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Single Dose Doxycyline as Postexposure Prophylaxis for Lyme Disease

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For patients with a bite by an *Ixodes* tick in an endemic area for *Borrelia burgdorferi* (all of Massachusetts) AND attached for more than 36 hours, consider:

- Doxycycline 200 mg **single dose** (adult; children 4 mg/kg not to exceed 200 mg) given with food
- Counsel regarding tick-borne diseases including Lyme (prophylaxis not always effective), anaplasmosis, babesiosis, borreliosis (relapsing fever) and Powassan.
- Counsel on tick exposure prevention (EPA-approved repellants including permethrin, clothing and tick checks with prompt removal of attached ticks)

Lyme disease, carried by *Ixodes scapularis* (the black-legged tick, also called the deer tick) has been endemic across Massachusetts for at least the last 20 years. While surveillance case definitions have changed over time, data from Massachusetts between 2005 and 2024 has shown a clear increase of 350% (from 2,467 confirmed and probable cases in 2005 to 8,835 confirmed and probable cases in 2024). It is important to note that because the diagnosis of Lyme disease is primarily clinical and does not rely entirely on laboratory testing that surveillance data is useful for tracking trends only; the actual number of Lyme disease cases diagnosed each year is much greater than is captured in surveillance data.

This year, data from emergency departments (EDs) across Massachusetts show that visits involving patients reporting exposure to ticks is higher than it has been at any point in the last three years (https://www.mass.gov/doc/tick-exposure-and-tickborne-disease-syndromic-surveillance-report-june-2025-0/download). Diagnoses of a tick-borne disease associated with these visits are also higher than at the same time during the last three years.

A study[1] published in 2001 first demonstrated that a single dose of 200 mg doxycycline given within 72 hours after an *Ix. scapularis* tick bite results in an 87% reduction in development of an erythema migrans rash indicative of infection. Consideration for the use of doxycycline post-exposure prophylaxis (PEP) has been included in the Infectious Diseases Society of America

[1] Nadelman, RB et al. Prophylaxis with single-dose doxycycline for the prevention of Lyme disease after an Ixodes scapularis tick bite. N Engl J Med. 2001 Jul 12;345(2):79-84.

(IDSA) guidelines since 2006 and was included in the most recent 2020 guidelines written by IDSA, the American Academy of Neurology and the American College of Rheumatology (https://www.idsociety.org/practice-guideline/lyme-disease/) and endorsed by the American Academy of Family Physicians.

The current recommendations for consideration of administration of PEP for a tick bite are:

- The tick was identified as an *Ixodes scapularis* or another *Ixodes* spp. vector in other parts of the country; AND
- The tick was acquired in an area of high endemicity for *Borrelia burgdorferi* (this includes all of Massachusetts); AND
- The tick was attached for 36 hours or more (pictures of tick engorgement for estimation of attachment time available here https://web.uri.edu/tickencounter/species/blacklegged-tick/); AND
- The antibiotics can be taken within 72 hours after tick removal.

This recommendation applies to pediatric and adult patients and should be balanced against the safety of the antibiotic in the patient; an allergy to doxycycline, pregnancy, lactation and likelihood of photosensitivity are potential concerns (https://www.cdc.gov/lyme/media/pdfs/Lyme-Disease-Prophylaxis-After-Tick-Bite-Poster.pdf). Please note that the minimum incubation period for Lyme disease is 3 days and in the absence of symptoms, a longer course of treatment is not indicated.

Whether or not antibiotic prophylaxis is prescribed, patients should be counseled about the signs and symptoms of Lyme disease, anaplasmosis, babesiosis, relapsing fever (borreliosis) and Powassan virus disease. Prophylaxis is not 100% effective against Lyme disease, is not likely to prevent infection with *Babesia microti* or Powassan virus and data are lacking on its efficacy at preventing infection with *Anaplasma phagocytophilum* (the cause of anaplasmosis) or *Borrelia miyamotoi*.

For questions about the epidemiology of tick-borne disease in Massachusetts, please contact the Massachusetts Department of Public Health Division of Epidemiology available 24/7 at (617) 983-6800.