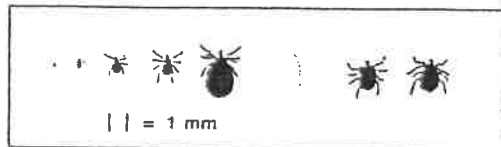


Important Facts about Lyme Disease

The Disease and the Tick

Lyme disease is an infection caused by a spirochete bacterium. The spirochete is transmitted to people by the bite of the tiny Ixodes tick, commonly referred to as the "deer tick". Ixodes ticks are found in vegetation and on animals in grassland, marshland, and woodland habitats. Lyme disease can occur in any season, although it is more prevalent during the warmer months. The Ixodes tick is much smaller than the dog tick. The following diagram depicts the Ixodes tick (deer tick) and the Dermacentor tick (dog tick) *near actual size*. Going from left to right: larva, nymph, adult male, adult female and engorged adult female Ixodes ticks; adult male and female Dermacentor ticks (dog ticks).



Diagnosis and Treatment

1. Diagnosis is often difficult; check for any rash or red patch, especially one that expands slowly over several days. The red patch may get quite large (up to 18 inches); it may be ring-shaped, though irregular or scattered rashes are not unusual.
2. Flu-like symptoms such as headaches, fever, or chills may occur early in the disease, as can stiff neck or muscles, difficulty in concentration or remembering, and fatigue.
3. Pain, swelling, and an elevated temperature may occur in one or more joints if the disease is untreated.
4. If you notice any of the above symptoms lasting for several days (whether or not they follow a tick bite) see your physician. Pregnant or nursing women who have been bitten by a tick should consult their doctors.
5. Lyme disease is usually treatable with antibiotics; the earlier it is diagnosed, the easier it is to treat.

Prevention

1. Be aware of tick habitats - tall grasses, bushes, woods.
2. Wear long pants with cuffs tucked into socks; light-colored clothing will help you detect any ticks.
3. Repellents on your clothing may be helpful.
4. Brush off clothing and parts before entering the house
5. Undress and check for ticks; they usually crawl about for several hours before biting.
6. Remove attached ticks with fine tweezers by gently, repeatedly, and patiently tugging at the point where their mouthparts enter your skin. (Save the tick in a sealed jar of alcohol for future reference).
7. Protect your pets. Remove ticks found on your pets: use tick-control products that your veterinarian recommends

Important Facts about Rabies

Rabies is caused by a *virus* that attacks the nervous system. Rabies is always fatal unless the victim has been protected by immunization or, in the case of humans, receives proper treatment. Rabies affects all mammals but is most often found in raccoons, skunks, foxes, and bats. Currently the mid-Atlantic states of Virginia, Maryland, Pennsylvania, West Virginia and the District of Columbia are experiencing an intense wildlife rabies outbreak. Seventy-five percent of the animals diagnosed as rabid in this outbreak are raccoons. Others reported are skunks, bats, foxes, groundhogs. Rabies has also been found in dogs, cats and livestock

Infection is usually caused by a bite from a rabid animal since the virus is found in the animal's saliva. Rabies can also be contracted if saliva comes in contact with cuts in the skin or mucous membranes. In rare occasions the virus has been transmitted through the air. Studies have shown that the active rabies virus found in bat feces can become airborne on dust particles. However, infection from bats usually results from the handling of diseased animals.

Once in the body, the virus attacks the central nervous system by traveling along neural pathways to the brain. Once in the central nervous system, the virus is transmitted through nerves to salivary glands and other tissues in the body. The incubation period (from infection to the onset of symptoms) is usually 2 to 12 weeks, but may be longer. The incubation period in humans can exceed one year. This variability is due to differences in susceptibility among species, the amount of virus deposited when bitten, and the location of the bite.

Symptoms of Animals with Rabies: Rabid animals can appear *furious* or *dumb*. In the furious stage, the animal is aggressive and excited, snapping and biting at anything. There also may be foaming at the mouth. In the dumb stage, the animal often seems docile, almost tame. It may be disoriented and lack coordination. The animal drools because it cannot swallow its saliva. The dumb stage is of special concern to humans because the infected animal is easily approached by unsuspecting people. In most animals, death occurs less than ten days after the onset of symptoms.

Control of Rabies: At this time there are limited ways to control wildlife rabies. There is a vaccine for foxes but methods to administer this vaccine to the wild fox population are still being researched. There is no vaccine for other wild animals, such as raccoons and skunks. Legal furbearer trapping may help keep populations in balance with their environment and possibly reduce the chance of a rabies outbreak.

Rabies in domestic animals can be controlled through vaccinations. Pets, especially dogs and cats should be vaccinated against rabies. Livestock should also be vaccinated.

The most effective means of preventing human rabies is through knowledge about the disease and immunization of domestic cats and dogs. People should learn about rabies and how it is contracted, learn more about the natural behavior of wildlife (especially raccoons, skunks, foxes, groundhogs and bats), avoid unnecessary contact with wild animals, use precautions if in contact with wild animals, and be very suspicious of wild animals that exhibit unnatural behavior. There is a relatively pain-free vaccination against rabies for people. This is a series of five shots given in the arm, shoulder, or buttocks. Wildlife biologist, wildlife conservation officers, taxidermist, trappers, animal control officers and others who run a fairly high risk of contact with potentially rabid animals should seriously consider vaccination against rabies and obtain booster shots when necessary.

If bitten or scratched by an animal that might be rabid immediately wash the wound thoroughly with generous amounts of soap and water. Then apply rubbing alcohol or a strong solution of water and iodine to the exposed areas. **After the first aid treatment, see a physician immediately.** Rabies vaccine and antiserum will be administered as required. If your pet has been in contact with a suspected rabid animal, contact your veterinarian immediately.

What to do with a suspected rabid animal:

1. Be extremely cautious around the animal. Keep people and pets away from the animal. Do not handle the animal. Normally shy animals can lunge and bite even when apparently paralyzed. Contact your wildlife conservation officer, police officer or health official.
2. If the suspected animal is a pet, the animal should be examined by a veterinarian and confined for a period of time. If it remains in good health, it may then be released.
3. Suspected rabid wildlife should be killed to limit the spread of the disease. If possible avoid damaging the head of the animal. The brain is needed for diagnosis. The carcass should be placed in a heavy-duty plastic bag and placed in a metal container (like a trash can). The specimen should be kept cool and away from people and pets and should be submitted to the nearest health department as soon as possible.



Tick Habitat: If you go into a tick habitat, minimize skin exposure by wearing proper clothing. Even long pants tucked into socks would add extra skin.

Sometimes there are multiple, secondary skin rashes. This large rash should not be confused with the harmless red spot that usually is seen immediately after receiving the bite. Many people have a small redness at the site of the bite, which is a normal sensitivity to the bite itself. (If you are uncertain, contact your doctor.)

Although a majority of infected persons develop the classic red rash, many do not. Other common symptoms of early Lyme Disease — with or without the rash — are flu-like, and include fatigue, headache, neck stiffness, jaw discomfort, pain or stiffness in muscles or joints, slight fever, swollen glands, or reddening of the eyes. A pregnant or nursing woman who is bitten by a tick and develops a rash, or flu-like symptoms should contact her doctor. Symptoms of Ehrlichiosis and Babesiosis do not include a rash, but fatigue, headache, and fever can occur.

If untreated, Lyme Disease can progress to more serious stages. In these later stages of the disease, the joints, the heart and the central nervous system can be involved. One example is so-called "Lyme Arthritis," with attendant joint pain and swelling. These symptoms, which usually occur in a single joint, can go away after a few days, and recur in another joint. Health symptoms, which can occur within one to three weeks after the rash, include dizziness, weakness, and an irregular heartbeat. Still other patients may develop weakness of facial muscles — drooping of an eyelid or a corner of the mouth, or inflammation of the eye.

Treatment

Lyme Disease, Ehrlichiosis, and Babesiosis are treatable. Naturally, they are easier to treat when infections are detected early. Even in their later stages the diseases commonly respond to medication. Antibiotics are the treatment of choice for Lyme Disease and Ehrlichiosis. Babesiosis is treated with a combination of drugs. Your physician will choose the best treatment for your particular case.



Prevention

Be aware of and avoid tick habitats such as tall grass, bushes, brush, and woods. If you go into such habitats, wear shoes and appropriate clothing — hat, long-sleeved shirt, and long pants tucked into socks. The use of tick repellents on the outside of clothing may be helpful.

Before coming indoors, brush off your clothing. Once inside, remove all clothing, check for ticks, and promptly wash the clothing. Family members can help each other with tick inspection. Remove and dispose of any unattached ticks. If you find ticks that are attached to you, follow the procedure outlined under TICK REMOVAL. Monitor the bite area and be alert for early symptoms, such as an expanding rash or flu-like signs over the next month or so.

Since pets that are allowed outdoors can cause us to come in contact with ticks, frequently inspect your pet and remove any attached or unattached ticks. Use tick-control products that your veterinarian recommends. These preventative measures are important to help protect pets because they can also get Lyme Disease and Ehrlichiosis.

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Five Steps to Prevention

1. Avoid tick habitats
2. Dress properly if you must go into a tick habitat
3. Check for, and remove, any ticks on your family members as soon as possible after leaving a tick habitat
4. Check pets for ticks and use tick-control pet products
5. Consult with your doctor and veterinarian about available vaccines

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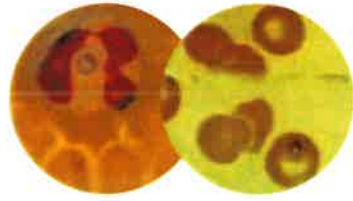
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Lyme Disease

Lyme Disease is an infection caused by the bacterium *Borrelia burgdorferi*, which can be transmitted by the bite of certain species of ticks. The disease often starts as a skin rash and can progress to more serious stages involving joint, nerve or heart tissue. Antibiotics are usually effective, especially if treatment starts early in the disease process. Lyme Disease has now been reported in at least 47 states, mainly in the northeast and north-central states in the U.S., as well as in many countries throughout the world. Two other diseases, Human Ehrlichiosis and Babesiosis, are associated with the same ticks that spread Lyme Disease. However, the prevalence of human cases is usually much lower than that for Lyme Disease.



Ehrlichia and Babesia
under microscopy

Babesiosis

Babesiosis is an infection caused by the malaria-like protozoan, *Babesia microti*. Since the late 1980's, the disease has spread from the islands off the New England coast to the mainland. The disease begins with nonspecific, flu-like symptoms 1-3 weeks after an *Ixodes* (deer) tick bite. Like malaria, the protozoan inhabits red blood cells and can result in anemia-causing fatigue and poor exercise tolerance. The infection can be asymptomatic to mild in the young. It can be severe and even life-threatening in patients without spleens, immune-compromised patients, and older patients with pre-existing medical conditions. Antibiotics are effective in treating the infection and fewer complications occur with earlier treatment.

Ehrlichiosis

Ehrlichia are intracellular bacteria also transmitted by the *Ixodes* tick resulting in a disease called Ehrlichiosis. Several different *Ehrlichia* bacteria exist but the one associated with the deer tick is called Human Granulocytic Ehrlichiosis, HGE, or HE, named after the cell which it infects. After incubating about 1-3 weeks, HE can most commonly cause fever, headache and muscle aches. Fatigue and gastrointestinal complaints may include nausea, vomiting, and diarrhea. The illness may vary from mild to severe and life-threatening. Effective antibiotics eradicate the infection and fewer problems develop with earlier treatment. Other pre-existing conditions worsen the course of this infection.

Co-infections with two or even three of these tick-borne diseases can increase the severity of symptoms and prolong illness.

The Tick



Adult Female Ticks:
Ixodes (Deer tick) left
and *Dermacentor* (Dog tick) right
Ticks shown approximately three times actual size

In the United States, two closely related tick species — *Ixodes scapularis* and *Ixodes pacificus* — have been identified as harboring and transmitting the Lyme Disease-causing *Borrelia* and *Ehrlichia* bacteria and *Babesia* protozoan to people and animals. *I. scapularis*, the black-legged tick, is found in the eastern U.S., and *I. pacificus*, the western black-legged tick, is on the West Coast. Keep in mind that *Ixodes* species are smaller than the common American "dog tick," which does not transmit the Lyme Disease causing spirochetes but can transmit the agent of Rocky Mountain spotted fever.

Spring, summer, and fall are the seasons when the smaller nymphal form of *I. scapularis* is most

active in the northeast and midwest and when people are at greatest risk. Adult *Ixodes* ticks are active in the fall, warm days of winter, and spring. In certain climates, such as in parts of California, the tick is active all year long.

The two *Ixodes* ticks are found in a variety of habitats, principally woodlands and bushy areas. They feed on a variety of wild animals such as birds, mice and deer. Domestic animals, such as cats, dogs, horses, and cows, can also carry ticks. Children appear to have a higher risk for tick bite and Lyme Disease.



Actual Size (left to right) of larva, nymph, adult male, adult female, and engorged adult female *Ixodes* ("Deer Ticks") and adult male and female *Dermacentor* ("Dog Ticks")

The Bite and Transmission

Most people do not feel a tick biting, nor the subsequent drawing of blood the tick needs for nourishment. If left undisturbed, the tick will remain attached to its host and become engorged with blood over the next 2-4 days. While fully engorged, the tick drops off the host. If the *Ixodes* tick happens to be a carrier of the *Borrelia* spirochetes, or other disease-causing organisms, it may transmit them to the host during this feeding process. Once in your body, the spirochetes can multiply. Not all ticks carry a disease-causing organism, and a bite does not always result in the development of disease — even if a tick is a carrier.



Four Forms: of the *Ixodes* tick — larva, nymph, adult male, and adult female are shown approximately four times actual size