

## BACKGROUND

Lyme Disease (LD) is a tick-borne zoonosis (a disease shared between animals and people) caused by infection with the spirochete, *Borrelia burgdorferi* that is transmitted to people through the bite of an infected tick. *Ixodes scapularis* (the blacklegged or deer tick) is the type of tick that carries LD in Pennsylvania. The number of annually reported cases of LD in the United States has increased about 25-fold since reporting began in 1982. In the United States, the disease is mostly localized to the northeastern, mid-Atlantic, and upper Midwest regions, and in northwestern California. Pennsylvania has reported between 8,000-10,000 LD cases annually in recent years. Every county in Pennsylvania typically reports a LD incidence higher than the national average.

## WHO DOES THE ISSUE IMPACT?

- a. Season: An individual's risk of developing LD depends on each person's likelihood of being bitten by tick vectors infected with *B. burgdorferi*. This likelihood is primarily determined by the density of vector ticks in the environment (which varies by place and season), the prevalence of *B. burgdorferi* infection in vector ticks, and by the extent of person-tick contact, which is related to the type, frequency, and duration of a person's activities in a tick infested environment. The highest risk of LD is when nymphal deer ticks are in the environment in June and July, however, LD can be transmitted by adult deer ticks any time of year.
- b. Location: Most *B. burgdorferi* infections are thought to result from exposure to ticks around the home during property maintenance, recreation, and leisure activities. Thus, individuals who live or work in residential areas surrounded by woods or overgrown brush infested by vector ticks are at higher risk of getting LD.
- c. Activities: In addition, persons who participate in recreational activities away from home such as hiking, camping, fishing and hunting in tick habitats, and persons who engage in outdoor occupations, such as landscaping, brush clearing, forestry, and wildlife and parks management in endemic areas may also be at risk of getting LD. When in highly endemic areas, individuals can reduce their risk of LD by avoiding tick infested habitat. If exposure to tick infected habitat cannot be avoided, individuals may reduce their risk of infection by applying repellents, wearing protective clothing, and regularly checking for and removing attached ticks.

## COMPLICATIONS

LD is a multi-system, multi-stage, inflammatory illness. In its early stages, the disease is readily treated with oral antibiotics; however, untreated or inadequately treated infection may progress to late-stage arthritic, cardiac, or nervous system complications requiring more intensive therapy.

## SIGNS AND SYMPTOMS

LD most often presents with a characteristic rash, erythema migrans (EM), which can sometimes look like a bullseye. It may also be accompanied by nonspecific symptoms such as fever, malaise, fatigue, headache, muscle aches and joint pain. The incubation period, the time from infection to onset of EM, is typically 7 to 14 days but may be as short as 3 days and as long as 30 days. EM is observed in 70-80% of cases with early symptomatic infection; however, some infected individuals have no recognized illness, or have only non-specific symptoms suggesting viral illness, such as fever, headache, fatigue, and muscle aches.

## CAUSES AND TRANSMISSION

The Lyme disease bacterium, *Borrelia burgdorferi*, is spread through the bite of infected ticks. The blacklegged tick (or deer tick, *Ixodes scapularis*) spreads the disease in the northeastern, mid-Atlantic, and north-central United States. The western blacklegged tick (*Ixodes pacificus*) spreads the disease on the Pacific Coast.

## TESTS AND DIAGNOSIS

LD is diagnosed based on symptoms, objective findings (such as EM, facial palsy, or arthritis), and a history of possible exposure to infected ticks. However, since LD is endemic in Pennsylvania and infected deer ticks are found in all counties in Pennsylvania, all Pennsylvanians are considered potentially exposed. Furthermore, many persons do not recall a tick bite prior to their LD diagnosis, so the presence or absence of a known tick bite should never be a determining factor in diagnosing LD. Blood tests are also performed to detect the body's immune response to the infection. Not all patients with LD will develop the characteristic bulls-eye rash (EM) and early blood tests may be negative in persons who are infected with LD.

## TREATMENTS

The consequences of LD can be significantly reduced by detecting and treating the infection in its early stages with standard antibiotic regimens, since early and correct treatment usually results in a prompt and uncomplicated resolution of symptoms. Early and uncomplicated infection, including infection presenting with isolated cranial nerve palsy, almost always responds satisfactorily to treatment with orally administered antibiotics. Intravenous antibiotics are generally recommended for treating meningitis, later stage neurologic LD, and complicated LD arthritis. Late, complicated LD may respond slowly or incompletely. A minority of patients have persistent or recurrent symptoms following appropriate antibiotic therapy. These symptoms may be due to causes other than persisting infection and may be due to tissue damage caused during active infection.

## WHAT CAN YOU DO?

To prevent LD:

- The risk of being bitten by an infected tick can be decreased by using the following precautions:
  - Use insect repellent containing low concentrations (10 to 30%) of diethyltoluamide (DEET) on clothing and exposed skin;
    - Apply DEET sparingly on exposed skin. Do not apply to the face. Do not use under clothing.
    - Do not use DEET on the hands of young children. Avoid applying to areas around the eyes and mouth.
    - Do not use DEET over cuts, wounds or irritated skin. Wash treated skin with soap and water after returning indoors, and wash treated clothing.
    - Avoid spraying in enclosed areas. Do not use DEET near food.
  - Avoid tick-infested areas;
  - Wear light colored clothing so ticks can be spotted more easily;
  - Tuck pant legs into socks or boots, and shirts into pants;
  - Tape the areas where pants and socks meet;
  - Wear a hat, long sleeved shirt, and long pants for added protection;
  - Walk in the center of trails to avoid overhanging brush; and

- Check yourself, family members and pets for ticks after leaving potentially tick infested areas and promptly remove any ticks detected.

If you find a tick:

- If you find a tick attached to your skin, there is no need to panic. There are several tick removal devices on the market, but a plain set of fine-tipped tweezers will remove a tick quite effectively. Prompt and proper tick removal is very important for preventing possible disease transmission.
  - Use fine-tipped tweezers and protect your fingers with a tissue, paper towel, or latex gloves. Avoid removing ticks with your bare hands.
  - Grasp the tick as close to the skin surface as possible and pull upward with steady, even pressure. Don't twist or jerk the tick; this can cause the mouth-parts to break off and remain in the skin. If this happens, remove the mouth-parts with tweezers. If you are unable to remove the mouth easily with clean tweezers, leave it alone and let the skin heal.
  - After removing the tick, thoroughly disinfect the bite and your hands with rubbing alcohol, an iodine scrub, or soap and water.
  - Avoid folklore remedies such as "painting" the tick with nail polish or petroleum jelly or using heat to make the tick detach from the skin. Your goal is to remove the tick as quickly as possible; do not wait for it to detach.

If you suspect that you or a family member might have LD:

- See your healthcare provider if you become ill after having been bitten by a tick or having spent time outdoors participating in activities that may result in tick bites like hiking, camping, yard work, gardening, fishing, hunting, dog walking, etc.

## RESOURCES FOR MORE INFORMATION

PA DOH Vectorborne Disease webpage: [Vectorborne Diseases](#)

CDC LD website: <https://www.cdc.gov/lyme/index.html>

*This fact sheet provides general information. Please contact your physician for specific clinical information.*

**If you have any questions, contact us at 1-877-PA-HEALTH.**

