USACHPPM
Readiness thru Health

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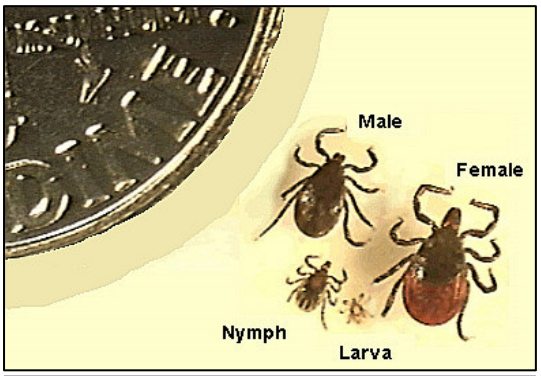
Just the Facts...

Lyme Disease

Q. *What is Lyme disease (LD)?*
A. Lyme disease is an infectious disease that often begins with a characteristic rash, and which can later involve the joints, nervous system and/or heart. It is caused by a spiral-shaped bacterium (spirochete) called *Borrelia burgdorferi* that is transmitted to humans or domestic animals by the bite of an infected tick. It can sometimes become severely debilitating, but is rarely, if ever, fatal.

Q. *How exactly does a person get LD?*
A. You can get LD if you are bitten by a tick that is infected with *Borrelia burgdorferi*. Bacteria in the tick's saliva are transmitted to you while the tick is feeding. An infected tick must be attached to you for at least several hours (usually 24-48) in order for transmission to take place, so prompt removal of a tick will lessen your chance of getting sick. Also, not all ticks are infected, so a tick bite does not necessarily mean that disease will follow. In addition, you **cannot** get LD if an infected tick is just crawling on your skin or clothing. LD bacteria are **NOT** transmitted from person-to-person.



Ixodes scapularis **(blacklegged tick, a.k.a. 'deer tick') is responsible for transmitting Lyme disease in the United States.**

Q. *Do all kinds of ticks transmit LD?*
A. No. Only certain species of ticks are capable of transmitting *B. burgdorferi* to people. There are two vectors (transmitters) of *B. burgdorferi* in the United States. *Ixodes scapularis,* the blacklegged tick (also known as the "deer tick"), is the vector for *B. burgdorferi* in the east and Midwest, while *Ixodes pacificus*, the western blacklegged tick, is the vector along the West Coast. *Ixodes ricinus*, known as the sheep tick or European castor bean tick, transmits *B. burgdorferi* as well as other Lyme disease-causing *Borrelia* species in Europe, while *Ixodes persulcatus*, the Taiga tick, is the vector in Asia. Simultaneous infections with *B. burgdorferi* and *Babesia microti* (the agent of babesiosis), and/or *Anaplasma phagocytophilum* (the agent of human granulocytic ehrlichiosis), have been documented in ticks, and there is evidence that two or even all three of these organisms may be transmitted during the course of a single tick bite.

Q. *How do ticks acquire Borrelia burgdorferi?*
A. Ticks become infected by feeding on the blood of an infected animal known as a reservoir host. Reservoir hosts carry *Borrelia* organisms in their bloodstream for a prolonged period of time, thus allowing ticks that feed on them to become infected. Rodents, especially the white-footed mouse (*Peromyscus leucopus*), are the reservoir hosts for *B. burgdorferi*.

Q. *What is the life cycle of the blacklegged tick?*
A. Like most ticks, the blacklegged tick has four life stages: egg, larva, nymph and adult. After hatching from the egg in the summer, the larval tick takes a blood meal on one host animal (usually a mouse), then falls to the ground and molts to the nymphal stage. The nymph rests during the fall/winter and takes a blood meal on another host (again, usually a mouse) the following spring. The nymph then molts to the final adult stage, either male or female. The adult female takes a blood meal on a larger animal (usually a deer) and a male tick mates with her while she is feeding. When her blood meal is complete, the female falls to the ground and lays 2,000 – 3,000 eggs in a cluster in the spring. The full life cycle of the blacklegged tick takes 2 years and requires 3 different animal hosts for completion. The ticks are most numerous in wooded areas, leaf litter, high grass, weeds and brush. They are not found in trees, and they do not jump or fly. Ticks crawl up low-lying vegetation and sit quietly with their front legs extended (questing behavior) waiting for an animal or human to pass by. They attach to the fur or clothing by direct contact.

Q. *How prevalent is LD?*
A. In 1975, investigation of an unusual prevalence and geographic clustering of children with arthritis-like symptoms in Lyme, Connecticut led to the discovery of this illness. It is now known that LD occurs over wide areas of the United States. The most severely affected areas are the Northeast from Massachusetts to Maryland, the upper Midwest (especially Wisconsin), and the West Coast (especially California). These are areas where blacklegged ticks are most prevalent. However, cases have been reported in 49 states and the District of Columbia, as well as in many other parts of the northern hemisphere, particularly Europe and Asia. The Centers for Disease Control and Prevention (CDC) now reports approximately 17,000 – 20,000 cases of LD within the U.S. every year, but indicates that the actual incidence is probably much higher. LD is by far the most prevalent arthropod-borne disease in the U.S.


Erythema migrans rash on dark skin – USACHPPM


Erythema migrans rash on light skin – CDC

Q. *What are the symptoms of LD?*
A. **<u>Early</u> –** The first symptom of LD is usually a skin rash called erythema migrans (EM) that occurs at the site of the tick bite within 3 days to one month following infection (usually 7-14 days). The tick itself may go undetected. The rash begins as a small red spot, which gradually enlarges as spirochetes spread locally in the skin. Oftentimes the lesion has partial clearing in the center so that it resembles a donut or bull's-eye, and it

usually expands to at least several inches in diameter, sometimes up to as much as 12 inches or more. It is flat, not raised. The skin rash usually has no sensation associated with it and may therefore go unnoticed, particularly if it is located on a part of the body that is difficult to see. While the rash is red in color on light skin, it may appear more like a bruise on dark-skinned individuals. Up to 40% of people with LD may not have the early skin rash. Other common early signs of LD – with or without the rash – include flu-like symptoms such as significant fatigue, headache, sore and aching muscles and joints, fever, sore throat, stiff neck and swollen glands. If left untreated, these early symptoms of LD may disappear on their own over a period of weeks; however, this does not necessarily mean that the disease has cleared up, and serious complications could arise later. On the other hand, if promptly treated with appropriate antibiotics, the skin rash and flu-like symptoms go away within days, and complications can usually be avoided.

Disseminated – Later symptoms of LD can begin to appear shortly after the initial symptoms or not until weeks to months later. These symptoms occur as spirochetes begin to spread via the blood stream and lymph into tissues in other parts of the body. These symptoms may include complications of the joints, the nervous system, and the heart. Rash may recur as multiple secondary lesions on parts of the body other than the bite site in about 50% of untreated people.

Symptoms in the joints occur in up to 60% of untreated people, and primarily consist of an arthritis that affects the large weight-bearing joints such as the elbow, wrist, and especially the knee. Pain, swelling or stiffness can move from joint-to-joint, and may persist for months to years.

Neurologic complications occur in 10-20% of untreated people. The most common symptoms include facial paralysis (Bell's palsy or other cranial nerve palsies), severe headache and stiff neck (meningitis), memory problems, sleeplessness and irritability (encephalopathy), and weakness and/or pain in the chest or extremities (radiculoneuritis). These symptoms can fluctuate in severity, and may persist for weeks, months, or years.

Heart symptoms occur in 6-10% of untreated people. Electrical conduction in the heart may be affected (heart block), sometimes requiring temporary insertion of a pacemaker, and inflammation of the heart muscle (myocarditis) may occur.

Q. ***How is LD diagnosed?***
A. Diagnosis is based primarily on recognition of the typical symptoms of LD such as the characteristic skin rash or flu-like symptoms, particularly if they occur in the spring or summertime, or if the individual has had a known exposure to ticks or tick habitat in an area of the country where the disease is known to occur. Most patients do not remember a tick bite. PROMPT TREATMENT OF EARLY SYMPTOMS MAY PREVENT LATER AND MORE SERIOUS PROBLEMS.

Atypical cases, or cases presenting with only disseminated stage complications, can sometimes be very difficult to diagnose. In these persons, a blood test looking for antibodies to the causative bacteria is often helpful. It should be noted that early in the disease, this blood test may be negative even though infection is present. This is because it takes a while for the body to develop a detectable level of antibodies; as LD progresses, antibody levels rise and the test becomes more reliably positive.

Q. What is the treatment for LD?
A. Oral antibiotic treatment works best early in the illness, clears up infection, and often prevents later complications. Doxycycline and amoxicillin are the most effect oral antibiotics, and 3-4 weeks treatment is usually effective. Cefuroxime axetil or erythromycin can be used for persons allergic to the penicillins or tetracyclines. Some disseminated disease symptoms, especially neurologic manifestations such as meningitis, may require high dose intravenous ceftriaxone or penicillin therapy for 4 weeks or more, depending on the severity of disease. In advanced disease, treatment failures may occur and retreatment may be necessary. Even when therapy has been successful in eliminating infection, symptoms may linger for extended periods of time due to initial damage that was caused during the course of the infection.

Q. How can LD be prevented?
A. Currently, there is no vaccine to protect against LD. Therefore, knowledge of where these ticks are found, avoidance of such areas when possible, use of protective clothing and repellents, routine tick checks of the body, and if bitten, prompt removal of the tick, are the primary preventive measures. Wear a long-sleeved shirt, long pants, and high socks. Tuck your shirt into your pants and pant cuffs into your socks. Light colored fabrics make it easier to detect ticks that are crawling on your clothing. Use a repellent containing permethrin on your clothing and a repellent containing deet (N,N-diethyl-m-toluamide) on your exposed skin. Routinely check your skin and clothing for ticks while you are outdoors in tick habitat, and do a careful check of your whole body once you come indoors. The ticks can be very small. Look for new "freckles" or moving specks of dirt.

Q. What should I do if I find a tick attached to my skin?
A. Remove attached ticks as soon as they are found. Use tweezers to firmly grasp the tick's mouthparts up against the skin, and pull back firmly and steadily. Be patient – the tick's central mouthpart called the hypostome is covered with sharp barbs, sometimes making removal difficult. Don't pull back sharply, as this may tear the mouthparts from the body, leaving them embedded in the skin. If the mouthparts do break off, don't panic – the mouthparts alone cannot transmit disease because the infective body of the tick is no longer attached. However, to prevent secondary infection, remove the mouthparts as you would a splinter. Never squeeze the body of the tick or use such things as petroleum jelly, fingernail polish remover, or a lighted match: these methods are ineffective and could force more infective fluid into the skin. After removal, wash the wound site, and apply an antiseptic. Preserve the tick by placing it in a clean, dry jar, or other well-sealed container, and keeping it in your freezer. Should you develop disease symptoms, take the tick with you to the physician's office; identification of the tick species may assist the physician with your diagnosis and treatment. Discard the tick after a month; all known tick-borne diseases will generally display symptoms within this time period.