



Lyme disease

(*Borrelia burgdorferi*)

in Alberta

Common name

lyme disease, lyme borreliosis, juvenile arthritis, erythema chronicum migrans

Scientific name

a spirochaete bacterium,
Borrelia burgdorferi

What's Bugging Wild Critters?

Fact sheet #12:
Lyme Disease

Significance

Lyme disease can cause debilitating chronic disease in people and occasionally livestock and dogs. Although the bacterium is common in wildlife, the disease is rare.

What? Where? How?

An outbreak of a mysterious disease associated with arthritis in young people occurred in and around the town of Lyme, Connecticut in the 1970s. Intense medical investigations in the 1980s and 90s identified *Borrelia burgdorferi* as the agent and ticks as the vector, and the disease was called Lyme disease. It is now considered the most common disease transmitted to people by ticks and occurs around the world in North America, Europe, Scandinavia, and Asia. The bacteria can survive in a wide range of wild mammals and birds, with subsequent spillover through infected ticks into humans and domestic animals.

Infections in wildlife rarely involve any clinical signs. In contrast, fever, stiffness, lameness, and arthritis can occur in dogs, cats, horses, and cattle. Many infections of *B. burgdorferi* in humans occur without clinical signs. However, people who develop Lyme disease may have damage to the skin, heart, joints, and nervous system, resulting in long-term illness but rarely death. A "bull's-eye" skin rash develops in 60%-80% of the people with clinical disease.

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This involves a pinpoint red spot where the tick bite occurred in the centre of a clear white area with an expanding red circular ring around it. Other nonspecific early symptoms can include fever, nausea, vomiting, and pain in the joints. Long-term serious neurologic complications can include headaches, stiff neck, paralysis of facial nerves, encephalitis, meningitis, inflammation of eye tissues, pain in the limbs, and changes in behaviour. In some people, the disease causes irregular heartbeat. Pain in swollen muscles and in the joints occurs in over half of untreated cases. Untreated cases may result also in chronic neurologic conditions and arthritis, particularly in the knees, for many years.

Transmission Cycle

Survival and spread of *B. burgdorferi* depends on the biology and availability of suitable tick vectors. Ticks are the only means by which the bacteria can move from one habitat (wild animal) to another. Two species, *Ixodes scapularis* in the east and *Ixodes pacificus* on the west coast, are particularly well suited to the task because they have three blood-feeding stages in their lives and, more importantly, each stage has evolved to feed on different wild mammals. Thus the bacteria can be picked up by one stage and passed to a different

individual or group of mammals by the next stage!

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All ticks have four distinct life stages: egg, larva, nymph, and adult. As larvae and nymphs, *I. scapularis* and *I. pacificus* feed mainly on small mammals, usually white-footed and deer mice but also other mice, voles, squirrels, and chipmunks. Adult ticks tend to feed on a variety of large mammals, especially deer, but also raccoons, foxes, dogs, and people.

Distribution in Alberta

Limited surveys of ticks in Alberta have not found *B. burgdorferi*, and the two primary tick species that transmit Lyme disease to humans (see above) do not live in Alberta. Fortunately, the most common tick in Alberta (the one found on moose) does not provide suitable habitat for the bacteria and thus is not a public health concern. There are people in Alberta who have Lyme disease; however, public health officials have been unable to confirm that any of these cases resulted from infection within Alberta. Similarly, cases of Lyme disease in hunting dogs involve dogs that have spent time outside Alberta in places where the bacteria are known to occur.

Importance for Wildlife Management

To date, indications are that *B. burgdorferi* does not cause clinical disease nor significantly influence the survival or reproductive success of infected wildlife. Similarly, as far as we know it does not affect the ticks.

Public Significance

Lyme disease is one of the most common diseases transferred from wildlife to humans in North America. Although the current public health risk in Alberta is low, the risk in other parts of North America is significant. Areas of particular concern in the

U.S. include the northeast and mid-Atlantic regions (especially New York and Pennsylvania) and the Midwest region (especially Wisconsin and Minnesota). In Canada, infected ticks have been found in British Columbia and the extreme southern tip of Ontario. Note that ticks which occur in the foothills of Alberta during the spring are not suitable habitat for Lyme disease. The consequence of contracting the disease can be a chronic painful condition, with significant changes in various tissues and organs.

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Prevention/Control

Public awareness is the most important factor in reducing risk of infection in humans. It is important to find out whether you live in an area that poses significant risk. Currently, such areas do not occur in Alberta. However, regardless of where you live, you should avoid areas heavily infected with ticks. If walking in such areas, tuck your pant legs into your socks or boots and use insect repellents that contain DEET or permethrin. Conduct a tick search of you and your dog after walking in a natural area with abundant ticks. Pay particular attention to hairy areas. This may mean considerable time spent checking your dog and you may need help checking in some of your own hairy areas!

Even in areas where Lyme disease is common, there are lots of uninfected ticks. However, early removal of any ticks found attached to people is always a good idea—so long as it is done the right way. Removal should NOT be done by squeezing the large part of the tick. By squeezing its abdomen you may end up injecting yourself if bacteria are forced through the tick's mouthparts and into you!

The proper way to remove a tick is to use tweezers to gently hold the tick where the mouthparts enter the skin. Slowly pull out away from the skin and let the tick pull out its mouthparts. A quick pull often results in leaving mouthparts embedded in the skin and this can lead to a festering sore. If possible, save the tick (preferably in alcohol) and, in the event that illness occurs, you can provide it to the physician. Watch the bite site and if you develop flu-like symptoms, sore muscles or joints, or an expanding bull's-eye rash, consult your doctor. Don't forget to take the tick!

In heavily infected areas, pesticides can be used to control ticks. However, there are negative aspects to the use of pesticides and any application must be done according to label instructions and in a manner that minimizes mortality of nontarget species.



Summary

Currently, Lyme disease is not a significant health risk in Alberta. However, those who travel should be aware of the potential risk in other areas. It is caused by a bacterium that may be carried in ticks that occur in specific areas of North America. Although many people do not exhibit any clinical signs, the disease can involve anything from a few symptoms through to extensive neurologic damage, irregular heartbeats, muscle pains and lasting arthritis.

Additional Information

Parasitic Diseases of Wild Mammals, Second Edition. Edited by William M. Samuel, Margo J. Pybus and A. Alan Kocan. 2001. Chapter 4 - Ticks.

Government of Alberta Health and Wellness: <http://www.health.gov.ab.ca/public/diseases/index.html>

Canadian Lyme Disease Foundation: <http://www.canlyme.com/>

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For more information on wildlife diseases in Alberta: <http://www3.gov.ab.ca/srd/fw/diseases/index.html>