



BC Centre for Disease Control
An agency of the Provincial Health Services Authority

Lyme Disease Surveillance Case Definition

655 West 12th Avenue
Vancouver, BC V5Z 4R4

Tel 604.707.2400
Fax 604.707.2441
www.bccdc.ca

Lyme Disease

Nationally notifiable since 2009

1.0 National Notification

Confirmed and probable cases of disease should be notified.

2.0 Type of Surveillance

Routine case-by-case notification to the federal level

3.0 Case Classification

3.1 Confirmed case

Clinical evidence of illness with laboratory confirmation by one of the following methods:

- isolation of *Borrelia burgdorferi* from a clinical specimen as specified by current guidelines^{1,2}.
- detection of *B. burgdorferi* DNA by PCR testing on synovial fluid, cerebrospinal fluid, EM tissue biopsies or blood and by methods specified by current guidelines^{1,2}.

OR

Clinical evidence of illness with a history of residence in, or visit to, a Lyme disease risk area*, and with laboratory evidence of infection in the form of a positive serologic test using the two-tiered approach which consists of a screening ELISA followed by an immunoblot assay (NB: immunoblots include traditional Western blots¹ or newer line blots and both formats target an identical set of *B. burgdorferi* immunoreactive proteins³) (see section 4.0)

3.2 Probable case

Clinical evidence of illness without a history of residence in, or visit to, a Lyme disease risk area* and with laboratory evidence of infection in the form of a positive serologic test as defined above under confirmed cases (also see section 4.0)

OR

Clinician-observed erythema migrans without laboratory evidence but with history of residence in, or visit to, a Lyme disease risk area*

* A Lyme disease risk area in Canada is defined as a locality in which there is evidence for the occurrence of reproducing populations of known tick vector species (particularly *Ixodes scapularis* and *I. pacificus*) and the likely transmission of *B. burgdorferi* as determined by one of the following methods: i) active field surveillance involving capture of wild rodent reservoirs as well as drag sampling on multiple occasions to ensure that ticks have become established (as evidenced by demonstration of all three feeding stages of the tick over more than one year) and that *B. burgdorferi* is being transmitted (as evidenced by molecular detection or culture of ticks or rodent samples)⁴; ii) active field surveillance involving only drag sampling for ticks⁵; iii) evidence from passive tick surveillance when using field-validated methods of analysis of these data to improve their specificity in detecting tick populations (these may include high numbers of submitted ticks⁶, immature ticks and multiple ticks found feeding on humans or animals); iv) field-validated signals from human case surveillance; or v) field-validated ecological/niche models that predict risk⁷. Method (i) is recommended to confirm the first occurrence of Lyme disease risk areas in Provinces and Territories where these have not been identified to date. Methods (ii), (iii), (iv) and (v) are recommended only for those Provinces and Territories after the occurrence of

one or more reproducing populations of tick vectors, and *B. burgdorferi* transmission, has been confirmed using method (i). The known locations of Lyme disease risk areas are available at <http://www.healthycanadians.gc.ca/diseases-conditions-maladies-affections/disease-maladie/lyme/risks-risques-eng.php#a3>, or through websites of the relevant Provincial and Territorial public health organisations. Information on countries outside Canada where Lyme disease risk occurs can be found at <http://www.phac-aspc.gc.ca/tmp-pmv/index-eng.php> and <http://www.cdc.gov/ticks/diseases/abroad.html>.

4.0 Laboratory Comments

Criteria for serologic testing are described by the guidelines of the Canadian Public Health Laboratory Network¹. Serologic evidence is confirmatory only in patients with objective clinical evidence of disseminated Lyme disease, and a history of residence in, or visit to, a Lyme disease risk area. Serologic testing is not recommended in patients with early localized Lyme disease with exposure from a Lyme disease risk area.

5.0 Clinical Evidence

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 America². Other symptoms that are, or have been suggested to be, associated with Lyme disease (including those of so-called “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 (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 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 disease².

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 myocarditis. Carditis can occur in the early stages of the disease.

6.0 ICD Code(s)

6.1 ICD-10 Code(s)

A69

A69.2 Lyme Disease (Erythema chronicum migrans due to *Borrelia burgdorferi*)

6.2 ICD 9 Code(s)

7.0 Type of International Reporting

8.0 Comments

These are definitions for surveillance and epidemiologic purposes only, and they do not represent clinical case definitions.

9.0 References

1. Canadian Public Health Laboratory Network. The laboratory diagnosis of Lyme borreliosis: guidelines from the Canadian Public Health Laboratory Network. *Can J Infect Dis Med Microbiol* 2007;18:145-8.
2. 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.
3. Centers for Disease Control and Prevention. 1995. Recommendations for test performance and interpretation from the 2nd National Conference of serologic diagnosis of Lyme disease. *MMWR Morb. Mort. Wkly Rep.* 44: 590-591.
4. Health Canada. Consensus conference on Lyme disease. *Can Med Assoc J* 1991;144:1627-32.
5. Ogden NH, Koffi, JK, Pelcat Y, Lindsay LR. Environmental risk from Lyme disease in central and eastern Canada: a summary of recent surveillance information. *Can Comm Dis Rep* 2014; 40:74-82.
6. Koffi JK, Leighton PA, Pelcat Y et al. Passive surveillance for *Ixodes scapularis* ticks: enhanced analysis for early detection of emerging Lyme Disease risk. *J Med Entomol* 2012; 49:400-409.
7. Mak S, Morshed M, Henry B. Ecological niche modeling of Lyme disease in British Columbia, Canada. *J Med Entomol* 2010; 47:99-105.

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