



# LYME DISEASE

Other names: *Borrelia burgdorferi*



## CAUSE

Lyme disease is caused by a spirochete bacteria (*Borrelia burgdorferi*) that is transmitted through the bite from an infected arthropod vector, the black-legged or deer tick (*Ixodes scapularis*).

## SIGNIFICANCE

Lyme disease can infect people and some species of domestic animals (cats, dogs, horses, and cattle) causing mild to severe illness. Although wildlife can be infected by the bacteria, it typically does not cause illness in them.

## TRANSMISSION

The bacteria has been observed in the blood of a number of wildlife species including several bird species but rarely appears to cause illness in these species. White-footed mice, eastern chipmunks, and shrews serve as the primary natural reservoirs for Lyme disease in eastern and central parts of North America. Other species appear to have low competencies as reservoirs for the bacteria.

The transmission of Lyme disease is relatively convoluted due to the complex life cycle of the black-legged tick. This tick has multiple developmental stages and requires three hosts during its life cycle. The life cycle begins with the eggs of the ticks that are laid in the spring and from which larval ticks emerge. Larval ticks do not initially carry *Borrelia burgdorferi*, the bacteria must be acquired from their hosts they feed upon that are carriers of the bacteria. Through the summer the larval ticks feed on the blood of their first host, typically small mammals and birds. It is at this point where ticks may first acquire *Borrelia burgdorferi*. In the fall the larval ticks develop into nymphs and hibernate through the winter. Tick nymphs emerge the following spring and resume feeding on their second host in the spring or summer. It is during this time that the risk for hosts (including humans and domestic animals) to be infected with Lyme disease is greatest, but it also provides a second opportunity for the ticks to acquire the bacteria. In the fall nymphs mature into adults while they feed on their third and final host, which provides an additional chance for these ticks to transmit the bacteria to new hosts (including humans and domestic animals). Adults hibernate during the winter and females lay their eggs in the spring.

Temperature strongly influences the life cycle and prevalence of black-legged ticks. Climate change may therefore increase the prevalence of Lyme disease by potentially expanding the range of black-legged ticks, decreasing the length of winters and thus increasing their activity period and the time period during which people may be infected.

## CLINICAL SIGNS

The classic symptom of Lyme disease, the erythema migrans (bullseye) rash occurs in 70-80% of infected individuals. Many of the initial human symptoms are broad ranging and are often ambiguous (e.g. fever, chills, fatigue, muscle and joint aches, etc.). As a result, Lyme disease is frequently dismissed as the flu. More severe symptoms can arise at later stages of infection, including: arthritis and swelling in the joints, facial palsy, nerve pain, short-term memory problems, heart palpitations, inflammation of the brain and spinal cord, and severe headaches and stiff neck. If left untreated the disease can develop into chronic Lyme disease and may lead to serious complications.

## MANAGEMENT AND PREVENTION

Prevention is the best medicine when it comes to Lyme disease and many simple methods exist to reduce the risk of being infected through tick bites. Medical treatments also exist that can effectively manage the disease. Research continues into the development of an effective new vaccine for people.

- The CDC recommends the use of insect repellents containing 20-30% DEET, picaridin, or IR3535 to avoid transmission through tick bites.
- Wear light coloured, full length pants and shirts, and long socks in order to prevent tick bites and aid in locating any ticks you may acquire. Remove any attached ticks as quickly as possible using fine-tipped tweezers.
- Vaccinate domestic animals.
- Protect your pets by taking measures to prevent tick bites and prevent interactions with wildlife.
- Contact physician or veterinarian if a person or domestic animal are suspected of being infected with Lyme disease. The disease can be treated with antibiotics and early treatment is often the most effective.
- Report any sick or dead animals to the Canadian Wildlife Health Cooperative. Find your closest regional centre at: <http://www.cwhc-rccsf.ca/>

## SUGGESTED READING

- <http://blog.healthywildlife.ca/ontario-research-on-the-blacklegged-tick-and-lyme-disease/>
- <http://blog.healthywildlife.ca/rapid-spread-of-lyme-disease-a-risk-in-canada/>
- <http://blog.healthywildlife.ca/ghostbusters-no-tickbusters/>
- [http://www.cfsph.iastate.edu/FastFacts/pdfs/lyme\\_disease\\_F.pdf](http://www.cfsph.iastate.edu/FastFacts/pdfs/lyme_disease_F.pdf)
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