



How to Stay Out of the Lyme-Light This Summer

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As the warmer weather finally arrives after another long New England winter, so do the ticks unfortunately. There are approximately 30,000 cases of Lyme disease reported to the Centers for Disease Control and Prevention (CDC) each year. In 2015, there were 2,922 confirmed cases and 1,302 probable cases of Lyme disease reported in Massachusetts. The blacklegged tick, *Ixodes scapularis*, or more commonly known as the “deer tick,” is responsible for spreading Lyme disease. It carries the causative pathogen, *Borrelia burgdorferi*, named after Willy Burgdorfer for his role in the discovery of the spirochete causing Lyme disease. Most humans get infected through the bites of these ticks in the nymph stage of life during the late spring and summer months. Adult ticks can also spread Lyme disease; however, they are much bigger and easier to see and are more likely to be removed prior to infection. In order to transmit Lyme disease, ticks need to be attached to a host for 36-48 hours. Ticks are usually found in hard-to-see areas on the body including groin, armpit, and scalp.

Tell your patients that if a tick is found on the skin, fine-tipped tweezers could be used to remove it. To properly remove the tick, grasp the tick as close to the skin’s surface as possible and pull upward, do not twist or jerk the tick. If the mouth-parts break and remain on the skin, try to remove it with a tweezer, but if it cannot be removed, then it is best to leave it alone and allow the skin to heal. Patients should clean the bite area and hands with rubbing alcohol, iodine scrub, or soap and water. To dispose of the live tick, patients should either submerge the tick in alcohol, place it in a sealed bag or container, wrap it tightly in tape, or flush it down the toilet. If the patient develops a rash or fever within several weeks of removing a tick, he/she should call their healthcare provider.

Early signs and symptoms (3-30 days post-tick bite) of Lyme disease include erythema migrans (“bull’s eye” rash), fatigue, chills, fever, headache, muscle and joint aches, and swollen lymph nodes. If early Lyme disease is left untreated (days to weeks post-tick bite), symptoms include additional erythema migrans rashes on other parts of the body, facial palsy, severe headaches and neck stiffness, pain and swelling in the large joints, shooting pains, heart palpitations, and dizziness. Only 70-80% of patients infected with Lyme disease will present with erythema migrans. This rash is rarely itchy or painful and appears at the site of the tick bite. Patients should seek medical attention if they observe any of these symptoms after a tick bite, live in an area known for Lyme disease, or have recently traveled to an area where Lyme disease occurs.

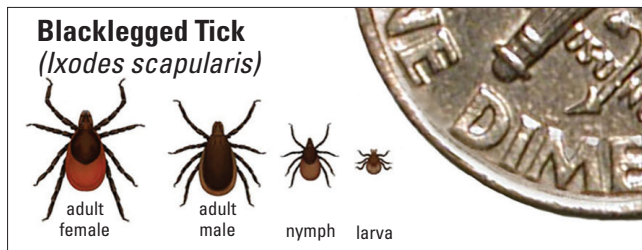
Lyme disease may be preventable with a few helpful tips for patients venturing outdoors this summer. Patients should avoid tick-infested areas like wooded and bushy areas with high grass, and they should walk in the center of trails. Advise patients to check their skin, clothes, gear, and pets after returning from a tick-infested area with a hand-held or full-length mirror. Be sure to check under the arms, in and around the ears, inside the belly button, behind the knees, in between legs, around the waist, and hair. It is also advised to shower within two hours of coming indoors, and tumble dry clothes on high heat for 10 minutes. Patients can use repellents that contains 20-30% DEET on exposed skin and clothing, and they can treat clothing and gear with

products containing 0.5% permethrin, which lasts through several washes. Permethrin spray (i.e. Repel® Permethrin, Sawyer® Permethrin clothing spray) can be found in most retail locations (i.e. Walmart, Walgreens) or online (i.e. Amazon) and contains 0.5% permethrin. Pretreated clothing with permethrin is also commercially available and may provide longer lasting protection.

References:

Lyme Disease. Centers for Disease Control and Prevention. August 19, 2016. Available at <http://www.cdc.gov/lyme/index.html>. Accessed April 17, 2017.

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(9):1089-134.



“Classic” Lyme disease rash

After a Recognized Tick Bite:

By Stephanie Cloutier, Pharm.D.

Prevention of Lyme Disease after a Recognized Tick Bite*

| Adults | Children |
|-----------------------------|--|
| Doxycycline 200 mg x 1 dose | Doxycycline** 4 mg/kg x 1 dose (max 200 mg x 1 dose) |

*A single dose of doxycycline may be offered to adults and children > 8 years of age when ALL of the following circumstances exist:

- The attached tick can be reliably identified as an adult or nymphal I. scapularis tick that is estimated to have been attached for > 36 hours on the basis of the degree of engorgement of the tick with blood or of certainty about the time of exposure to the tick.
- Prophylaxis can be started within 72 hours of the time that the tick was removed.
- Ecologic information indicates that the local rate of infection of these ticks with B. burgdorferi is >20%.
- Doxycycline treatment is not contraindicated.

**Children > 8 years of age.

First Line Treatment Options for Early Lyme Disease: 3-30 Days Post-Tick Bite

| Adults | Children |
|--|--|
| Doxycycline* 100 mg twice daily x 14 days | Amoxicillin 50 mg/kg/day in 3 divided doses, max 500 mg/dose |
| Amoxicillin 500 mg three times a day x 14 days | Cefuroxime 30 mg/kg/day in 2 divided doses, max 500 mg/dose |
| Cefuroxime 500 mg twice daily x 14 days | Doxycycline* 4 mg/kg/day in 2 divided doses, max 100 mg/dose |

*Doxycycline is contraindicated in patients that are younger than 8 years old, and women who are pregnant or lactating due to the potential for disrupting bone and tooth development. Pregnant and lactating women may be treated the same as non-pregnant patients with the same disease manifestation except doxycycline should be avoided.

Second Line Treatment* Options for Early Lyme Disease: 3-30 Days Post-Tick Bite

| Adults | Children |
|---|---|
| Azithromycin 500 mg daily x 7-10 days | Azithromycin 10 mg/kg daily, max 500 mg/day |
| Clarithromycin 500 mg twice daily x 14-21 days | Clarithromycin 7.5 mg/kg twice daily, max 500 mg/dose |
| Erythromycin 500 mg four times a day 14-21 days | Erythromycin 12.5 mg/kg four times a day, max 500 mg/dose |

*Should be reserved for patients who are intolerant of or should not take amoxicillin, doxycycline, and cefuroxime. Macrolides are not recommended first line because they have been found to be less effective compared to doxycycline, amoxicillin, and cefuroxime. These patients should be monitored closely to ensure resolution of clinical manifestations.



Chronic Lyme Disease

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Chronic Lyme disease is a condition that has been controversial for years. Many health professionals question it as a real disease, while others believe

it is a manifestation of an infection with *Borrelia burgdorferi*, a parasite found in ticks. Chronic Lyme disease or Post-Treatment Lyme Disease Syndrome (PTLDS) is a condition that may affect many different organ systems including but not limited to the central nervous system, musculoskeletal, circulatory, digestive, reproductive, and skin.¹

The standard diagnostic test for Lyme disease is a two-tiered blood test used to determine the patient's antibody response to the infection rather than infection itself.¹ ELISA or enzyme-linked immunosorbent assay is the first test the Center for Disease Control (CDC) recommends, followed by confirmation with a Western blot. The tests are most reliable when the body has developed antibodies, several weeks after infection with *B. burgdorferi*. The ELISA test looks for antibodies to the parasite while the Western blot test uses electricity to separate antigens into bands and compares it to known cases of Lyme disease.¹ Other tests that are not commonly used due to inaccuracy include a polymerase chain reaction (PCR), antigen detection, and culture testing. These are direct tests that measure the bacteria and not the patient's response to the infection.¹

The pathophysiology of PTLDS is unknown. It is believed to be caused by residual damage to the tissues and immune system that occurred during the acute infection.² Symptoms can be vague and can wane off and on, making a confirmed diagnosis almost impossible. According to the CDC, treatment with antibiotics have not shown better outcomes than placebo.² Patients with PTLDS are limited to waiting out the disease, which has been successful but may take months.

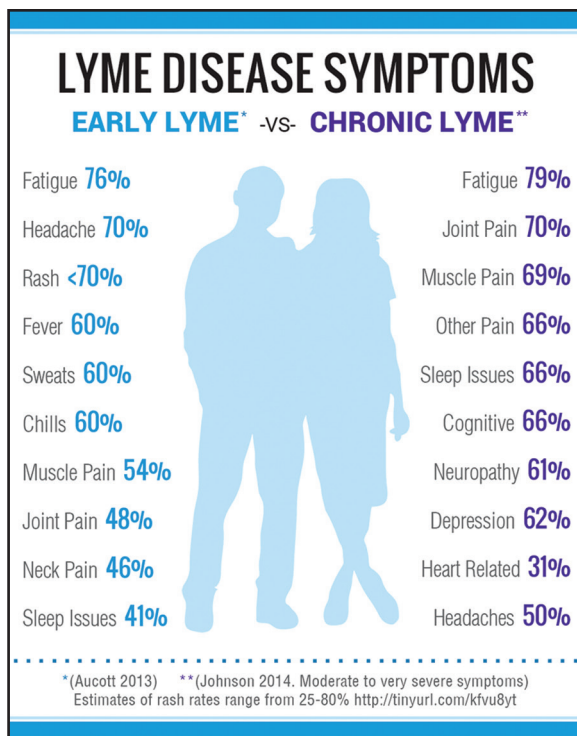
According to the Infectious Diseases Society of America (IDSA), patients with PTLDS have a prior history of Lyme disease treated with an acceptable regimen, but the subjective symptoms (wide spread musculoskeletal pain, fatigue, headaches) have occurred within 6 months of diagnosis and are persistent/relapsing for at least 6 months.³ Exclusion criteria for Chronic Lyme includes a diagnosis of fibromyalgia prior to onset of Lyme

disease, diagnosis of underlying disease or condition that might explain the patient's symptoms such as morbid obesity, sleep apnea or narcolepsy, or laboratory or imaging abnormalities that may suggest an underlying disease post-Lyme disease.³

The portion of patients found with PTLDS is relatively small. There are not many randomized trials because of the vagueness of symptoms and laboratory findings. According to the IDSA, further antibiotic treatment has not proven to be useful nor effective for patients with chronic subjective symptoms greater than 6 months. Long term treatment with antimicrobial therapies can lead to adverse effects and an increased resistance in the community.³ According to the International Lyme and

Associated Disease Society (ILADS) it is strongly recommended to discuss the possibility of antibiotic retreatment with all patients and perform an individualized risk-benefit assessment.⁴ The effectiveness of antibiotics may be due to an anti-inflammatory effect, suppression of the infection by the antibiotic, or a placebo effect. Other potentially helpful treatments may be stress reduction, increase in exercise, and proper sleeping habits.⁴

Until further research is conducted or more definitive laboratory testing is developed the mystery behind Chronic Lyme disease still remains and the controversy continues for health professionals. For



more information on Chronic Lyme disease, please see the following websites:

- CDC: <https://www.cdc.gov/lyme/postlds/>
- Lymedisease.org: <https://www.lymedisease.org/lyme-basics/lyme-disease/chronic-lyme/>
- IDSA: <http://www.idsociety.org/Lyme/>
- NIH: <https://www.niaid.nih.gov/diseases-conditions/chronic-lyme-disease>

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1. Krinsky DL, Ferreri SP, Hemstreet B. Handbook of Nonprescription Drugs. 18th ed. Washington Lyme Disease: Advocacy, education and research. Chronic Lyme.[Internet]. 2016 October. [cited 4 May 2017]. Available from: <https://www.lymedisease.org/lyme-basics/lyme-disease/chronic-lyme/>
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4. Cameron DJ, Johnson LB, Maloney EL. Evidence assessments and guideline recommendations in Lyme disease: the clinical management of known tick bites, erythema migrans rashes and persistent disease. Expert Rev Anti Infect Ther. 2014;12(9):1103-35.