for further supplemental testing using IgM and IgG immunoblots. The performance of the testing depends on the stage of infection. Although the sensitivity of testing in late Lyme disease is high, the sensitivity of the 2-tier algorithm is low in early localized Lyme disease and not recommended. Patients who present with early localized Lyme disease should be treated without serologic testing. Other unapproved tests may be unreliable and are not recommended.

For further information on laboratory methods please refer to the Provincial Public Health Lab Network: *Users Manual (2012)*. The *Statement for Managing Lyme Disease* also has more details regarding Lyme diagnostic testing.

## Treatment

Please refer to the *Nova Scotia Statement on Lyme Disease* produced by the Infectious Diseases Expert Group (IDEG) found at [novascotia.ca/DHW/CDPC/documents/IDEG/Statement-For-Managing-Lyme-Disease.pdf](http://novascotia.ca/DHW/CDPC/documents/IDEG/Statement-For-Managing-Lyme-Disease.pdf)

- Early localized (erythema migrans) and early disseminated (except if there is central nervous system [CNS] involvement) can be treated with oral antibiotics (doxycycline, amoxicillin, or cefuroxime).
- CNS manifestations, except for cranial nerve 7 palsy (which can be treated with oral antibiotics), should be treated with IV antibiotics (IV ceftriaxone, cefotaxime, or penicillin).
- Relapsed or refractory Lyme arthritis and cardiac Lyme may require IV antibiotics.
- An infectious diseases specialist should be consulted to assist in the management of disseminated or late Lyme disease.
- Routine use of prophylactic antimicrobials following a tick bite is not recommended.

### Post-treatment Lyme disease syndrome:

Following treatment some patients may have residual non-specific complaints termed, post-treatment Lyme disease syndrome (PTLDS). The cause of this syndrome is not clear but at present there is no data to suggest prolonged antibiotic treatment courses in these patients is beneficial.

# PUBLIC HEALTH MANAGEMENT & RESPONSE

## Case management

1. Contact the primary care provider to obtain clinical information on the case.
2. Review clinical information, mode of transmission, in particular tick exposures, travel, areas of work and recreational activity, donation or receipt of blood products, tissue/organs.
3. Educate the client and/or family about Lyme disease and prevention measures, providing access to fact sheets, brochures, website, as indicated. The following CCDR article, “Review of methods to prevent and reduce the risk of Lyme disease” may assist with this discussion: <http://www.phac-aspc.gc.ca/publicat/ccdr-rmtc/15vol41/dr-rm41-06/ar-04-eng.php>
4. Document information on Lyme disease case report form.

## Education

### Key messages

- The risk of contracting Lyme disease in Nova Scotia is low.
- Blacklegged ticks are found throughout Nova Scotia, therefore the province should be considered an at risk area for Lyme disease.
- Nova Scotians are encouraged to spend time outdoors, be active and remember to protect themselves against tick bites, which is the best way to prevent Lyme disease.
- Use of self-protection (use of protective clothing, DEET or Icaridin- follow label directions carefully).
- Cover skin when walking, working or playing in areas where ticks are found.
- Wear enclosed shoes, tucking shirt in pants and pant legs in socks.
- Walk on well-traveled paths, avoiding high grass and vegetation.
- Check yourself, your children and pets after walking in grassy or wooded areas. When possible, take a bath or shower within two hours of coming indoors. This makes it easier to find ticks and washes away loose ones. Check clothing and inspect skin including in and around ears, arm pits, inside belly button, groin, around the waist, and especially in hair and scalp area.

- Remove ticks as soon as you find them. Carefully grasp the tick with tweezers as close to the skin as possible and slowly pull the tick straight out. Wash the area where the tick was attached to the skin with soap and water and disinfect with rubbing alcohol or hydrogen peroxide.
- Review common signs and symptoms of Lyme disease.
- See a health care provider if symptoms of Lyme disease develop after exposure to the blacklegged tick.
- Use simple landscaping techniques [available on the DHW website] to reduce the number of blacklegged ticks around your home.
- Please see the DHW website for detailed information at <http://novascotia.ca/dhw/CDPC/>

## Exclusion

No exclusion is required.

## Contact Tracing

No contact tracing is required.

## Surveillance forms

[Lyme Disease Case Report Form](#)

## [General Information Sheet](#)

## [Sample Letters](#)

### REFERENCES

American Academy of Pediatrics. *[Lyme Disease]*. Red Book: 2015 Report of the Committee on Infectious Diseases, 30th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2015 [516-525]

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CDC Post-Treatment Lyme Disease Syndrome, 2015 <http://www.cdc.gov/lyme/postLDS/index.html>

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