

Health and Safety

The Trouble With Ticks

The Story

Ticks sometimes transmit Lyme Disease, a potentially debilitating disease. People who work or recreate outdoors could be infected when the disease is present and they don't take a few simple proper protective measures. Supervisors must make sure that their field-going employees understand the nature of the hazard, and that they protect themselves.

Lyme disease was first recognized in 1975 after researchers investigated why unusually large numbers of children were being diagnosed with juvenile rheumatoid arthritis in Lyme, Connecticut and neighboring towns. It was discovered that most of the affected children lived near wooded areas that harbored ticks.

Lyme disease is an infection caused by a bacterium (*Borrelia burgdorferi*) that is carried in the east and Midwest by the deer tick, and in the west by the Western black-legged tick. In early stages the disease causes a skin rash, and sometimes joint pain, chills, fever and fatigue. As it progresses, it affects joints and the nervous system. During early stages of infection, Lyme disease can be successfully treated with antibiotics. If *untreated during the early stages, Lyme disease can cause serious and sometimes disabling disorders.*

Life Cycle of a Tick

After it hatches from the egg, a tick undergoes several growth stages during a two year period:

1. Eggs laid in spring hatch in the summer.
2. Larvae (the size of a newsprint period) lie on the ground, waiting for a host to brush against them.
3. After a blood meal, the larvae drop off and molt into nymphs during the fall.
4. Nymphs (the size of a poppy seed) become active the next spring and attach themselves to another host. After a blood meal, they drop into the leaf litter and molt into adults.
5. Adults (the size of a sesame seed) climb onto edges of grass or leaf tips in the fall, and wait for their next host. After feeding for about a week, adults mate.
6. Adults that don't get their blood meal by the time cold weather arrives go into a dormant stage during the winter. When temperatures get above 40 degrees F, they again look for a host.
7. In the spring, females lay approximately 3,000 eggs under the leaf litter.

The eggs hatch in the summer and the cycle continues...

Transmission of Lyme Disease:

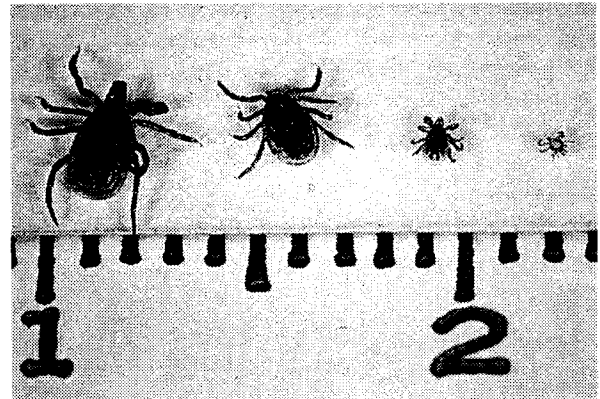


Figure 1: From left to right: The deer tick (*Ixodes scapularis*) adult female, adult male, nymph, and larva on a centimeter scale. (Center for Disease Control)

Tick larvae are not infected when they are born, and will not transmit the disease. Larvae and nymphs become infected when they feed on an infected host. Nymphs and adults can infect hosts if the larva or nymph became infected during its previous life stage. Studies indicate that if an infected nymph feeds on some species of lizard, the bacteria are killed, and the tick will not transmit the disease when it is in the adult stage.

Tick Food and Habitat Preferences:

Larvae and nymphs prefer small mammals, birds, and lizards, but are will feed on larger animals, including humans. Adults prefer to feed on deer, but are willing to substitute other larger mammals, including humans. Nymphs live in leaf mold and on the ground. Nymphs wait on the ground or on the edges of grass leaves. Adults wait on grass or leaves of other vegetation within 3 feet of the ground. When a host brushes by, the tick climbs on the host and looks for a place to attach itself. Once it attaches itself to the host the tick will feed for several days to a week. After it is engorged, it drops off. Larvae and nymphs then wait for the next life stage before they feed again. Adult females develop and lay their eggs, and die.

At-risk Occupations and Employer Responsibilities:

Any occupation that requires outdoor work in an area where Lyme disease is endemic is considered at risk of becoming infected. Employees working in wildland environments may be exposed to ticks carrying Lyme disease. These employees must understand the nature of Lyme disease, how they might be infected, and how they can protect themselves. Employers must provide means for employees to protect themselves, and to get medical attention if exposed to the disease.

Preventing infection

To prevent exposure to infection, people whose work requires them to be in forested, brushy, or grassy areas should do the following to protect themselves from being bitten by ticks:

- Assume that ticks which are infested with *Borrelia burgdorferi* may be present.
- Dress in a manner that prevents ticks from getting on their skin, and that allows them to easily see ticks on the clothing (i. e. light-colored clothing).
- Watch throughout the day for ticks on their clothing and skin, and remove them immediately.
- Avoid placing jackets and other clothing on the ground.
- Check for presence of ticks on their body at the end of the day, and carefully remove them if they occur. (Note: Studies indicate that ticks normally infect a host only after they have been feeding for 36 to 48 hours.)

Protective measures

- Wear boots, light-colored pants, and light-colored long-sleeved shirts. Tuck pants into socks and shirts into pants.
- Keep long hair gathered up or tied back, and covered.
- Use insect repellent containing DEET on exposed skin. (Follow *manufacturer's directions*.)
- Apply DEET or Permethrin (an insecticide) on clothing. (Follow *manufacturer's directions*. *Do not use Permethrin on skin.*)

Removing a tick Do:

- Use a specially designed tick removal tool, or fine pointed precision tweezers.
- Grasp the head or mouth. Gently and firmly pull outward.
- Clean the bite wound with disinfectant.
- Get medical assistance to remove ticks if they are difficult to access, if you do not have the proper tool, or if you are not confident you can do it properly.
- Save the tick to assist in diagnosis if problems develop.

Do not:

- Grasp the tick by the body.
- Twist the tick.
- Apply oil, petroleum jelly, alcohol, heat, or other irritants.
- Try removing ticks without proper tools.
- Try to remove ticks that are difficult for you to see or reach.

Symptoms

The most common early symptom of Lyme disease is an expanding rash. A rash occurs in 80 to 90% of infections. The rash is solid red or a series of red rings (Figure 2). It expands to a diameter ranging from 2 to 24 inches. On dark-skinned people, the rash may look like a dark bruise. The rash appears 3 to 30 days after infection occurs, and lasts for 3 to 5 weeks. The rash is usually not painful or itchy. Other symptoms which may occur around the time the rash occurs are: swelling of lymph glands, headache, joint pains, chills, fever, and fatigue. Sometimes these symptoms may be intermittent and mild. Severe, potentially debilitating symptoms can occur weeks, months, or even years after being bitten by an infected tick. Such symptoms include, severe headaches, painful arthritis, cardiac abnormalities and cognitive (mental) disorders.



Figure 2 A circular rash is symptomatic of Lyme disease. Photo courtesy American Lyme Disease Foundation, Inc.

Treatment

Lyme disease is easily treated with antibiotics, and almost always cured when it is treated during the early stages of infection. Treatment within the first 3 weeks of infection is straightforward and almost always successful. The cure rate decreases the longer treatment is delayed. Generally, Lyme disease can be effectively treated in its later stages, but symptoms may linger for

months or years following treatment. In rare instances, Lyme disease causes permanent damage. Get medical assistance in removing ticks that are not easy to access, or those that have attached themselves long enough to engorge and enlarge. See a physician immediately if an expanding rash occurs near a tick bite; or if joint pain, chills, fever or fatigue occur after incurring a tick bite. Diagnosis can be complicated so choose a physician who understands current methods of diagnosing and treating Lyme disease.

Lyme disease vaccine

Employees should consult with their physician to determine if the vaccine is appropriate for them, and whether they want to request the vaccination series. The vaccine is given in a series of 3 shots, starting with the initial visit. The second shot occurs at 1 month, and the third at 6 to 12 months after the initial shot. Studies indicate that the vaccine is 80% effective after all 3 shots, and 50% effective after 2 shots. Although data are not yet conclusive, it is anticipated that boosters in subsequent years will be needed on an annual basis. Undesirable side effects of the vaccine may occur. The vaccine may not be effective in providing immunity for all strains of Lyme disease and is not effective in providing immunity for other major diseases which ticks may carry

Conclusions and Recommendations

Employees working outdoors may be exposed to ticks that could transmit Lyme disease and other diseases. These employees should:

- ?? Dress in a manner that prevents ticks from attaching to their skin and allows the employee to easily see ticks on their clothing.
- ?? Check their bodies for presence of ticks at the end of the day.

- ?? Know how to recognize and remove ticks and understand symptoms of infection.
- ?? Report all tick bites to their supervisor.
- ?? Get medical treatment if they have difficulty removing a tick; if the tick is damaged or squeezed during removal, or, if they experience symptoms of Lyme disease infection.
- ?? Understand that a Lyme disease vaccination is available to them but vaccination is not a substitute for preventing exposure to tick bites.

Additional information about Lyme disease is available on the internet from organizations such as the American Lyme Disease Foundation, Inc. <www.aldf.com> and The Lyme Disease Network of NJ, Inc. <www.lymenet.org/>. Information is also available from The Centers For Disease Control, The Occupational Safety and Health Administration, and local public health agencies.

Sources:

Reim, J.; Hollars D., 2001. The Trouble with Ticks