



Lyme Disease

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1. CASE DEFINITION

Confirmed Case

- Clinical illness* with laboratory confirmation by one of the following methods:
 - Isolation of *Borrelia burgdorferi* (*B. burgdorferi*) from an appropriate clinical specimen (i.e., skin biopsy, synovial fluid or CSF) as specified by current guidelines (see diagnosis) **OR**
 - Detection of *B. burgdorferi* DNA by molecular diagnostic methods (i.e., PCR) from an appropriate specimen (i.e., skin biopsy, synovial fluid or CSF) by methods specified by current guidelines (see diagnosis) **OR**
- Clinical illness* with a history of residence in, or visit to, an endemic area** and with laboratory evidence of infection:
 - Positive serologic test using the two-tier EIA (ELISA) followed by an immunoblot assay. Immunoblots could include traditional Western Blot criteria or newer line blot and both formats target an identical set of *B. burgdorferi* immunoreactive proteins

Probable case

- Clinical illness* without a history of residence in, or visit to, an endemic area and with laboratory evidence of infection in the form of a positive serologic test as defined above under confirmed cases **OR**
 - Clinician-observed erythema migrans (EM) without laboratory evidence but with history of residence in, or visit to, an endemic area

*Clinical illness

- Erythema migrans (EM)
 - 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 1-2 weeks (range 3-30 days) after infection and persists for up to 8 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

**Endemic area is defined as a locality in which reproducing populations of *Ixodes scapularis* or *Ixodes pacificus* tick vectors are known to exist, as demonstrated by molecular methods and to support transmission of *B. burgdorferi* at that site. For more information about prevalence and location of vectors in Canada, see Canada.ca Risk of Lyme Disease to Canadians: <https://www.canada.ca/en/public-health/services/diseases/lyme-disease/risk-lyme-disease.html#a3>.

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 **OR**

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

- Neurological
 - Early neurological Lyme disease may have 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 myocarditis

- Carditis can occur in the early stages of the disease

The species of tick known to carry Lyme disease is not endemic to the NWT however imported ticks have occasionally been found.

2. DIAGNOSIS

- Diagnosis is based on travel to a Lyme-endemic area, history of exposure to ticks, clinical picture and confirmation by laboratory testing
- Consultation with an infectious disease specialist is recommended
- Prior to specimen collection consult the microbiologist/virologist-on-call at the Alberta Provincial Laboratory and follow the [Alberta Provincial Laboratory Guide to Services](#)
- Antibody detection and laboratory confirmation follows a two-step testing approach to decrease the possibility of reporting false-positives
- For more information, refer to the following resources:
 - Public Health Agency of Canada, Laboratory Diagnostics for Lyme Disease: [CCDR: Volume 40-11, May 29, 2014 - Public Health Agency of Canada](#)
- Ticks recovered in the NWT from animals or humans should be submitted for testing
- Contact your local community health centre, public health unit or call Environment and Natural Resources (ENR) at (867) 767-9237 EXT 53468
- To submit a tick, collect it in a dry container with a lid and send to Stanton Regional Hospital Laboratory with this requisition from the National Microbiology Laboratory: Passive Surveillance for Black Legged Ticks, (Public Health Agency of Canada) [Communicable Disease | HSS Professionals](#)

- For more information on removing ticks and submitting ticks for testing, follow the Government of Canada guide to [removing and submitting ticks for testing](#)

3. REPORTING

As described in the [NWT Public Health Act 2009](#), health care professionals and laboratories shall provide the Chief Public Health Officer or designate with the information required by the regulations, within the time set out in the regulations.

Health Care Professionals

- Confirmed or probable cases are to be reported to the Office of the Chief Public Health Officer (OCPHO) by telephone or fax within **7 days** of diagnosis being made or opinion is formed, **AND**
- Complete and fax the [Communicable Disease Reporting form](#) to the OCPHO within **7 days**

Laboratories

- Report all positive results to the OCPHO within **7 days**

4. OVERVIEW

For more information on Lyme disease:

- Health Canada: [Lyme disease - Canada.ca](#)
- Centers for Disease Control and Prevention: [Lyme Disease | Lyme Disease | CDC](#)
- World Health Organization: [WHO | Lyme Borreliosis \(Lyme disease\)](#)

Causative Agent

- Tick borne infection caused by the spirochete *Borrelia burgdorferi*
- In eastern and central North America, the primary vector is *Ixodes scapularis* and in western North America, including British Columbia it is *Ixodes pacificus* – *Ixodes scapularis* and *pacificus* are also known as the deer tick or black legged tick
- Currently there is no evidence of these particular ticks being endemic in the NWT, so a travel history is very important

Clinical Presentation

- Lyme disease is a multi-system inflammatory disease that ranges from asymptomatic or mild illness to chronic, debilitating illness
- Different symptoms of the disease may occur depending on the subspecies of *Borrelia*; European strains may cause different symptoms from species in North America
- Generally the disease manifests in three stages:

1. First stage – early localized infection

- Within 3-32 days of a tick bite a circular, ring shaped rash called erythema migrans (EM), occurs at the site of a tick bite
- EM expands slowly in a ring shaped pattern and is generally 5 cm in diameter and may be hot to touch and described as burning, itchy or painful
- The rash occurs in about 70-80% of infected persons
- Patients often experience symptoms such as: malaise, fatigue, chills, fever, headache, muscle and joint pain and swollen lymph nodes
- This stage lasts several weeks or more in untreated persons

2. Second stage – early disseminated infection

- Days to weeks after the initial EM, multiple EMs occur and are similar to the primary lesion – these begin to fade within 3-4 weeks (1-14 months)
- If the infection goes untreated, the disease can last for several months with possible symptoms such as: central and peripheral nervous system disorders, multiple skin rashes, arthritis and arthritic symptoms, heart palpitations, and extreme fatigue and general weakness

3. Third stage – late persistent infection

- Disease can last months to years with possible symptoms including, chronic arthritis and, neurological symptoms

- › Fatalities from Lyme disease are rare
- › If contracted during pregnancy, adverse effects on the fetus, including stillbirth, can occur

Major Complications

- **Post-Lyme Disease Syndrome:** months or years after the initial infection and despite treatment with antibiotics the client can experience chronic neurological abnormalities, chronic arthritis, chronic fatigue, severe headache, and muscle pain, difficulty with concentration or sleep disturbance

Transmission

- Transmitted when an infected tick bites and consumes the blood of a human
- Mice, squirrels, birds and other small animals are a reservoir for the bacteria
- The bacterium is transmitted to ticks when they feed on these infected animals and then to humans and deer through the bites of the infected ticks
- Dogs and cats can contract Lyme disease but it does not spread animal to person
- Dogs can carry the infected tick into your home or yard
- In Canada, deer ticks (blacklegged ticks) are widely distributed in the following regions according to [Risk of Lyme disease to Canadians - Canada.ca](#):
- Not transmissible from person-to-person

Incubation Period

- 3-32 days after tick exposure for EM; median is about 3 weeks
- Early stages of illness maybe asymptomatic

Clinical Guidance

- For patient specific clinical management consult your local health care professional, paediatrician or infectious disease specialist

5. PUBLIC HEALTH MEASURES

Management of Cases

- Obtain history of travel outside of the NWT
- Early diagnosis is essential to prevent development of late complications
- Consultation with an infectious disease specialist is recommended
- Routine precautions when hospitalized
- Isolation of the case is not necessary – disease is vector borne, not spread person-to-person

Management of Contacts

- No management of contacts is required as person-to-person spread does not occur

Prevention

- In areas where ticks are found, individuals should know about the risk of Lyme disease and should take precautions to protect themselves such as the following:
 - › Walk on well-traveled paths, avoiding areas of high grass
 - › Avoid tick-infested areas
 - › Wear light-coloured clothing to cover arms and legs
 - › Apply a tick repellent containing DEET to sleeves and pant legs and exposed skin every 12 hours
 - › Inspect skin regularly, especially that of children and remove any ticks promptly and carefully without squeezing or crushing the body of the tick
 - › Inspect clothing as well as skin on a regular basis if working in or visiting a tick infested area
 - › Inspect pets if traveling through high grass

6. PUBLIC & HEALTH PROFESSIONAL EDUCATION

- GNWT department of environmental health: [Tick Borne Diseases | Health and Social Services](#)
- Government of Canada website for [Lyme disease](#)

7. EPIDEMIOLOGY

- For more information on epidemiology of lyme disease in the NWT see: <http://professionals.hss.gov.nt.ca/sites/default/files/epidemiological-summary-lyme-disease.pdf>

8. REFERENCES

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