

# Lyme Disease & Ticks

For Pet Owners



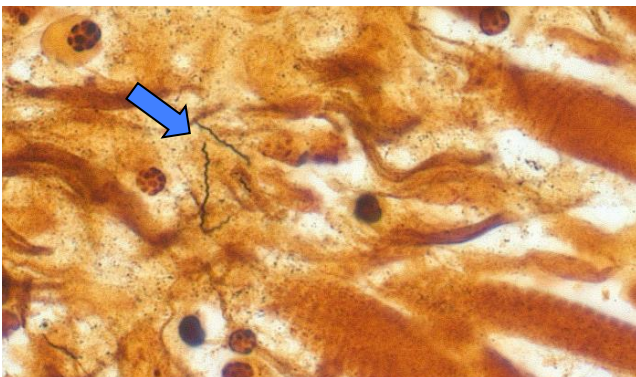
## What is Lyme Disease?

Lyme disease is a bacterial infection, caused by *Borrelia burgdorferi*, that can develop when an animal or person is bitten by an infected tick. It can cause a wide range of problems, but most dogs that are exposed to the bacterium never get sick.

When disease does occur in a dog, it happens after a long incubation period, typically a few months after being infected via a tick bite. Therefore, Lyme disease may need to be considered during times of the year when ticks are not active (e.g. in the winter in temperate regions).

Fever, lameness, stiffness and swollen joints are common in dogs with Lyme disease. Enlarged lymph nodes, lethargy and decreased appetite may also develop.

In a small percentage of infected dogs, kidney disease may also occur, resulting in a condition in which the kidneys 'leak' protein into the urine. The medical term for this is *protein-losing glomerulopathy*.



Photomicrograph of several *Borrelia burgdorferi* spirochetes (arrow) in heart tissue (magnification 158X) (PHIL 16517)

## What are ticks?

Ticks are small parasites that survive by feeding off the blood of different types of animals, including people. Adult ticks have eight legs and belong to the same family as spiders (i.e. they are arachnids, not insects). There are many different types of ticks, and ticks often have preferences for certain species of animals. Ticks themselves are a nuisance, but not a health concern. However, some ticks are able to transmit certain infectious diseases.

## Does the type of tick matter?

YES. Different ticks transmit different bacteria and viruses. *Borrelia burgdorferi*, the cause of Lyme disease, is only transmitted by *Ixodes ticks*. *Ixodes scapularis* and *Ixodes pacificus*, the eastern and western black-legged ticks (sometimes referred to incorrectly as "deer ticks") are the most common source of *B. burgdorferi*.

Like other ticks, *Ixodes* ticks go through four life-stages: egg, larva, nymph and adult. This life cycle takes two years to complete and each life stage occurs on a different animal (also called a host). Eggs are laid on the ground by adult ticks. These eggs hatch into larvae, which feed on small mammals (e.g. rodents) and birds throughout the summer and fall. After dropping off into the environment, they then go dormant until the next spring, when they mature into nymphs. Larvae and nymphs are very tiny - about the size of a pinhead (<2 mm).

Nymphs also feed on small mammals and birds, and subsequently "molt" into adults in the fall. Adults then feed on deer and other larger mammals, including dogs (and people). Adult ticks are a little larger, but are still quite tiny (~3 mm), but they can get quite fat after feeding (~10 mm).

Ticks usually become infected with *B. burgdorferi* as larvae or nymphs when they feed on infected small mammals, particularly mice. The bacterium stays in the tick as it matures, and can then be transmitted to animals during subsequent feeding.



Female blacklegged ticks in various stages of feeding (Public Health Agency of Canada)

## Where are ticks found?

Ticks can be found in many regions of the world. In Canada and the United States, the high-risk areas for *Ixodes scapularis* are in the northeastern US, west of the Great Lakes in the US extending into southern Manitoba, the north shores of Lake Erie and Ontario. Tick ranges are expanding and ticks can sometimes be found outside of their normal ranges. In some areas such as the north shore of Lake Ontario, ticks were very rarely found only a few years ago and are now very common.

## How do ticks transmit diseases?

Ticks can transmit bacteria during feeding. When they have attached to an animal or person, they eventually begin to feed and in the process they can pass bacteria into their host's bloodstream. *This is a slow process.* It takes 24-48 hours (or more) for ticks to pass on *Borrelia burgdorferi* to their host.



A blacklegged tick, *Ixodes scapularis*, "questing" on a blade of grass in search of a host (PHIL 14473)

## How do I protect my dog from Lyme disease?

There are four main ways to reduce the risk of Lyme disease:

- 1) Reduce tick exposure
- 2) Check for, and promptly remove, ticks
- 3) Use tick preventive medications
- 4) Vaccinate your dog against Lyme disease

### 1) Reducing tick exposure

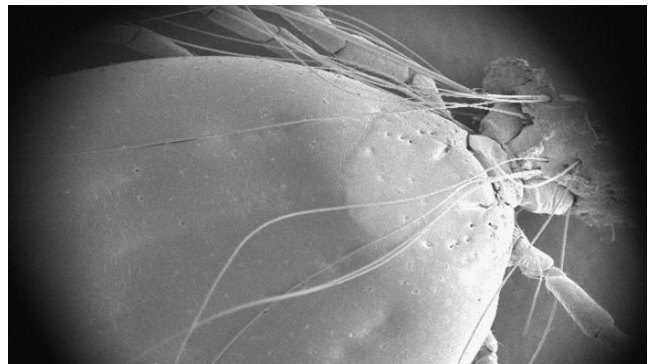
Keep the grass on your property cut and remove piles of branches, leaves and similar materials to help make your yard less tick-friendly. Taking steps to avoid attracting deer (e.g. removing plants that deer like to eat) can also be useful.

Knowing what areas near your home or cottage are more heavily infested with ticks can help you decide where to walk your dog. It is best to avoid

letting your dog roam off-leash in woodlands where deer and ticks are present.

### 2a) Tick checks

Get into the habit of regularly checking your dog (and yourself!) for ticks. If your dog commonly ventures into areas where ticks may be present, tick checks should be done every day during tick season. It isn't hard to do, in fact it's just like petting your dog, except you want to make sure you cover every part of the dog and feel for little bumps. Pay extra attention to sites where ticks may hide, such as around the ears, between the toes, under the armpits and around the tail. Also pay close attention to the head, since dogs explore with their noses and may stick their heads into tick-rich sites.



Scanning electron micrograph of an engorged female tick that was removed from a cat; note the piece of skin with some of the cat's fur in which the mouth parts are still embedded (PHIL 9972)

### 2b) Removing ticks

Using fine forceps (tweezers) gently grasp the tick as close to the skin as possible. With gentle, slow, steady pressure, the tick can be pulled off. Care should be taken not to crush the tick to reduce the risk of contaminating the hands of the person removing the tick, leaving the tick's head or mouthparts in the skin (which can be very irritating), or increasing the chance that *B. burgdorferi* will be "pushed" into the dog as the tick is removed. Gloves should be worn to protect the hands in case the tick's body breaks open during removal. Hands should be washed or an alcohol hand sanitizer used after glove removal or any direct contact with ticks.

Topical insecticides (e.g. pyrethroids or pyrethrin spray) can also be used to kill ticks, particularly if there are a large number present. These should be obtained from your veterinarian. Never use insecticides on a cat without the advice of your veterinarian. Some products, such as

permethrin, are useful in dogs but are highly toxic to cats. Many different types of flea and tick collars are available over the counter (e.g. at pet or grocery stores), but these are associated with deaths of hundreds of cats in Canada every year.

It is also useful to determine what type of tick was present because of the different disease risks associated with different tick species. Some public health units (e.g. Niagara) offer a tick identification service, and your veterinarian should also be able to submit the tick to a diagnostic lab for identification.

### 3) Tick preventives

A variety of tick preventive medications are available. These work by killing ticks that have attached to a pet and started feeding. They can kill ticks within a short period of time, so the ticks die and drop off before they are able to transmit *B. burgdorferi*. Some products also have tick repellent activity (e.g. products containing permethrin).

#### I check my dog for ticks regularly.

##### Should I use a tick preventive?

If you are in an area where ticks are common, if your dog's haircoat or behaviour make thorough tick checks difficult, and/or you regularly visit areas where ticks congregate, then a tick preventive is probably a good idea. You should talk to your veterinarian about the risk of tick exposure, the risk of Lyme disease and available preventives.



An adult female *Ixodes pacificus*, another tick species that can transmit *Borrelia burgdorferi* as well as *Anaplasma* (PHIL 8686)

### A tick was on my dog...

#### Can the tick be tested for *B. burgdorferi*?

Technically, the tick can be tested. However, it is not recommended for a variety of reasons. The presence of the *B. burgdorferi* in the tick does not mean the dog was exposed. The tick must feed on the dog for 24-48 hours for the bacterium to be transmitted. Further, dogs are often exposed to the bacterium but uncommonly develop disease. In most cases the dog's immune system fights off the bacterium, with the bacterium being eliminated or at least suppressed in the body, and nothing bad happens.

If tick testing is done and the tick tests positive for *B. burgdorferi*, there is still no indication to treat your dog. Therefore, it makes no sense to test the tick. It's also important to remember that ticks can harbor lots of different *Borrelia* species - if a test cannot tell *B. burgdorferi* from harmless *Borrelia* (which is a problem with some tests that are currently available), then the test results can be misleading.

#### Can my dog be tested for *B. burgdorferi*?

Your dog *can* be tested but it is typically not useful. If the tick you saw infected your dog, your dog would still not test positive for a month or longer, until antibodies against *B. burgdorferi* can be detected. A negative result would not mean that your dog was not infected. A positive result would have to have been from a previous exposure. Even if you dog is positive, if your dog is healthy, treatment is not indicated, as discussed in the next section. The main reason testing could be considered is to provide a baseline value to compare with in case your dog develops signs of disease later, something that is unlikely.

### My dog tested positive for Lyme disease on its heartworm test. What do I do?

Some heartworm tests also include a test for *B. burgdorferi* antibodies. A positive result indicates that the dog has been exposed to the bacterium and made antibodies against it. That's what the body is supposed to do when it encounters an invader. It does not mean the dog is sick with Lyme disease or will ever get sick.

If your dog is healthy, the typical recommendation is to do nothing. Sometimes a urine test is performed to make sure there are no signs of

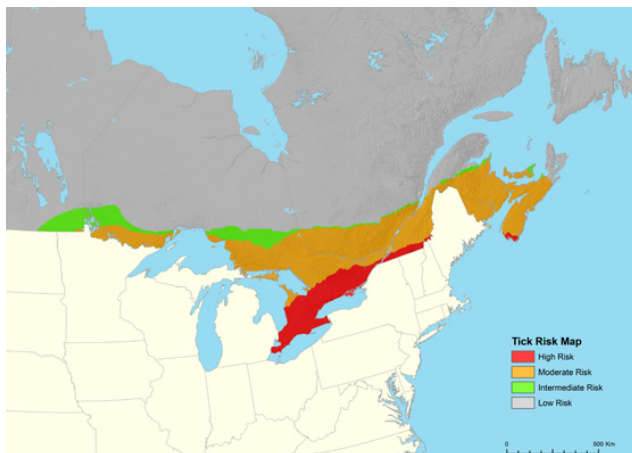
kidney disease due to Lyme (Lyme nephropathy). If your dog has signs of illness that could be Lyme disease, then treatment might be required.

### How is Lyme disease treated?

Antibiotics are used to kill the *B. burgdorferi* bacterium. Usually, dogs with Lyme disease are treated for about a month. Treatment usually results in improvement of clinical signs, and most of the time there are no long-term problems. However, antibiotics do not necessarily completely rid the body of the bacterium, and sometimes illness can reoccur.

### I've never seen a tick on my dog, and I've been told there aren't any black-legged ticks where I live, so I don't have to worry. Right?

Unfortunately, this is not necessarily true. Ticks are expanding their geographic range and they are now becoming established in some areas that they were rarely or never seen only a few years ago.



Areas predicted to be at risk for becoming Lyme endemic areas in eastern and central Canada (Public Health Agency of Canada)

### What about vaccination?

Vaccines to prevent Lyme disease in dogs are available. These are not 100% effective and are not a replacement for measures to reduce tick exposure. They should be considered a back-up only, just in case your dog still gets exposed, despite your best efforts to reduce exposure, do tick-checks and use tick preventatives. If Lyme disease occurs in your area and your dog's lifestyle is such that exposure to ticks is likely, you should discuss vaccination with your veterinarian.

### Can my dog give me Lyme disease?

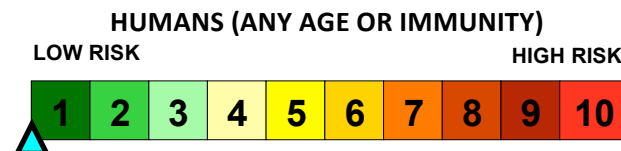


No. Dogs and people are exposed the same way, from being bitten by infected ticks. Infected dogs pose no risk to people.

A classic "bull's-eye" rash, which is seen in about 80% of Lyme disease cases in people following a bite from an infected tick. The rash is not seen in dogs and cats. (PHIL 9875)

### What Is The Risk?

The risk of disease to humans, regardless of their age or immune status, posed by *B. burgdorferi* in pets is:



**HOWEVER** people can be exposed to *B. burgdorferi* in the same way pets are, therefore Lyme disease in a dog should serve as a warning signal to people who live in and visit the same areas (e.g. fields, wooded areas) as the affected animal that they too could be exposed. Tick avoidance and tick checks are equally important for people in these situations.

### Additional information and image sources:

Public Health Agency of Canada

<http://www.phac-aspc.gc.ca/id-mi/tickinfo-eng.php>

Centers for Disease Control & Prevention (US)

<http://www.cdc.gov/lyme/>

CDC Public Health Image Library

<http://phil.cdc.gov/phil/home.asp>

European Centre for Disease Prevention and Control

[http://www.ecdc.europa.eu/en/healthtopics/emerging\\_and\\_vector-borne\\_diseases/tick\\_borne\\_diseases/lyme\\_disease/Pages/index.aspx](http://www.ecdc.europa.eu/en/healthtopics/emerging_and_vector-borne_diseases/tick_borne_diseases/lyme_disease/Pages/index.aspx)