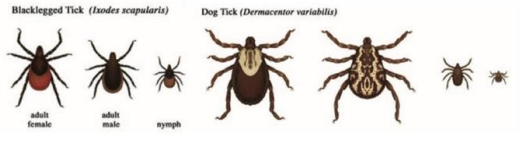
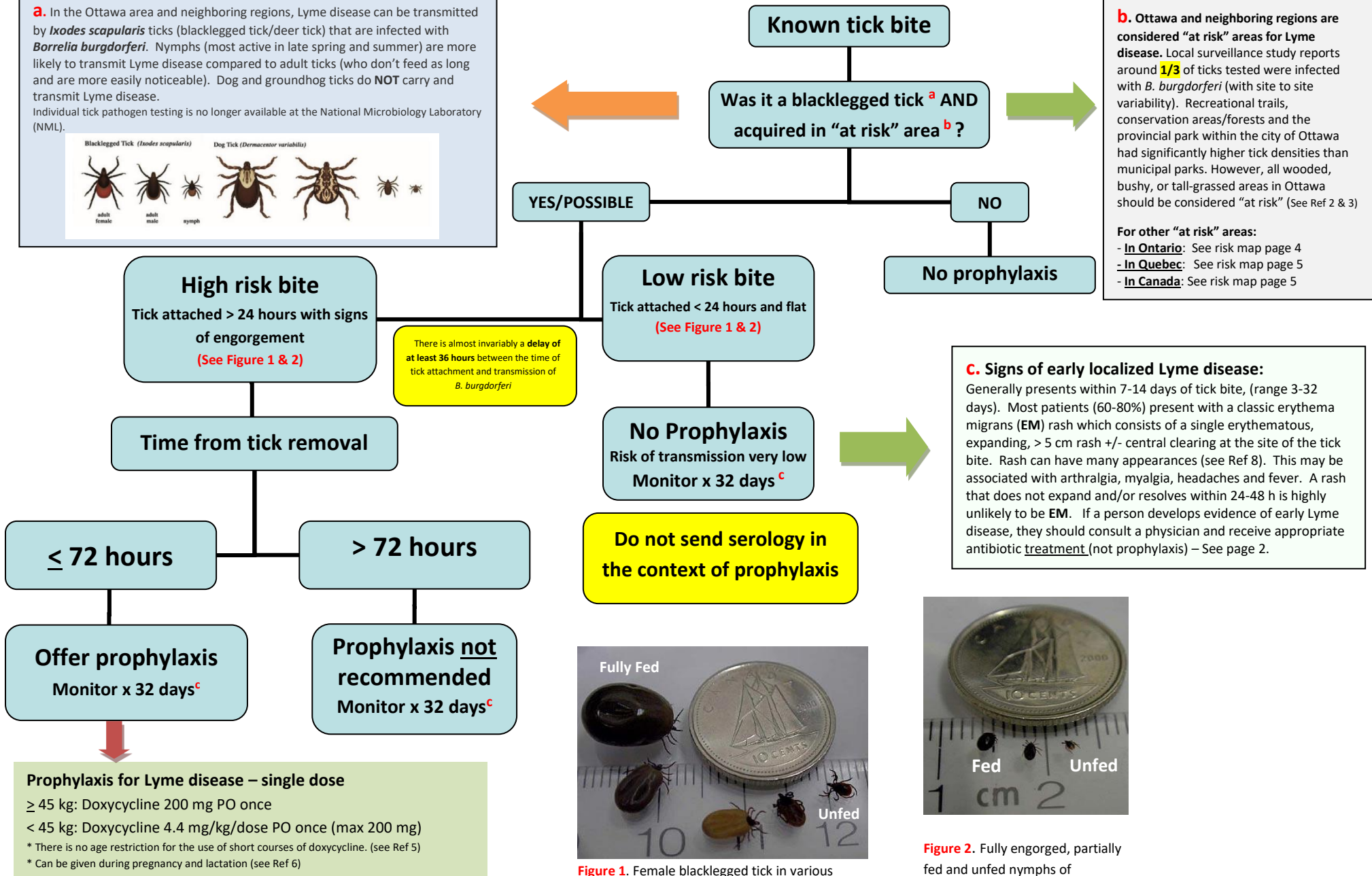


**a.** In the Ottawa area and neighboring regions, Lyme disease can be transmitted by *Ixodes scapularis* ticks (blacklegged tick/deer tick) that are infected with *Borrelia burgdorferi*. Nymphs (most active in late spring and summer) are more likely to transmit Lyme disease compared to adult ticks (who don't feed as long and are more easily noticeable). Dog and groundhog ticks do **NOT** carry and transmit Lyme disease. Individual tick pathogen testing is no longer available at the National Microbiology Laboratory (NML).



**b.** Ottawa and neighboring regions are considered "at risk" areas for Lyme disease. Local surveillance study reports around **1/3** of ticks tested were infected with *B. burgdorferi* (with site to site variability). Recreational trails, conservation areas/forests and the provincial park within the city of Ottawa had significantly higher tick densities than municipal parks. However, all wooded, bushy, or tall-grassed areas in Ottawa should be considered "at risk" (See Ref 2 & 3)

**For other "at risk" areas:**  
 - In Ontario: See risk map page 4  
 - In Quebec: See risk map page 5  
 - In Canada: See risk map page 5



**c. Signs of early localized Lyme disease:**  
 Generally presents within 7-14 days of tick bite, (range 3-32 days). Most patients (60-80%) present with a classic erythema migrans (EM) rash which consists of a single erythematous, expanding, > 5 cm +/- central clearing at the site of the tick bite. Rash can have many appearances (see Ref 8). This may be associated with arthralgia, myalgia, headaches and fever. A rash that does not expand and/or resolves within 24-48 h is highly unlikely to be EM. If a person develops evidence of early Lyme disease, they should consult a physician and receive appropriate antibiotic treatment (not prophylaxis) – See page 2.



**Figure 1.** Female blacklegged tick in various stages of feeding, noting change in size and color



**Figure 2.** Fully engorged, partially fed and unfed nymphs of blacklegged tick.

**Prophylaxis for Lyme disease – single dose**  
 ≥ 45 kg: Doxycycline 200 mg PO once  
 < 45 kg: Doxycycline 4.4 mg/kg/dose PO once (max 200 mg)  
 \* There is no age restriction for the use of short courses of doxycycline. (see Ref 5)  
 \* Can be given during pregnancy and lactation (see Ref 6)

**C. Ottawa and neighboring regions are considered "at risk" areas for Lyme disease.** Local surveillance study reports around **1/3** of ticks tested were infected with *B. burgdorferi* (with site to site variability). Recreational trails, conservation areas/forests and the provincial park within the city of Ottawa had significantly higher tick densities than municipal parks. However, all wooded, bushy, or tall-grassed areas in Ottawa should be considered at risk (See Ref 2 & 3)

**For other "at risk" areas:**

- **In Ontario:** See risk map page 4
- **In Quebec:** See risk map page 5
- **In Canada:** See risk map page 5

**Suspected early localized Lyme disease**

Generally presents within 7-14 days of tick bite, (range 3-32 days). Most patients (60-80%) present with a classic erythema migrans (EM) rash which consists of a single erythematous, expanding, > 5 cm rash +/- central clearing at the site of the tick bite. Rash can have many appearances (see Figure 3 and Ref 9). This may be associated with arthralgia, myalgia, headaches and fever. A rash that does not expand and/or resolves within 24-48 h is highly unlikely to be EM. A *tick saliva hypersensitivity reaction* is most likely in cases of rashes < 5 cm appearing within 72 hours of the tick bite (Not Lyme Disease and no treatment required).

**Possible Early Disseminated Lyme Disease (see page 3)**

**Skin:** Multiple EM lesions  
**Neuro:** Cranial nerve palsies (especially CN7), aseptic meningitis, meningo-radiculoneuritis  
**Cardiac\*:** AV block, myopericarditis  
**Joints:** Arthritis (often mono/pauciarticular – large joints)

*\* can sometimes occur < 32 days – more commonly after 1 month*

**Possible Late Lyme Disease**

**Joint:** Chronic, intermittent arthritis  
**Neuro:** peripheral neuropathy, encephalomyelitis (very rare)

**Time from tick detachment or potential exposure to ticks**  
 (through outdoor activities in "at risk areas")<sup>C</sup>

> 32 days

3 – 32 days

**Start empiric therapy**  
 Treatment of EM results in rapid resolution of skin lesions within several days and almost always prevents development of later stages of Lyme disease

**PATIENT EDUCATION**

Counsel patients on possible persistent symptoms after adequate treatment of Lyme disease. Some patients may have prolonged, persistent non-specific symptoms such as fatigue, pain or headaches, in the convalescent period which gradually resolves and responds to symptomatic treatment.

**Adequately treated early Lyme disease does not need ID referral**

**MD must notify Ottawa Public Health (OPH)**  
 613-580-2424 ext 24224

**Online information and reporting form:**  
[https://www.ottawapublichealth.ca/en/professionals-and-partners/resources/Documents/lyme\\_reporting\\_form\\_en.pdf](https://www.ottawapublichealth.ca/en/professionals-and-partners/resources/Documents/lyme_reporting_form_en.pdf)

**Do not send serology in most cases of early Lyme disease**

In general, serology is done in cases of extracutaneous Lyme disease or if tick was acquired in a non "at risk" area. In addition, some patients may not present with EM and clinical diagnosis may be more difficult. Consideration should be given to serologic testing **at the initial visit and repeated at least 2 weeks later**

Serologic testing is not sensitive in the first 2-4 weeks after infection and not useful in the diagnosis of early cutaneous Lyme Disease. If tick bite was acquired in Europe – MUST specify on requisition to test for European Lyme.

Serology follows national and international recommendations involving two-tier serologic algorithm (at Public Health Ontario Laboratory).

Antibiotic	Dosage	Max dose	Duration
Amoxicillin	50 mg/kg/day PO div TID	500 mg PO TID	14 days
Doxycycline	4.4 mg/kg/day PO div BID	100 mg po BID	10 days
Cefuroxime	30 mg/kg/day PO div BID	500 mg po BID	14 days

*Doxycycline potential adverse effects: photosensitivity (sun protection/sunscreen recommended). For short term use (< 14-21 days), visible teeth staining or enamel hypoplasia is unlikely to occur. Formulation covered by OHIP+: Doxycycline 100 mg tablets (can be quartered) and suspension (limited availability – verify with pharmacy first prior to ordering).*

*Allergies: For patients unable to take doxycycline or beta-lactam antibiotics – second line agent is azithromycin x 7 days Reference: 1 & 4*

*For Pregnancy: Use amoxicillin or cefuroxime (See Ref 6)*

# MANAGEMENT OF DISSEMINATED LYME DISEASE

**Suspected disseminated Lyme disease (clinical syndromes as below)**

- Following an unrecognized infected tick bite in an untreated patient, the Lyme disease bacteria can disseminate to other anatomic sites leading to other skin lesions (multiple EM), neurologic, cardiac or joint symptoms.
- Known tick bite or potential exposure would have typically occurred > 32 days prior but can be as early as a few weeks (cardiac).

**Skin**  
Multiple EM lesions

No need to send Lyme serology if lesions are typical

**Treatment:**  
Similar treatment as single Erythema migrans (see page 2)

**Cardiac**  
Typically occurs about a 1 month after initial infection (up to 40% do not recall an EM rash)  
Symptoms of Lyme carditis include: chest pain, dyspnea, edema, palpitations, syncope, exercise intolerance)  
**Asymptomatic patients do not have Lyme carditis**

- Send Lyme serology  
- If symptoms of carditis: do ECG, troponins  
- ID/Cardiology consult

**Lyme carditis suspected?**  
AV block/conduction abnormalities, Lyme myocarditis or pericarditis

**Treatment:**  
Admit with continuous ECG monitoring if significant PR prolongation (PR > 300 ms), other arrhythmias or myopericarditis  
**Inpatient:** Ceftriaxone IV  
**Outpatient:** Doxycycline PO  
Total duration: x 14-21 days

**Neurological**  
Headache, neck stiffness, facial nerve palsy\*

- Send Lyme serology  
- LP: CSF for cell count (typically shows lymphocytosis or monocytosis), glucose, protein, opening pressure  
\* No LP warranted for isolated facial palsy without signs of meningitis. (Lyme PCR not recommended routinely)  
- MRI head/spine rarely needed – unless suspicion of parenchymal/spinal cord involvement (rare)  
- ID/Neuro Consult

**Lyme neuroborreliosis suspected?**  
CNS: Meningitis, encephalitis, myelitis  
PNS: painful radiculoneuritis, mononeuropathy multiplex, acute cranial neuropathies (especially CN VII, VIII > III, V, VI) radiculitis

**Treatment:**  
- **Facial palsy:** Doxycycline x 14 days  
*No recommendation on use of corticosteroids. May provide according to idiopathic facial palsy if current diagnosis is unclear.*  
- **Meningitis or radiculopathy:** Ceftriaxone IV and once improved and diagnosis confirmed, can complete course with doxycycline PO (total duration 14-21 days)  
Doxycycline PO and Ceftriaxone IV are both equally effective

**Joint**  
Typically marked swelling of 1 joint (or < 5). Often affecting large joint (ie knee) and noted to be not as painful as expected with degree of swelling. Often lack of fever (but can be seen especially in children). Always need to rule out septic arthritis.

- Send Lyme serology  
- Consider joint aspiration to rule out septic arthritis (especially if fever, leukocytosis, acute onset)  
\*\*Lyme PCR in synovial fluid is not routinely recommended (can be discussed with ID)  
- ID/Rheumatology consult

**Lyme arthritis suspected?**

**Treatment:**  
If ≥ 8 yo: Doxycycline PO x for 28 d  
If < 8 yo: Amoxicillin PO x 28 d  
If allergic: Cefuroxime PO x 28 d  
Adjunctive NSAIDs

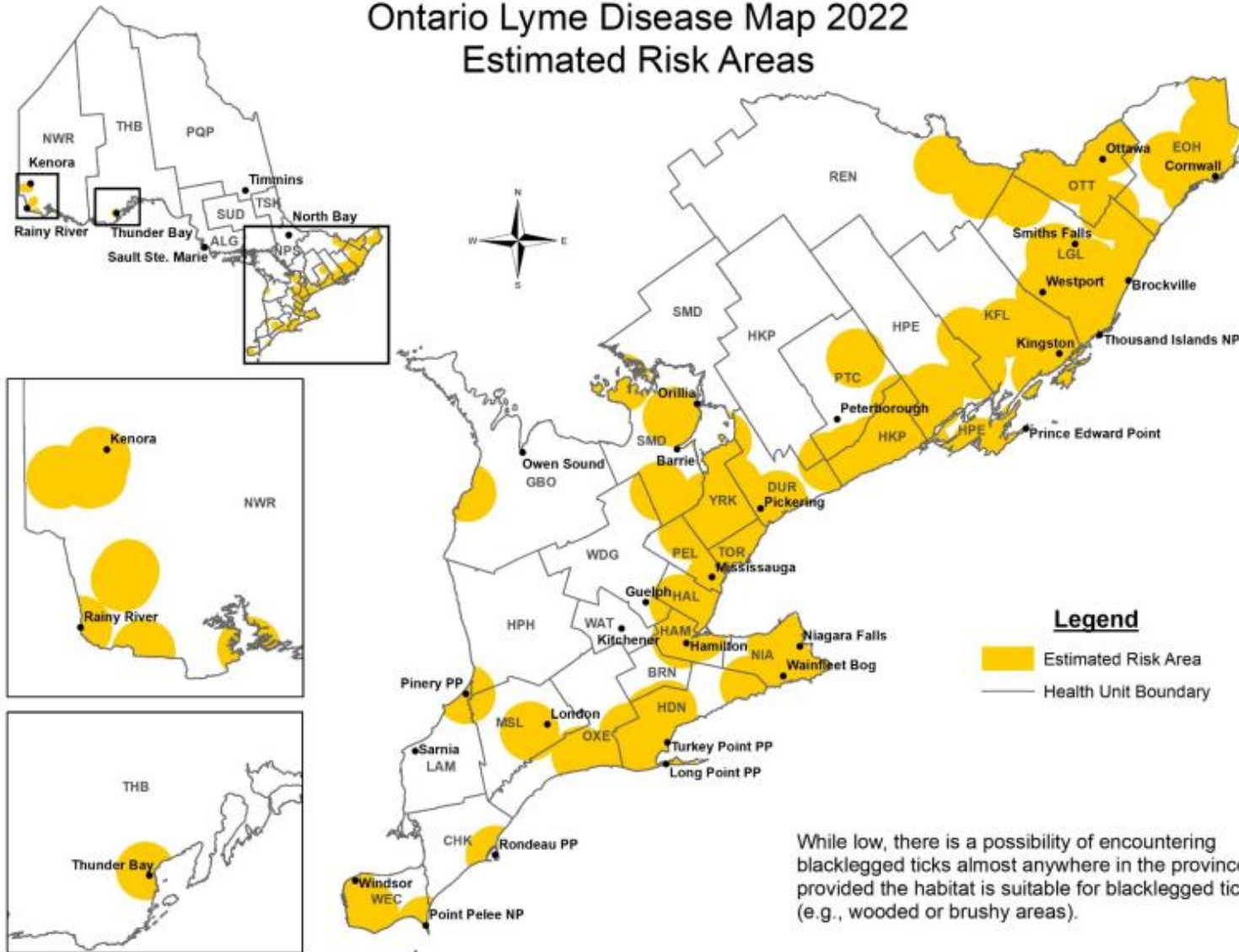
**90% respond within 1-3 months**  
If no or minimal response to initial course (persistent and moderate/severe joint swelling), then further treatment may be warranted – discuss with ID and Rheumatology

Antibiotic	Dosage
Amoxicillin	50 mg/kg/day PO div TID Max 500 mg PO TID
Doxycycline	4.4 mg/kg/day PO div BID Max 200 mg per 24H
Ceftriaxone	50-75 mg/kg/day IV Q24h Max 2 grams per 24H
Cefuroxime	30 mg/kg/day div BID Max 1 gram per 24H

**Interpretation of Lyme Serology**  
Lyme serology is **very sensitive** in the context of disseminated Lyme disease. Negative Lyme serology in this context **rules out** the diagnosis. If serology is drawn too early from onset of symptoms, then EIA may be reactive but Line Blot (Western Blot) is non-reactive. If indicated, resend another sample (convalescent) 2-3 weeks

**Co-infections**  
If presents with high-grade fever or characteristic laboratories (thrombocytopenia, leukopenia, neutropenia +/- anemia, elevated indirect bilirubin and LDH) then consider testing for co-infection with **Anaplasma phagocytophilum** or **Babesia microti** which have been increasingly found in Ontario. Other tick-borne infections to consider also include Powassan virus disease and *Borrelia miyamotoi* disease.

### Ontario Lyme Disease Map 2022 Estimated Risk Areas



While low, there is a possibility of encountering blacklegged ticks almost anywhere in the province, provided the habitat is suitable for blacklegged ticks (e.g., wooded or brushy areas).

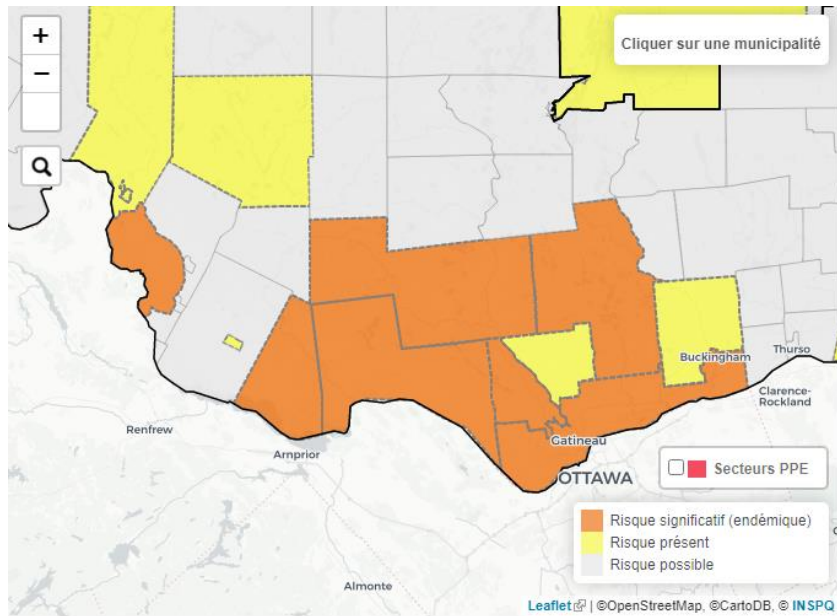
March 2022

[www.publichealthontario.ca/lymedisease](http://www.publichealthontario.ca/lymedisease)

From Public Health Ontario Lyme disease Risk Area Map  
[https://www.publichealthontario.ca/-/media/Documents/O/2022/lyme-disease-risk-area-map-2022.pdf?sc\\_lang=en](https://www.publichealthontario.ca/-/media/Documents/O/2022/lyme-disease-risk-area-map-2022.pdf?sc_lang=en)

# Lyme disease risk areas

## Outaouais including Gatineau Park



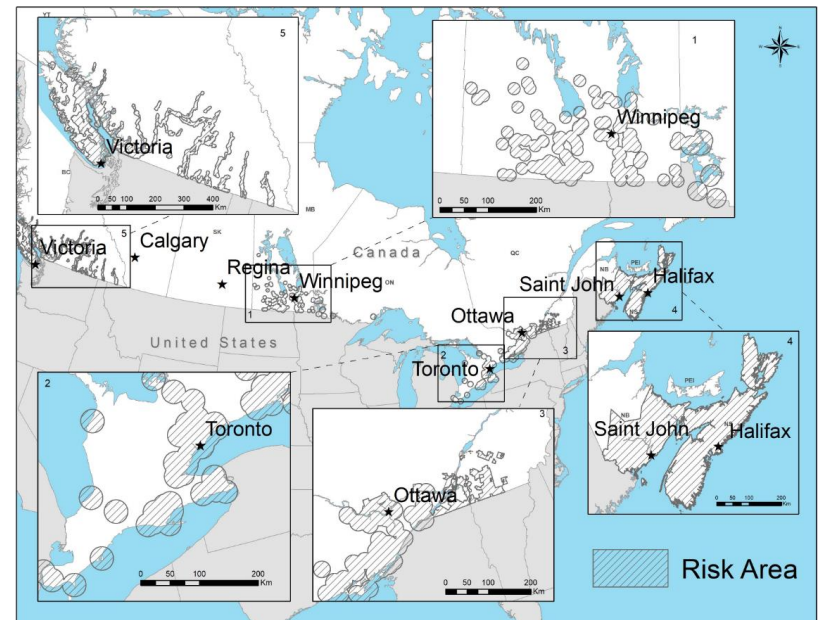
Dernière mise à jour : juin 2022, réalisée à l'aide du logiciel QGIS (version 3.16.10).

Further areas are now considered at high risk ('Risque significatif'). The following municipalities are considered at high risk (in orange): Gatineau (Aylmer, Hull, Gatineau, Vallée-de-la-lièvre) Bristol, Pontiac, La Pêche, Chelsea and Val-des-Monts. Most of Gatineau Park is now considered an area where there is high risk. In Cantley, the "risk is present" for Lyme Disease but not significant enough to warrant post-exposure prophylaxis.

Please consult an interactive map from the Institut national de Santé Publique Quebec (INSPQ) for more specific and up to date details on risk areas:

- <https://www.inspq.qc.ca/zoonoses/maladie-de-lyme>
- [https://www.inspq.qc.ca/sites/default/files/documents/zoonoses/carte\\_risque\\_acquisition\\_lyme2022.pdf](https://www.inspq.qc.ca/sites/default/files/documents/zoonoses/carte_risque_acquisition_lyme2022.pdf)

## Canada



This figure contains 5 cross-sections which display locations where the risk from tick bites is known to occur and is possible or for Lyme disease is possible. Circled hatched areas are locations where tick risk is known and are called risk areas. From:

<https://www.canada.ca/en/public-health/services/diseases/lyme-disease/surveillance-lyme-disease.html>



**Figure 3.** Single Erythema Migrans lesion – Bull's eye at the site of a tick bite. (see Ref 10 for more pictures).

## Facts about Lyme disease in Ottawa

- Lyme disease is a complex infection with symptoms that can manifest within a few days (early Lyme disease) and as late as many months (early/late disseminated Lyme disease) following an infected tick bite.
- The overall risk of acquiring Lyme disease following an *I. scapularis* tick bite **in a high-risk area** is low and estimated to be around **2.2 %**. [95% CI 1.2-3.9%] and when given appropriately, a single dose of doxycycline given as post-exposure prophylaxis, decreases the overall risk of progression to Lyme Disease to **0.2 %** [95% CI, 0-1 (Ref 4).
- Transmission < 24 hours of tick attachment is **highly unlikely**. Based on animal models, there is almost invariably a **delay of at least 36 hours** between the time of tick attachment and transmission of *B. burgdorferi*.
- Due to reassuring safety data, doxycycline can be given for short term use (< 14-21 days) in children of any age. (Ref 5)
- Treatment of early Lyme disease with appropriate antimicrobials is easy and effective.
- **Prevention is key**. Practice regular tick checks following outdoor activity. Wear appropriate light-colored clothing (to detect ticks more easily) and long sleeves/protective clothing, pants tucked into socks. Use insect/tick repellent (DEET, picaridin, IR3535, oil of lemon eucalyptus, p-methane-3,8-diol or permethrin) Remove attached tick **promptly** (within 24 hours) with fine-tipped tweezers.



From CDC: [https://www.cdc.gov/ticks/removing\\_a\\_tick.html](https://www.cdc.gov/ticks/removing_a_tick.html)

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10. **For more information on Lyme disease including other international guidelines** – please see: <https://www.canada.ca/en/public-health/services/diseases/lyme-disease/health-professionals-lyme-disease.html>.
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