Management of Tick Bites and Investigation of Early Localized Lyme Disease

**Tick bite but asymptomatic**

- **No risk of Lyme disease**
  - Advise patient to monitor for signs and symptoms for 30 days

- **Risk of Lyme disease is low**
  - Advise patient to monitor for signs and symptoms for 30 days
  - Counsel patient on preventing exposure to ticks

- **At risk for Lyme disease, but post-exposure prophylaxis is not warranted**
  - Advise patient to monitor for signs and symptoms for 30 days

- **At risk for Lyme disease; optimal timing for post-exposure prophylaxis**
  - Advise patient to monitor for signs and symptoms for 30 days

**Symptomatic (3–30 days following tick exposure)**

- **Does the patient have the following signs and symptoms compatible with Lyme disease?**
  - Expanding typical or atypical erythema migrans rash > 5 cm (see Box 1)
  - Fever, chills, headache, stiff neck, fatigue, decreased appetite, muscle and joint aches, swollen lymph nodes (see Box 2)

- **Was the patient exposed to ticks in the past 30 days?**
  - Yes, residence or travel to risk areas and contact with ticks through outdoor activities
  - No residence or travel to risk areas and no possible contact with ticks

- **Was the tick removed within the past 72 hours?**
  - Yes, residence or travel to risk areas and contact with ticks through outdoor activities
  - No residence or travel to risk areas and no possible contact with ticks

- **Was the tick attached?**
  - Yes
    - Safely remove the tick, if attached (see Box 3)
  - No
    - Is it a blacklegged tick? (see Box 3)

- **Attached for ≥ 24 hours?**
  - Yes
    - Tick acquired in risk or endemic area with a prevalence of infected ticks > 20%? (See Box 4)
  - No
    - Is or was the tick attached?

- **Clinical case of Lyme disease**
  - Treat for early localized Lyme disease (see Box 8)
  - Lyme disease serology not indicated
  - If symptoms persist, refer patient to appropriate specialist

- **Possible case of Lyme disease**
  - Routine management of patient’s symptoms
  - Order Lyme disease serology (see Box 6)
  - Consider treating for early localized Lyme disease (see Box 8)
  - If symptoms persist, consider an alternative diagnosis. Consult Public Health to understand the local epidemiology. Refer patient to an appropriate specialist, as needed
**Dosage for Adults**

- **Decreased appetite** 26%
- **>20%** (e.g., **Rouge**)

**Dosage for Children**

- **For children > 8 years of age:**
  - **1 g three times a day** for 21 days
  - **500 mg twice a day** for 14–21 days
- **For children ≤ 12 years of age ≤ 50 kg:**
  - **100 mg twice a day** for 21 days
  - **500 mg four times a day** for 14–21 days
- **For children ≤ 12 years of age ≤ 33 kg:**
  - **30 mg/kg three times a day** for 21 days
  - **30 mg/kg three times a day** for 14–21 days
- **For severe infections, up to 5 mg/kg/day for 21 days**

**Preferred**

- **Doxycycline**
  - 100 mg twice a day for 21 days
  - Contraindicated for pregnant or lactating people
- **Azithromycin**
  - 500 mg/d for 17 days
  - For children ≤12 years of age ≤ 33 kg
- **Cefuroxime**
  - 500 mg twice per day for 14–21 days
  - For children > 8 years of age
- **Clarithromycin**
  - 500 mg twice a day for 14–21 days
  - Relatively contraindicated in pregnant women
- **Erythromycin**
  - 500 mg four times a day for 14–21 days
  - For children > 8 years of age

**For Allergy or Intolerance**

- **Clarithromycin**
  - 500 mg/d for 17 days
  - For children ≤12 years of age ≤ 50 kg
- **Erythromycin**
  - 500 mg four times a day for 14–21 days
  - For children > 8 years of age

**For Neurological involvement (early disseminated disease)**

- **87%**

**For Arthritis (late disseminated disease)**

- **97%**

**Additional images of typical and atypical rashes are available on Health Canada’s website.**

**Note:** People with darker skin tones may present with a bruise-like rash.

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**Box 1. Clinical Manifestations of Early Localized Lyme Disease: Erythema Migrans Rashes**

**Box 2. Prevalence of Symptoms in Patients Presenting With Possible Early Localized Lyme Disease**

- **Erythema migrans rash** (typical or atypical) >70%
- **Headache** 42%
- **Fever/chills** 39%
- **Fatigue** 54%
- **Myalgia** 44%
- **Stiff neck** 35%
- **Decreased appetite** 26%

*Note: This is not a comprehensive list of higher-risk areas in Ontario.*


**Box 3. Blacklegged Ticks at Various Stages and Safe Tick Removal**

**Box 4. Areas of Risk for Lyme Disease**

- The risk of acquiring Lyme disease varies across geographical regions. Please click to see the risks in **Ontario, Canada**, and the **United States**.
- In Europe, the areas of highest risk are in Central and Eastern Europe, but infected ticks have also been found in Southern Scandinavia and up to the northern Mediterranean region.

**Box 5. Post-Exposure Prophylaxis**

The risk of developing Lyme disease following a tick bite by an infected tick is between 1% and 3%. In Ontario, the prevalence of infected ticks varies by geographic region. In many instances, it is reasonable to adopt the “wait and see” approach and treat patients if they develop symptoms compatible with Lyme disease. Counsel patients to watch for the development of early signs and symptoms for 30 days, and advise patients that other tick-borne infections may result in signs or symptoms too.

Based on the best available evidence, post-exposure prophylaxis can be considered if these four criteria are met: 1. The tick was attached > 24 hours 2. The tick was removed within the past 72 hours 3. The tick was acquired in an area with a prevalence of ticks infected with *Borrelia burgdorferi* > 20% (e.g., Rouge National Urban Park and Morningside Park in the Greater Toronto Area, Brighton, Kingston and surrounding areas, Thousand Islands, Brockville, Perth-Smiths Falls and surrounding areas, Ottawa and surrounding areas, and Rondeau Provincial Park in Morpeth*)

4. Doxycycline is not contraindicated (Doxycycline is contraindicated for pregnant people and for children < 8 years old. There is insufficient evidence for the prophylactic use of other medications, such as amoxicillin, in these populations)

**Adults:**

1 dose of doxycycline 200 mg, by mouth

**Children < 8 years:**

1 dose of doxycycline 4 mg/kg, up to a maximum dose of 200 mg, by mouth

*Note: This is not a comprehensive list of higher-risk areas in Ontario. For more information, please refer to the [Ontario Lyme Disease Map](https://www.cdc.gov/ Lyme disease/).*


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**Box 6. Laboratory Testing**

- **Laboratory testing is not indicated for asymptomatic patients**
- **Serological testing may not yield positive results during early localized Lyme disease, so management should not be based on serological testing results during this phase**
- **Antibiotic treatment in early disease may reduce seroconversion; testing should not be used to monitor treatment outcome**
- **Following exposure to Borrelia burgdorferi, immunoglobulin M (IgM) antibodies are detected within 2–4 weeks, and IgG antibodies within 4–6 weeks**
- **Public Health Ontario uses a two-step testing algorithm to maximize sensitivity and specificity (see Box 7)**
- **For serological testing, please complete the requisition fully and submit it, along with samples, to a public health laboratory for testing**
- **If European Lyme disease is suspected based on the patient’s travel history, please order serology testing specific to European Lyme disease**

**Box 7. Sensitivity of Serological (Two-Tier) Testing in Patients With Lyme Disease**

- **Erythema migrans, acute phase**
  - **(early localized disease)**
  - 29–40%
- **Erythema migrans, convalescence phase**
  - **(early localized disease)**
  - 29–78%
- **Neurological involvement**
  - **(early disseminated disease)**
  - 87%
- **Arthritis**
  - **(late disseminated disease)**
  - 97%

*Two-tier testing algorithm is based on serum sample initially tested using enzyme-linked immunosorbent assay (ELISA) method. If results of ELISA method are reactive/indeterminate, separate IgM and IgG Western blot tests are performed.*

*Following antibiotic treatment.*

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**Box 8. Recommendations for Treatment of Patients With Early Localized Lyme Disease**

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