Lyme Disease Diagnostic Algorithm for Clinicians

Patient with known/suspected blacklegged tick bite

- **Asymptomatic patient**
  - Tick attached >24 hours
    - No risk of Lyme disease transmission
  - History of travel (see Box 1)
    - Yes
      - Watch for signs and symptoms 30 days post-exposure
    - No
      - Time since tick was removed >3 days
        - Consider post exposure prophylaxis where appropriate (Box 2)

- **Symptomatic patient**
  - Suspect Lyme disease based on symptoms and exposure history (See Box 1 for Lyme Risk Areas)
  - Early localized disease (<30 days)
    - Erythema migrans (EM) rash (Box 3)
    - Low-grade fever, fatigue, headache, arthralgia (may be intermittent)
  - Early disseminated disease (<3 months)
    - Multiple EM rashes
    - Low-grade fever, fatigue, headache, arthralgia (may be intermittent)
    - Neurological (e.g. aseptic meningitis, cranial neuropathies - especially CN VII/Bell's Palsy)
    - Cardiac (e.g. 2/3° AV block)
  - Late disseminated disease (>3 months)
    - Oligoarticular arthritis (esp. large joints)
    - Neurological (e.g. encephalopathy, polyradiculoneuropathy)
    - Retinitis (rare)

**Box 1: Lyme Risk Areas**
- Peel Region does not contain endemic areas for Lyme disease and no populations of blacklegged ticks have been identified.
- Individuals in Peel without a travel history may be exposed to infected ticks transported on birds and other animals.
- Only blacklegged ticks carry Lyme disease in Ontario.
- Canada: [http://www.phac-aspc.gc.ca/id-mi/assets/images/tickinfo_map-lg-eng.jpg](http://www.phac-aspc.gc.ca/id-mi/assets/images/tickinfo_map-lg-eng.jpg)
- USA: Highly endemic in northeastern and north-central states.
- Europe: Endemic from southern Scandinavia to northern Mediterranean; highest incidence in central and Eastern Europe.

Potential European exposure must be specified on lab requisitions.

**Box 2: Post exposure prophylaxis** for Lyme disease after a recognized blacklegged tick bite
- **Adults**: Doxycycline 200mg PO x 1 dose
- **Children >8 years**: Doxycycline 4 mg/kg, up to a maximum dose of 200mg

Doxycycline is contraindicated in pregnancy and for children <8 years.
No further testing/treatment required following post-exposure prophylaxis.
Box 3. Erythema migrans (EM)
- Rash is present in most cases (60-85%)
- Begins as red macule/papule at site of tick bite
- Rapidly enlarging to diameter >5 cm
- Often develops central clearing (Figure 1); some studies noted uncharacteristic variants of EM in 25-30% of cases, e.g. oval or irregular shape, no central clearing (Figure 2), dusky or bluish centre

Figure 1.

Box 4. IDSA Guidelines for treatment of early localized Lyme disease
See complete IDSA guidelines for treatment of disseminated and late disease. (Available online at idsociety.org/lyme/)
Consultation with ID is strongly recommended.

<table>
<thead>
<tr>
<th>Adults</th>
<th>Doxycycline 100mg PO BID x 14-21 days (contraindicated in pregnancy)</th>
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<tbody>
<tr>
<td></td>
<td>Alternatives:</td>
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<td>Amoxicillin 500 mg PO TID x 14-21 days</td>
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<td></td>
<td>Cefuroxime 500 mg PO BID x 14-21 days</td>
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| Children ≥8 years | Doxycycline 4 mg/kg/day divided BID (maximum of 100 mg per dose) x 14-21 days |
|                  | Alternatives: Amoxicillin or cefuroxime as below                   |

| Children <8 years | Amoxicillin 50 mg/kg/day, PO, divided TID (max 1.5 g/day) for 14-21 days |
|                  | Alternative: Cefuroxime 30 mg/kg/day, PO, divided BID (maximum 1 g/day) for 14-21 days |

Box 5. Laboratory testing for Lyme disease
- Do not base management on a pending laboratory tick submission.
- Testing is not indicated for asymptomatic patients
- Limited value in early disease
- IgM usually within 2 weeks, IgG in most patients within 1 month
- Antibiotic treatment in early disease may reduce seroconversion
- Public Health Ontario Laboratory (PHOL) conducts two-tiered serologic testing to maximize sensitivity and specificity
- Specify on PHOL requisition, specify the following:
  - Timing of exposure
  - Travel history/location of exposure
  - If suspicious of European-acquired Lyme disease, specify European travel on the requisition (a different assay is used)
  - Clinical signs and symptoms
- PHOL requisition is available at https://www.publichealthontario.ca/en/eRepository/General_test_fillable_requisition.pdf

Box 6: Tick surveillance and submission
- Tick testing is most helpful for public health surveillance in identifying risk areas.
- Lyme disease is transmitted by both adult and immature ticks (called a nymph). Nymphs are very small (less than 2mm) and can easily go unrecognized.
- Peel Public Health accepts ticks for submission; contact our vector borne disease team at 905-799-7700; 905-584-2216 (in Caledon) or send us an email: peelregion.ca/scripts/mailto.pl?mailto=healthline
- Forms for tick submissions can be found at: https://www.publichealthontario.ca/en/eRepository/Surveillance_Form_for_Tick_Identification.pdf

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