LYME DISEASE

Provincial Case Definition

Confirmed case

A case that meets c*onfirmatory* laboratory results with or without clinical evidence (see below)

Probable case

A case that meets *presumptive* laboratory evidence with or without clinical evidence (see below)

Laboratory Evidence

Confirmatory laboratory evidence:

Laboratory evidence from one of the following methods:

- Detection of B. *burgdorferi* DNA by PCR testing on synovial fluid, cerebrospinal fluid, EM tissue biopsies or blood and by methods specified by the current guidelines.
- Detection of B. *burgdorferi* group-specific antigens by immunohistochemical assay on biopsy or autopsy tissues.
- Positive serologic tests in a two-tier or equivalent format including:
    a. Standard two-tier test (STTT): a positive or equivocal first-tier screening assay, often an enzyme immunoassay [EIA] or immunofluorescence assay [IFA] for immunoglobulin M (IgM), immunoglobulin G (IgG), or a combination of immunoglobulins, followed by a concordant positive IgM or IgG immunoblot interpreted according to established criteria, **OR**
    b. Modified two-tier test (MTTT): positive or equivocal first-tier screen, followed by a different, sequential positive or equivocal EIA in lieu of an immunoblot as a second-tier test.

Presumptive laboratory evidence:

- Positive IgG immunoblot, interpreted according to established criteria, without positive or equivocal first-tier screening assay.

Clinical Evidence

Lyme disease has three stages if left untreated:

1. Early Lyme disease symptoms are most commonly characterized by a red rash (> 5cm called erythema migrans or EM) that spreads from the site of the tick bite as described below. [1-2]
2. Early disseminated Lyme disease characterized by multiple EM rashes, possibly leading to neurological and cardiac symptoms. [1-2]
3. Late disseminated Lyme disease which is most commonly intermittent arthritis and may last months to over a year after a tick bite. [1-2]

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

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 EM. 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.[1-2]

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 EM lesions described above, but in multiple locations on the body and may be smaller (< 5cm). [1-2]
- **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. [1-2]
- **Musculoskeletal** – Lyme arthritis is a monoarticular or oligoarticular form of arthritis most commonly involving the knee, but other large joints or the tempero-mandibular 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. [1-2]
- **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. [1-2]

Reinfection

A new case is one that has not been reported in the same calendar year. Using calendar year allows case counting which is more closely aligned with seasonality of Lyme disease. Note that the surveillance reinfection definition is used for public health surveillance purposes and differs from a clinical reinfection definition which focuses on recurrent symptoms after previous treatment for Lyme disease.[3]

Reporting Requirements

Report confirmed cases to DHW Surveillance Team via Panorama.

Additional Forms

None.

Data Entry

Complete data entry in Panorama.

Additional comments

- Lyme disease is a provincially and nationally notifiable disease.
- Tests must be completed at the National Microbiology Laboratory, the Provincial Public Health Laboratory Network, or a referral laboratory approved by the Provincial Public Health Laboratory Network
- Nova Scotia no longer requires supportive clinical evidence of infection to classify individuals with confirmatory laboratory evidence as a confirmed case. This differs from the approach in Canada's National Case Definition, which requires supportive clinical evidence and confirmatory laboratory evidence to be classified as a confirmed case.[1] The addition of clinical evidence reduces the chance of false positives(i.e. being incorrectly classified as a Lyme Disease Case).[4,6-7] However, when diseases are common, false positives are less likely.[5-7] Because Lyme Disease is more common in Nova Scotia than the rest of Canada (i.e. Nova Scotia is a high incidence area), the likelihood of a false positive laboratory result is reduced. The bifurcation of case definitions based on Lyme Disease incidence (high- versus low-incidence jurisdictions) has been adopted by the US Centers for Disease Control.[3]

References

1. Government of Canada. (2018). National Case Definition: Lyme Disease. Retrieved June 15, 2023, from https://www.canada.ca/en/public-health/services/diseases/lyme-disease/health-professionals-lyme-disease/national-case-definition.html
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. (2022). Lyme Disease Case Definition. National Notifiable Diseases Surveillance System (NNDSS). Retrieved June 13, 2023, from https://ndc.services.cdc.gov/case-definitions/lyme-disease-2022/
4. Hatchette TF, Lindsay LR on behalf of the Lyme Disease Diagnostics Working Group. Modified two-tiered testing algorithm for Lyme disease serology: The Canadian context. Can Commun Dis Rep 2020;46(5):125–31.
5. Mead P, Peterson J, Hinckley A. Updated CDC Recommendation for Serologic Diagnosis of Lyme Disease. MMWR Morb Mortal Wkly Rep 2019;68.703.
6. Canadian Public Health Laboratory Network. The laboratory diagnosis of Lyme borreliosis: guidelines from the Canadian Public Health Laboratory Network. *Can J Infec Dis Med Microbiol* 2007; 18: 145-148.
7. Lindsay LR, Bernat K, Dibernardo A. Laboratory diagnostics for Lyme Disease. *Canada Communicable Disease Report* 40-11 2015.