

Lyme Disease Fact Sheet

Fact Sheet for Masters of Agricultural and Life Sciences Project and Report

What is Lyme disease?

Lyme disease is the most common vector-borne illness in the United States (Fig. 1). The causative agent is a corkscrew shaped bacterium called *Borellia burgdorferi*.

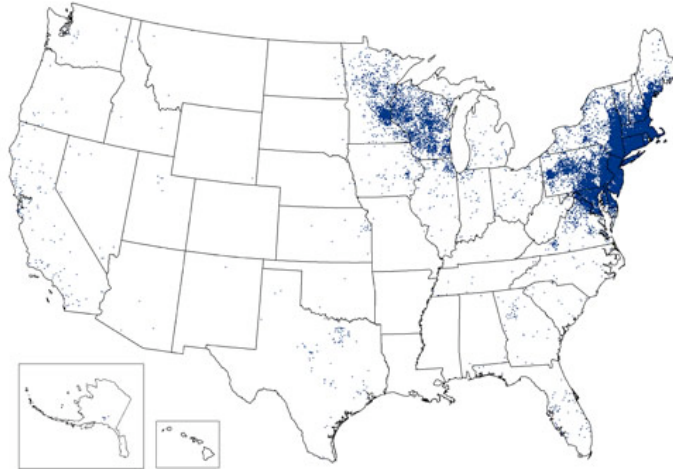


Figure 1: Reported cases of Lyme disease, 2009 (CDC).

How is Lyme disease spread?

Lyme disease is transmitted by the bite of the tick *Ixodes scapularis*, sometimes called the deer tick or blacklegged tick (Fig. 2).

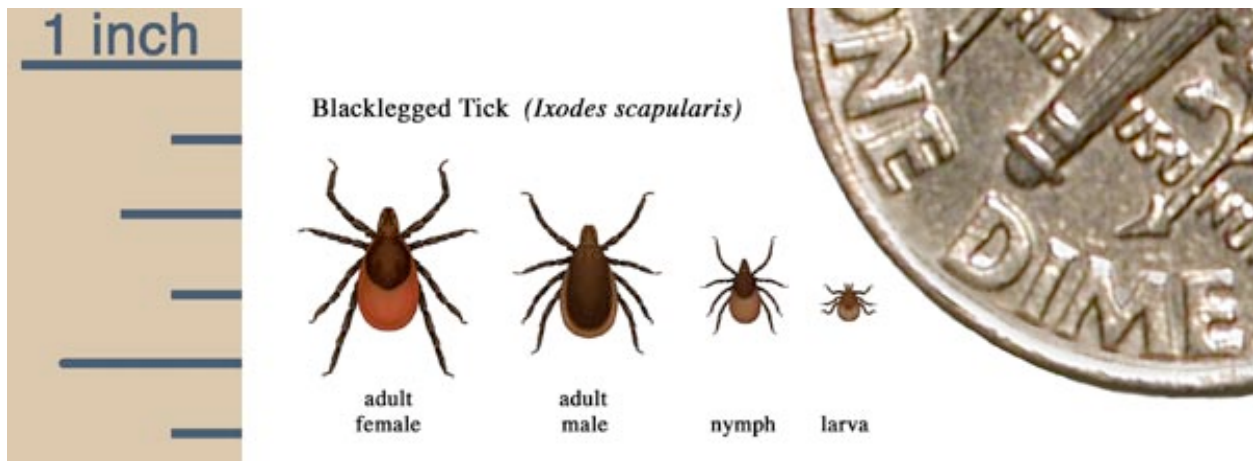


Figure 2: The blood-feeding stages of the deer tick (CDC).

What is the life cycle of the tick?

It is important to study the life cycle of the tick vector to understand the seasonal risk pattern of Lyme disease. Deer ticks have 4 life stages (egg, larva, nymph, adult) and it takes 2 years to complete their life cycle (Fig. 3). Larval ticks hatch from the egg in the summer and feed on small animal hosts such as rodents. Upon feeding on an infected animal, the tick ingests the bacteria along with the blood and becomes infected for life. The larva drops off its host, becomes inactive, and molts into the nymph. The following spring, the infected nymphs become active and feed on a wide variety of hosts, including people. Because the tiny nymph often goes unnoticed, this is the stage that is most likely to transmit Lyme disease to people. That is why human cases are more common in the late spring and early summer when the nymphs are most active. After feeding, the nymph molts into the adult. The adult ticks feed on large animals such as deer, but will also feed on humans. In the spring, the female tick lays her eggs and completes the life cycle.

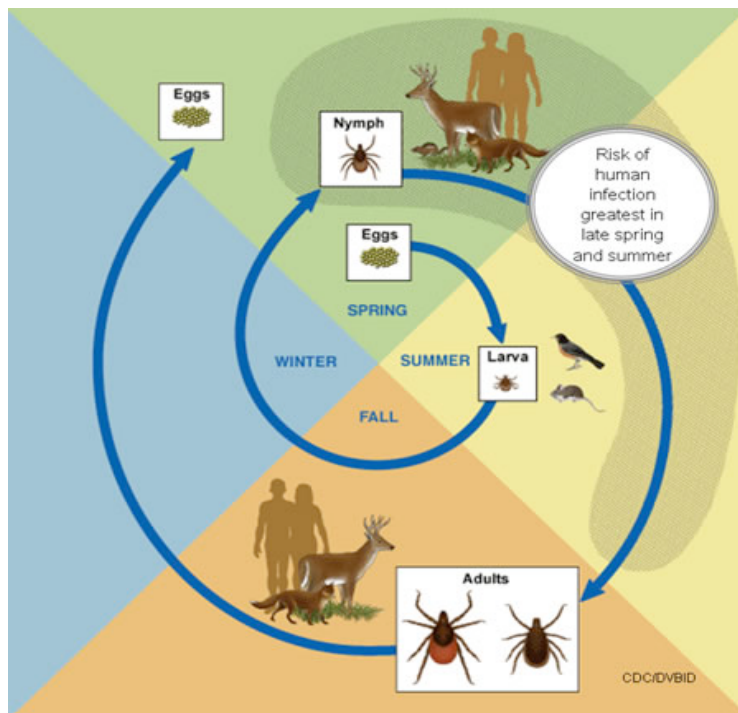


Figure 3: The life cycle of the deer tick (CDC).

Who can get Lyme disease?

Anyone can get Lyme disease at any age. Those that spend significant time outdoors (either working or leisure) have an increased risk of coming in contact with infected ticks.

Are there other ways to get infected with Lyme disease?

Lyme disease is not spread from person-to-person. Although *B. burgdorferi* bacteria do occur in the blood of infected people, no case of Lyme disease has ever been linked to blood transfusion. Infection of a pregnant woman can lead to complications, including possible stillbirth, but these can be avoided by appropriate antibiotic treatment of the

mother. Dogs and cats can get Lyme disease (there is a vaccine for dogs) but there is no evidence that they can spread the disease to their owner. However, pets should be treated with tick control products to prevent them from bringing ticks into your home and yard. You cannot get Lyme disease from eating venison or squirrels. However, as a general precaution, meat should always be cooked thoroughly. There is no evidence to suggest transmission by other means such as food, water, or the bites of other blood-feeding insects like mosquitoes or fleas.

Does Lyme disease occur in Virginia?

Lyme disease has been mostly localized to the northeastern, mid-Atlantic, and upper north-central regions of the United States. In the southeast, a wider range of hosts for the immature ticks effectively decreases the potential for contact with infected rodent reservoirs, resulting in a lower prevalence of disease. In the past decade, however, there has been an increase in the number of reported cases in Virginia (Fig. 4).

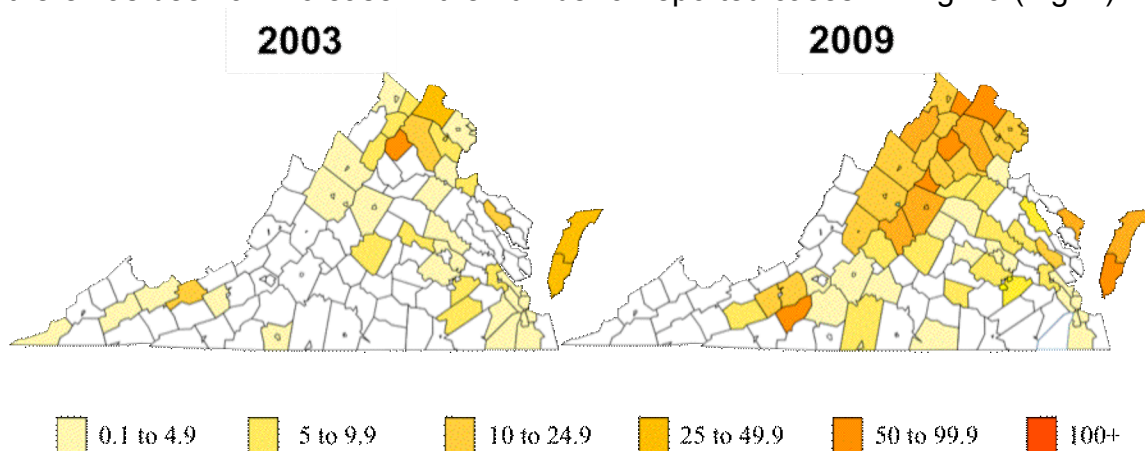


Figure 4: The expanding distribution and increasing prevalence of Lyme disease in Virginia (VDH).

What are the symptoms of Lyme disease?

Early symptoms include flu-like illness with headache, fever, muscle and joint aches, and fatigue. In about 70-80% of the cases, a characteristic circular rash will form that gradually enlarges over the course of about a week. Eventually, the rash may be as large as 12 inches in diameter with a clear center, giving it a bull's-eye appearance (Fig. 5). If untreated, the disease will spread to other parts of the body and cause a variety of symptoms such as tiredness, body aches, and headache. Arthritis may develop after several months. Some neurological symptoms that may occur include stiff neck, meningitis, Bell's palsy, poor muscle movement, numbness, pain, or weakness in the limbs, memory loss, difficulty with concentration, and change in mood or sleep habits. A few people, less than 1 out of 10, will develop heart problems such as an irregular heartbeat. Rarely, eye inflammation, liver disease, and severe fatigue can occur.



Figure 5: The characteristic bull's-eye rash of Lyme disease.

What is the treatment for Lyme disease?

Lyme disease can be cured by treatment with antibiotics but it is important to start treatment early to avoid complications. A small number of patients may continue to show symptoms for months to years after antibiotic treatment. These chronic symptoms include muscle and joint pain, arthritis, fatigue, cognitive impairment, and sleep disturbance (CDC). The cause of these symptoms is not known and treatment is controversial

What is the timeline of disease?

If the tick is removed within the first twenty-four hours, Lyme disease cannot be transferred. The tick must be attached to the skin for at least twenty-four hours for transmission to occur. The rash occurs between three and thirty days after a person is bitten (CDC). Anyone developing a rash or flu-like illness after a tick bite should see a physician.

How can Lyme disease be prevented?

The best way to avoid Lyme disease is to prevent tick bites. This can be accomplished by employing a number of simple steps.

Step 1: Avoid contact with ticks:

- Take extra precautions during the warm weather months.
- Limit exposure to tall grasses, wooded areas, bushes and leaf piles.
- Walk in the center of trails while hiking.
- Wear long-sleeved shirts fastened at the cuff and long pants tucked into boots or socks.

Step 2: Repel ticks with permethrin or DEET:

- Clothing and gear can be treated with permethrin.
- Spray an insect repellent containing Deet ($\geq 20\%$) on the skin. Be sure to follow label instructions.
- The Environmental Protection Agency (EPA) has a list of other repellents that can be used (<http://cfpub.epa.gov/oppref/insect/>).

Step 3: Detection and prompt removal of ticks:

- Wear light colored clothing for easy detection of ticks.
- Check yourself and others (including pets) after any outdoor activities.
- Shower within 2 hours of coming indoors.

Step 4: Prevent ticks in the yard:

- Treat your yard with pesticides to kill the ticks. Be sure to first familiarize yourself with the rules and regulations related to pesticide application on residential properties as determined by the EPA and your state.
- Create a tick-safe zone. Remove habitat for ticks and their rodent hosts by cutting tall grass and brush, mowing frequently, stacking wood neatly in a dry area, and getting rid of any old furniture, mattresses or trash. Discourage unwelcome animals such as deer and raccoons from entering your yard by constructing fences. Create barriers with wood chips or gravel between your yard and wooded areas to prevent tick migration.

How can I protect my pet from Lyme disease?

Both dogs and cats can contract Lyme disease. Methods to reduce the risk of your pet being exposed are similar to those for people. Check your pet for ticks daily and remove any found quickly. Talk to your veterinarian about treating your pet with acaricides and repellents. A vaccine for Lyme disease is available for dogs, but its use is controversial. Any efforts to reduce ticks in your yard will also benefit your pet.

How should a tick be removed?

Use gloves to protect your fingers with a tissue while removing the tick to decrease further possible contamination. Gently grip the tick with fine-tipped tweezers as close to the skin as possible. Use a gentle and steady pulling action. Try not to squeeze the tick as this may cause the tick to regurgitate, increasing the risk of infection. Don't twist or jerk the tick because this may cause the mouthparts to break off in the skin. After removal, disinfect the bite wound and your hands with alcohol or soap and water. Place the tick in alcohol or in a closed container to kill it. There are many folklore methods such as coating the tick with petroleum jelly or using heat to make the tick detach from the skin. These are not recommended because it is important to remove the tick as quickly as possible to reduce the chance of disease transmission.

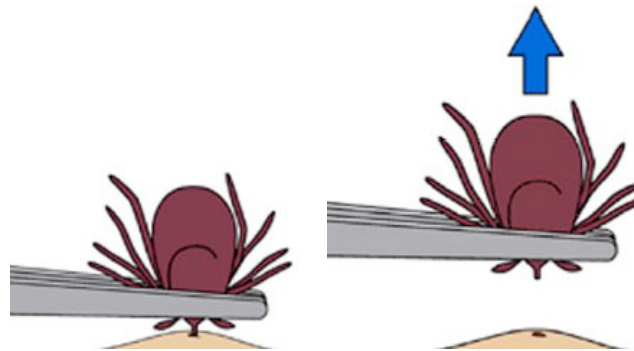


Fig. 6. Safe removal of a tick.

For additional information on Lyme disease, visit the Virginia Department of Health (<http://www.vdh.state.va.us>) or the Centers for Disease Control and Prevention (<http://www.cdc.gov>) websites.

