



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.)

Tick Habitat: If you go into a tick habitat, minimize skin exposure by wearing proper clothing. Pant legs tucked into socks would add protection.

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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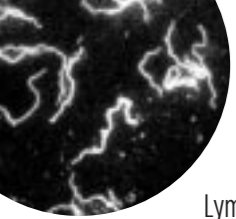
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Lyme Disease

Related Disorders

Ehrlichiosis

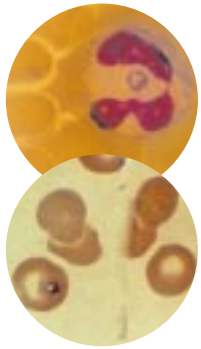
Babesiosis



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 *Demacentor* (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

Tick Removal



Remove the tick promptly; the sooner you remove it, the less chance of infection. Use either a tick-removing device or fine-point tweezers. Do not squeeze the tick's body; grasp it where its mouthparts enter the skin and tug gently and repeatedly, until it releases its hold by withdrawing its barbed mouthpart from your skin. Above all, be patient – proper tick removal will take time.

Save the tick in a covered jar of alcohol labeled with the date, the body location where the tick was attached, and record the place where you think you acquired the tick. Wipe the bite area with antiseptic, or wash with soap and water. Call your local or State Board of Health if you want to have the tick identified.

Symptoms — Lyme Disease



Classic examples of the variety of rashes which may accompany early Lyme Disease.

A typical early symptom of Lyme Disease is a slowly expanding red rash at the site of the tick bite. The rash usually appears within a week to a month after the bite and can slowly expand over several days.

