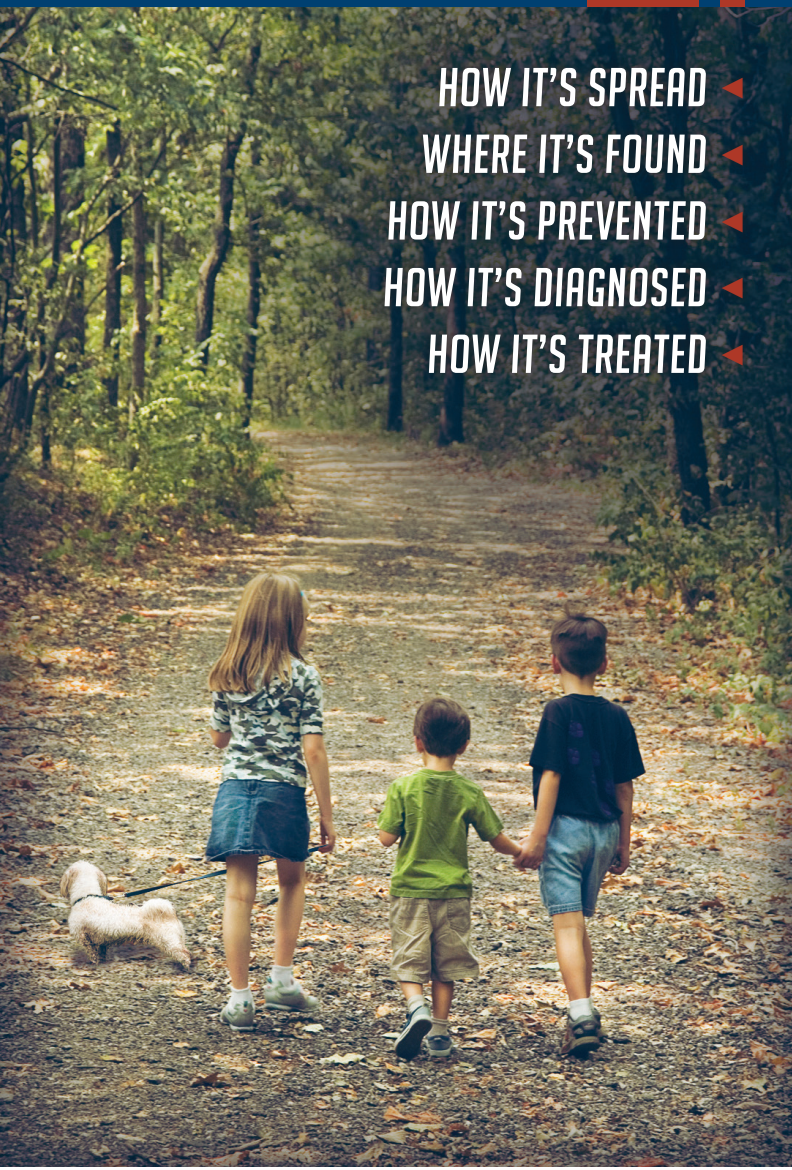
# LYME DISEASE:
## WHAT YOU NEED TO KNOW

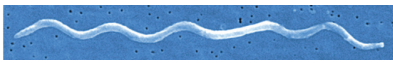



**U.S. Department of Health and Human Services**
Centers for Disease Control and Prevention

CS302074-A

# LYME DISEASE

Lyme disease is caused by bacteria called *Borrelia burgdorferi*, which is spread to people through the bite of several types of blacklegged ticks.



*Lyme disease is an infection caused by the corkscrew-shaped bacterium,* Borrelia burgdorferi.

## WHERE PEOPLE MOST COMMONLY GET LYME DISEASE

In the United States, most infections occur in the following areas:

- Eastern states, primarily New England and the mid-Atlantic
- Northern midwestern states, especially in Wisconsin, Minnesota, and the Great Lakes region
- West Coast, particularly northern California and less commonly, Oregon and Washington

For Lyme disease to exist in an area, both 1) blacklegged ticks and 2) animals infected with the Lyme disease bacteria must be present in the environment.

## TRANSMISSION

In general, ticks need to be attached for 36 to 48 hours before they can transmit Lyme disease bacteria. Most people are infected through the bites of immature ticks called nymphs. Nymphs are tiny (less than 2 mm) and difficult to see. They most commonly bite during spring and summer.

*Blacklegged ticks are much smaller than common dog ticks. In their larval and nymphal stages, they are no bigger than a pinhead. Adult blacklegged ticks are larger, about the size of a sesame seed. (Left to right: larva, nymph, adult male, adult female)*

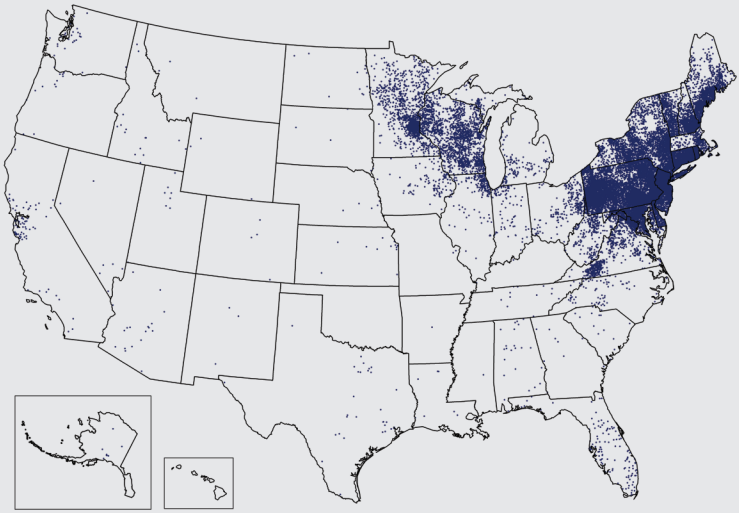
Adult ticks can also transmit Lyme disease bacteria. They are much larger and are more likely to be discovered and removed. Adult ticks most commonly bite during the fall.

There is no evidence that Lyme disease is transmitted from person-to-person through touching, kissing, or having sex with a person who has Lyme disease. Lyme disease acquired during pregnancy may lead to infection of the placenta and possible stillbirth. Therefore, early diagnosis and treatment of Lyme disease is important during pregnancy. However, no negative effects on the fetus have been found when the mother receives appropriate antibiotic treatment. There are no reports of Lyme disease transmission through breast milk or blood transfusion.

*Ticks can attach to any part of the human body but prefer hard-to-see areas such as the groin, armpits, and scalp. In most cases, the tick must be attached for 36-48 hours or more before Lyme disease bacteria can be transmitted.*

*Embedded nymphal tick | Photo courtesy of Durland Fish.*

## REPORTED CASES OF LYME DISEASE - UNITED STATES, 2017



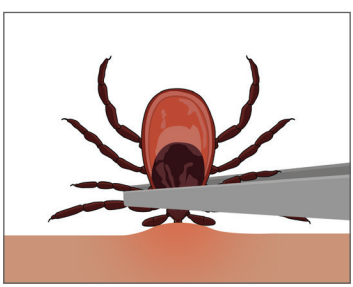
*1 dot placed randomly within county of residence for each confirmed case*

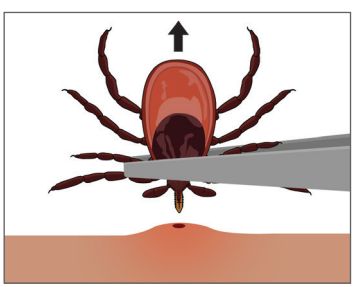
*Through Lyme disease cases have been reported in nearly every state, cases are reported from the infected person's county of residence, not the place where they were infected.*

*This map does not reflect every case of Lyme disease diagnosed in 2017. Surveillance data are subject to each state's abilities to capture and classify cases, which may vary between states, and also from year to year. Additionally, travel-associated cases are sometimes reported from states where Lyme disease is not known to occur.*

## TICK REMOVAL

Grasp the tick firmly and as close to the skin as possible. With a steady motion, pull the tick's body away from the skin. Do not be alarmed if the tick's mouthparts remain in the skin. Cleanse the area with rubbing alcohol or soap and water.





## SIGNS AND SYMPTOMS

Early diagnosis and proper antibiotic treatment of Lyme disease can help to prevent late Lyme disease. Although Lyme disease is rarely life-threatening, delayed treatment can result in more severe disease. People who notice a characteristic rash or other possible symptoms, should consult their healthcare provider.

**Signs and symptoms of early Lyme disease include:**

- a characteristic skin rash, called erythema migrans
- fatigue
- chills and fever
- headache
- muscle and joint pain
- swollen lymph nodes

Erythema migrans is a reddish or purple colored rash that usually appears 3–14 days after the bite of an infected tick. It typically appears at the site of the tick bite, is round or oval, and expands gradually over the course of several days. Common sites are the thighs, groin, trunk, and armpits. The center of the rash may clear as it enlarges, eventually resulting in a "bull's-eye" appearance; however, this is not always the case. The rash may be warm, but it usually is not painful. Some patients with early Lyme disease do not have or notice any rash and instead just have "flu-like" symptoms of fever, fatigue, and muscle aches.

Not all rashes that occur at the site of a tick bite are due to Lyme disease. An allergic reaction to tick saliva can also occur and be confused with an erythema migrans rash. Allergic reactions to tick saliva usually appear within a few hours after the tick bite, usually do not expand, and disappear within a few days.

**Late Lyme disease:** Some signs and symptoms of Lyme disease may not appear until weeks or months after a tick bite:

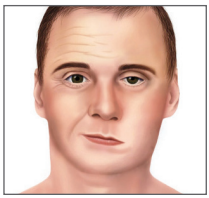
- Arthritis is most likely to appear as brief bouts of pain and swelling, usually in one or more large joints, especially the knees.
- Nervous system symptoms can include numbness, pain, nerve paralysis (often of the facial muscles, usually on one side), and meningitis (fever, stiff neck, and severe headache).
- Rarely, irregularities of the heart rhythm may occur.
- Problems with memory or concentration, fatigue, headache, and sleep disturbances sometimes persist after treatment.

Avoid late Lyme disease by promptly treating Lyme disease.

**Reinfection:** You can get Lyme disease again if you are bitten by another infected tick, so protect yourself from tick bites.

*Erythema migrans (bull's eye) rash*

*Lyme arthritis (swollen knee)*



*Facial palsy (facial droop)*

## DIAGNOSIS

Healthcare providers should consider the following factors when diagnosing Lyme disease:

- History of possible exposure to ticks in areas where Lyme disease is known to occur
- Signs and symptoms suggestive of the illness
- Results of blood tests

CDC recommends the use of FDA-cleared tests for Lyme disease testing. These tests measure antibodies that the body makes against Lyme disease bacteria. It can take several weeks after infection for the body to produce measurable levels of antibodies. This means that patients can have a negative blood test result if tested in the first weeks after infection. Healthcare providers should consider treating patients for Lyme disease without running a test if the patient has a history of exposure and has signs and symptoms suggestive of early Lyme disease.

People who have been infected for longer than 4–6 weeks will almost always test positive. A negative test in a patient with arthritis or other long-standing symptoms is strong evidence that Lyme disease is not the cause of their illness.

The immune system continues to make the antibodies for months or years after the infection is gone. This means that:

- Once a patient tests positive, he or she will continue to test positive for months to years even when the bacteria are no longer present.
- For people concerned about re-infection, it is difficult to distinguish between an old infection and a new infection using a blood test.

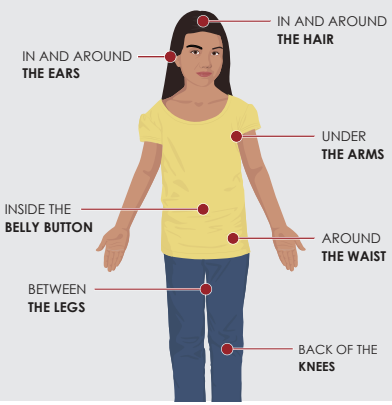
## TREATMENT

People treated with antibiotics for early Lyme disease usually recover rapidly and completely. The antibiotics most commonly used to treat Lyme disease include: doxycycline, amoxicillin, or cefuroxime axetil. Some patients may have persistent or recurrent symptoms and may require another course of antibiotics.

## TICK BITE PREVENTION

- Use Environmental Protection Agency (EPA)-registered insect repellents containing DEET, picaridin, IR3535, oil of lemon eucalyptus, para-menthane-diol, or 2-undecanone. Always follow product instructions.
- Wear clothing treated with 0.5% permethrin. Re-treat clothing annually according to label instructions.
- Shower as soon as possible after spending time outdoors.
- Check for ticks daily. Ticks can hide under the armpits, behind the knees, in the hair, and in the groin.
- Tumble clothes in a dryer on high heat for 10 minutes to kill ticks on dry clothing after you come indoors. If the clothes are damp, dry them completely and then dry for 10 minutes on high heat.

## WHERE TO CHECK FOR TICKS




## LYME DISEASE VACCINE

A vaccine for Lyme disease is not currently available.

## POST-EXPOSURE ANTIBIOTICS

Recent studies have examined the value of giving antibiotics to prevent Lyme disease after a known tick bite. While giving antibiotics for all tick bites is not always advised, it may be beneficial in some cases. Ask your healthcare provider if antibiotics after a tick bite are appropriate for you.

## TICK BITE PREVENTION FOR PETS

Dogs are very susceptible to tick bites and tickborne diseases. For these reasons, it is important to use a tick preventive product on your pets. Talk to your veterinarian about:

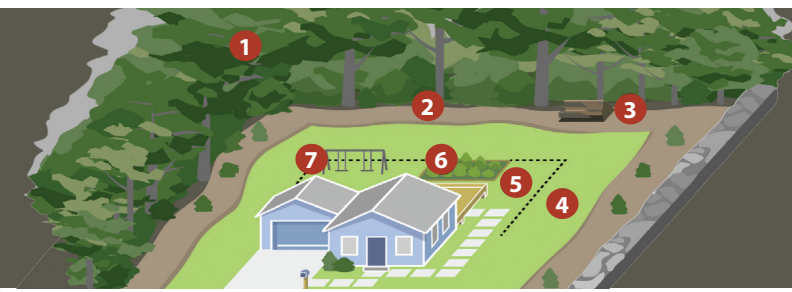
- Lyme disease vaccination for your dog
- The best tick prevention products for your dog
- Tickborne diseases in your area

**Reduce the chances that a tick bite will make your dog sick by:**

- Checking your pets for ticks daily
- Removing ticks from your pet immediately

## TICK CONTROL IN THE YARD

**Landscaping to create tick-safe zones.** Blacklegged ticks need high humidity to survive; they die quickly in drier environments. Removing leaf litter and clearing tall grass and brush around houses and at the edges of lawns will reduce the numbers of ticks. Placing wood chips or gravel between lawns or play areas and wooded areas creates a dry barrier that is difficult for ticks to cross. Fences can help keep deer away from homes.

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|---|---|---|
| 1 | TICK ZONE | Avoid areas with forest and brush where deer, rodents, and ticks are common. |
| 2 | WOOD CHIP BARRIER | Use a 3-ft. barrier of wood chips or rock to separate the "tick zone" and rock walls from the lawn. |
| 3 | WOOD PILE | Keep wood piles on the wood chip barrier, away from the home. |
| 4 | TICK MIGRATION ZONE | Maintain a 9-ft. barrier of lawn between the wood chips and areas such as patios, gardens, and play sets. |
| 5 | TICK SAFE ZONE | Enjoy daily living activities such as gardening and outdoor play inside this perimeter. |
| 6 | GARDENS | Plant deer-resistant crops. If desired, an 8-ft. fence can keep deer out of the yard. |
| 7 | PLAY SETS | Keep play sets in the "tick safe zone" in sunny areas where ticks have difficulty surviving. |

*Based on a diagram by K. Stafford, Connecticut Agricultural Experiment Station*

**For more information please contact:**
**Telephone:** 1-800-CDC-INFO (232-4636) **/ TTY:** 1-888-232-6348
**Web:** www.cdc.gov/Lyme