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# LYME DISEASE

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Lyme disease was first diagnosed in the United States in 1982 and is now widespread on the Eastern Seaboard. In Idaho, about one case was reported in 1988 and 42 cases were reported in 1989. Reporting Lyme disease in Idaho is voluntary, so the number of actual cases may be higher. Fewer cases have been reported in the western states than in the East, but western reports are increasing and may increase further as reporting becomes more prevalent. The distribution of cases in Idaho is statewide and fairly uniform.

The cause of Lyme disease is known to the scientific world as *Borrelia burgdorferi*, a corkscrew-shaped bacterium (spirochete) similar to the organism that causes syphilis. These bacteria generally live in rodents and other animals.

Lyme disease is a threat in Idaho because the bacterium that causes the disease is transmitted from animal to animal by ticks. The "vector" or carrier of Lyme disease in the eastern U.S. is the deer tick, *Ixodes dammini*, which does not occur in Idaho. The suspected vectors in Idaho also are ticks belonging to the genus *Ixodes*. *Ixodes* ticks are usually not abundant in Idaho, but local populations may be high. The Rocky Mountain wood tick and the common winter tick appear not to be carriers. Their digestive systems seem to have a barrier that excludes the disease-causing bacterium.

## History of Lyme Disease

More than 50 people in Old Lyme, Connecticut, many of them children, developed a mysterious disease in 1975 that resulted in severe inflammatory arthritis. The cause of the disease and its mode of transmission were eventually identified, and the disease was named Lyme disease after the town. This disease had been reported in Wisconsin in 1970 and in Europe during the early

1900s, but the cause was unknown until the Connecticut outbreak.

The number of reported cases of Lyme disease and its geographic distribution have been increasing. From 1975 to 1979, 512 cases were reported from 14 states. In 1984, 1,498 cases were reported from 24 states. By 1988, Lyme disease had been reported in 32 states. As with many "new" diseases, the initial burst of reported cases appears to reflect both an actual increase in the number of cases and an increased awareness of the disease resulting in physicians and patients being better able to recognize its symptoms.

The national Centers for Disease Control now report an average of 1,500 cases per year. The majority (86 percent) of the cases are concentrated in three areas: the northeastern and mid-Atlantic states, Minnesota and Wisconsin, and California and Oregon. Lyme disease has reached epidemic proportions, and if it were not for AIDS, Lyme disease might be the most important "new" infectious disease.

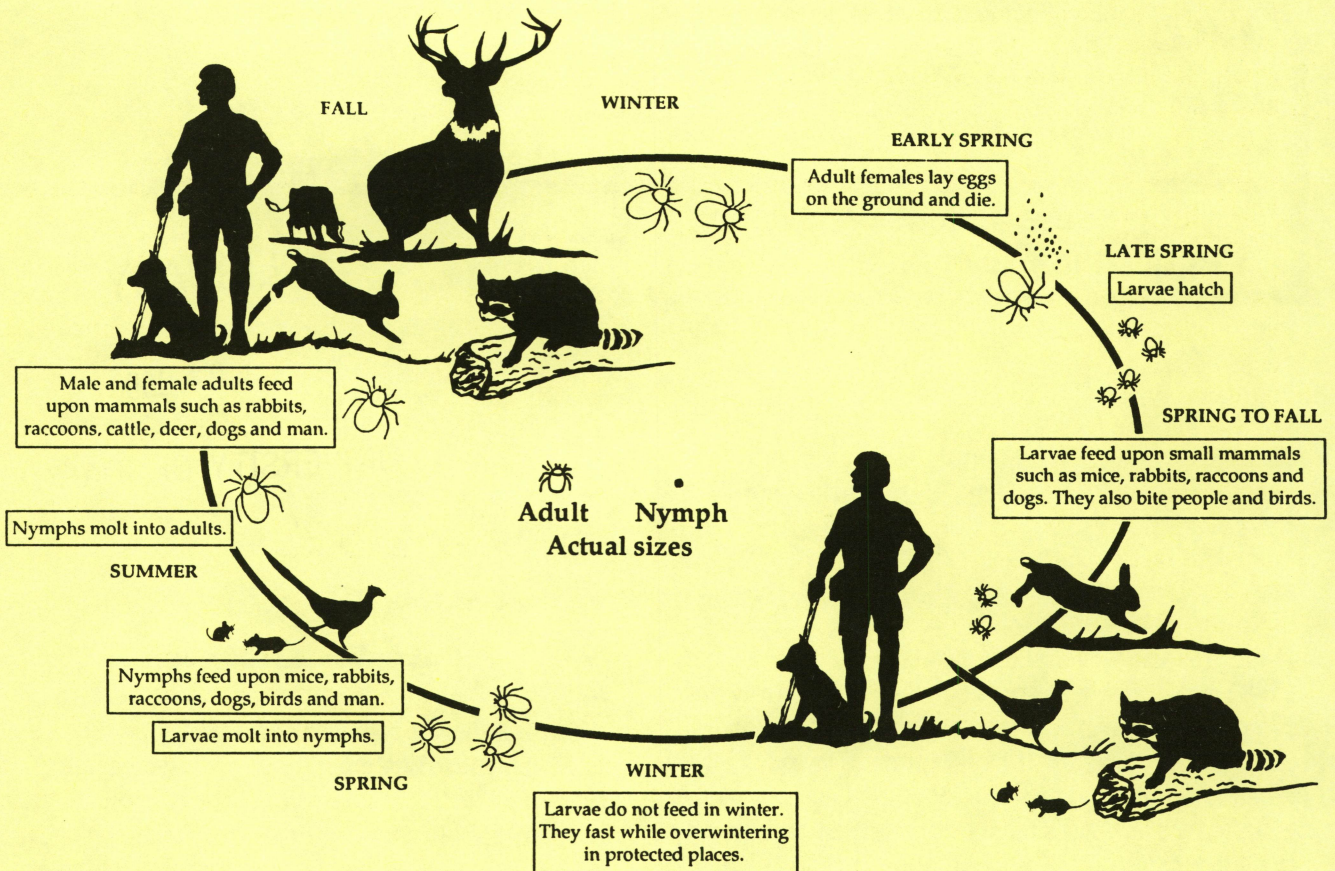
## Symptoms

Lyme disease is a complex illness with three major stages. The initial, acute stage occurs a week to 10 days after the infectious tick bite. It consists of flu-like symptoms (fever, chills, aches, malaise) accompanied by an expanding, circular "bull's-eye" rash at the site of the bite. Often, the tick bite and the rash go unnoticed due to skin coloration or obscure bite location such as the scalp. Thus, treatment with antibiotics, which is usually effective at this stage, may not be given. The illness may be passed off as "just a touch of flu," setting the stage for chronic symptoms later.

The second stage may appear weeks or months after the initial illness, with multiple rashes, dizziness, heart



## Two-Year Life Cycle of *Ixodes* Ticks



or nervous system abnormalities and bouts of arthritis, usually in major joints such as the elbows or knees. The third stage of Lyme disease may affect the central nervous system, causing behavioral changes, mood changes and memory loss months or even years after infection.

### Diagnosis

Diagnosis of Lyme disease is based primarily on clinical findings and history of a tick bite. A tick bite producing the characteristic "bull's-eye" red rash is diagnostic of Lyme disease; however, many individuals never show this symptom. Diagnosis of Lyme disease in later stages is often very difficult. The patient may not remember the exposure to the tick. Also, Lyme disease symptoms mimic those of many other diseases. A correct and timely diagnosis depends in large part on the patient informing the physician of any known or potential exposure to ticks.

Blood tests to detect increased levels of antibodies to the spirochete bacteria are available. The most common tests are the immunofluorescence assay (IFA) and the enzyme-linked immunosorbent assay (ELISA). These tests are able to detect increased antibody levels in the later stages of Lyme disease; however, in early stages of the disease 60 percent of test results are false negatives (a negative test result when the patient actu-

ally is infected). Therefore, most diagnoses are based on patient symptoms and history of exposure to the tick.

### Treatment

Because Lyme disease is caused by a bacterium, it can be treated with antibiotics. Antibiotics normally prescribed include penicillin, tetracycline and erythromycin. The earlier Lyme disease is detected, the easier it is to treat. Difficulties in treatment often arise during the later stages of the disease.

### Tick Life Cycle

*Ixodes* ticks are small, brown, hard ticks. They occur in three stages: larva, nymph and adult. The adult female when fully engorged with a blood meal is roughly the size of a pea and has a dark brown to gray abdomen. The larval and nymphal ticks are about the size of the period at the end of this sentence.

*Ixodes* ticks have a complicated life cycle that spans 2 years and involves three stages. In late winter or early spring the adult female lays eggs and then dies. She deposits her eggs near the ground in brushy locations or in tall grass at the edges of wooded areas. Small larvae, about the diameter of a pinhead, emerge from the eggs in late summer (July-September) and begin their search for a host. They generally are not yet infected with the Lyme disease bacteria. They may become in-



ected if they feed upon infected hosts. Their most common hosts are mice, but chipmunks, squirrels, other small mammals, humans and birds may also serve as hosts. The larvae remain attached to the host for 2 to 4 days.

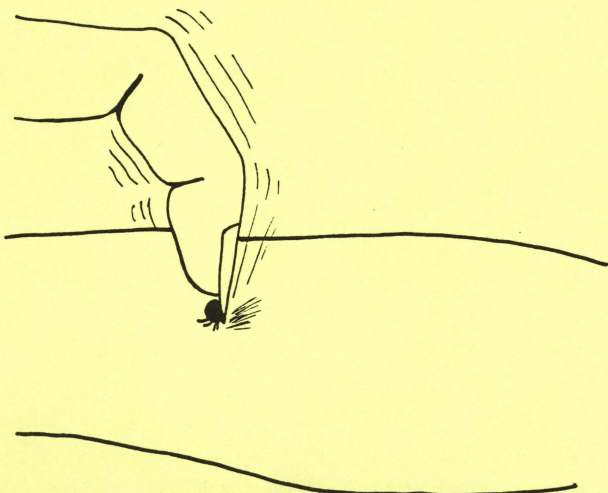
In fall the larvae drop off their hosts and enter a resting stage. They overwinter without feeding and in spring and early summer molt into nymphs and seek new hosts. Nymphs, which are a little larger than a pinhead, commonly attach to mice, other small mammals, humans and birds. Infected nymphs can transmit the Lyme disease bacteria to new hosts. This is the stage at which humans commonly become infected. After 3 to 4 days of feeding, the nymphs fall off their hosts and molt into adults. If dislodged while feeding, a nymph will seek another host.

Adult ticks are found in brushy vegetation approximately 3 feet off the ground. During fall and early winter, adult ticks attach to any warm-blooded animal host. Deer are the most common hosts, probably because of their large size and abundance in areas where ticks are common. Because adult ticks are usually 3 feet off the ground, animals smaller than deer are less likely to serve as hosts. Some less common hosts include foxes, raccoons, dogs and occasionally people.

Ticks attach to a host when it brushes against them. Female ticks feed on the host, drop to the ground and lay eggs, and the cycle begins again.

## Prevention

Knowing when and where Lyme disease is most likely to occur will reduce the risk of infection. The majority of Lyme disease cases occur between March and October, months when ticks are active in the northern states. Peak numbers of cases are reported in June, July and August. This peak coincides with the period when



Remove a feeding tick by working your nail under its head and slowly lifting it out.

nymphs are attaching to hosts and people are spending the most time outdoors. Although humans can be infected by ticks at any life-history stage, they are most frequently infected by nymphs.

The best way to prevent Lyme disease is to avoid the fields and woods, particularly brushy areas, where ticks and their hosts reside. However, this is not a suitable solution for many people. Even people who do keep out of tick country may have dogs, cats or other pets that bring home ticks. Those ticks can drop off pets and onto people. Furthermore, your pets can come down with Lyme disease.

A minimum 24 hours of tick attachment and feeding must occur for ticks to transmit Lyme disease. If ticks are promptly removed, the disease can be prevented. Remove a feeding tick by grasping the tick as close to its head as possible with tweezers and pulling with firm and steady pressure until the tick comes out. If you do not have tweezers, wedge your fingernail beside and under the tick and slowly lift it out. After removing the tick, wash your hands and the bite with soap and water and apply an antiseptic.

The following precautions will reduce your risk of infection when outdoors in tick habitat:

- Wear long pants, long-sleeved shirt, hat, socks and closed shoes.
- Tie shut the bottoms of pant legs or pull socks over pant legs.
- Wear light-colored clothing that will help you spot the dark ticks.
- Spray clothing with a commercial insect/tick repellent. Some people react to repellents, so use them sparingly, especially on children. Common repellents containing the active ingredient DEET (N,N-diethyl-meta-toluamide) in concentrations of 35 percent or less are recommended but may cause adverse reactions in some individuals. Follow label instructions. If symptoms occur from use of repellents contact your doctor or a poison control center.
- Put tick repellent collars on pets.

After returning from walking in woods or grassy areas where ticks may be present:

- Remove and wash clothing immediately.
- Shower and inspect your body for ticks. Areas such as the scalp and armpits are difficult to examine but may be preferred sites for tick attachment.
- Inspect children and pets for ticks.

Several insecticides may be used to control ticks in yards and playgrounds. However, tick control chemicals for this use usually are not recommended because



children, pets and other animals can easily move ticks into the treated area after treatment. The treatment can give you false security. When outdoors in tick areas, even treated ones, always check yourself and your children for ticks.

### **Precautions During Pregnancy**

Pregnant women infected with Lyme disease may pass the disease to their unborn child. The Lyme disease bacteria can cross the placenta and enter the developing fetus. Studies are being conducted to determine what effects Lyme disease has on both the outcome of the pregnancy and the development of the child. Although the data are inconclusive, preliminary results suggest that women infected with Lyme disease during pregnancy are more likely to miscarry, have a still birth or bear a child with developmental disabilities. If possible, pregnant women should avoid tick-infested areas. If bitten by a tick, they should contact their physician immediately.

### **Livestock Hosts**

Both cattle and horses may become infected with Lyme disease. In cattle, Lyme disease can be transmit-

ted directly from cow to cow through infected urine, and pregnant cows may pass the bacteria to their unborn calves. In dairy herds where animals are in close contact, entire herds are often infected. The clinical signs of Lyme disease in cattle and horses include fever, lameness and arthritis. Diagnosis is based primarily on clinical signs, history of exposure to *Ixodes* ticks or membership in a herd with infected animals. The disease is treated primarily with penicillin.

Tick specimens can be preserved in alcohol for identification. If you have a tick (especially one that has attached to a person) please contact your local district health department or the Idaho vector control specialist at (208) 334-5879 for identification of the specimen.

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