

# FACT SHEET

# LYME DISEASE

The following information will help you to become familiar with the epidemiology, symptomatology, ecology and control of Lyme disease.

## WHAT IS LYME DISEASE?

Lyme disease (also known as Lyme borreliosis) is an infectious disease syndrome transmitted through the bite of ticks in the genus *Ixodes*. The disease, thought to occur worldwide, is the most common tick-borne disease in central Europe, as well as in the USA.

Three spirochete bacteria in the genus *Borrelia* have been identified as causative agents of Lyme disease. The three "genospecies" are *Borrelia burgdorferi* (North America and Europe), *Borrelia garinii* (Europe), and *Borrelia afzelii* (Europe and Asia).

## HOW IS LYME DISEASE TRANSMITTED?

In Europe, Lyme disease is transmitted by the European Sheep Tick, *Ixodes ricinus*. *Borrelia* spirochetes thrive in the mid-gut of the tick, and are transmitted to humans and other animals during the feeding process. During the feeding period, the bacterium is multiplying in the tick mid-gut and migrating to the salivary glands, from which it is introduced into the wound site. The amount of time for tick attachment needed for transmission of the spirochetes is typically thought to be twenty-four hours, however, reports of transmission after less than two hours of tick attachment have been documented in central Europe.

Peak months for tick activity in Central Europe are May through September when the relative humidity is between 55 - 90 percent. During active periods, each tick development stage (larvae, nymph, adult) searches for a blood meal to complete the life cycle. Newly hatched larvae are about the size of the period at the end of this sentence. They feed on the blood of small rodents such as field mice. Nymphs prefer slightly larger mammals, but they will feed on almost any size mammal available. Adult ticks prefer large mammals such as deer, sheep, and humans. Adult ticks are commonly encountered searching for a host on tall vegetation up to one meter off the ground.

All tick stages are capable of transmitting Lyme disease, but nymphs pose the greatest threat to humans because of their small, easily undetectable size and ability to feed on larger mammals. Recent

epidemiological studies conducted in central Europe indicate that clinical signs and symptoms of Lyme disease will occur after a tick-bite in 2-4% of cases.

## WHAT ARE THE SYMPTOMS?

There are three symptomatic stages of Lyme disease. During the first stage, 70 percent of Lyme disease patients display a "bulls-eye" rash known as Erythema Chronicum Migrans (ECM). The rash begins at the bite site 3 days to 32 days following tick attachment. The "bulls-eye" rash has an outer red ring with partial clearing in the center which slowly expands up to 20 inches in diameter. The rash is considered diagnostically significant when it reaches a diameter of 2 inches. Twenty to fifty percent of Lyme disease patients experience one or more secondary annular lesions at sites other than at the tick bite site. The "bulls-eye" rash and secondary annular lesions fade away over the course of several weeks. Thirty percent of Lyme disease patients do not report or experience the characteristic "bulls-eye" rash or secondary annular lesions. Other symptoms of first stage Lyme disease include: profound fatigue, fever, chills, headache, sore throat, sore and aching muscles and joints, and swollen glands.

The second stage is marked by neurological complications and migratory musculoskeletal pain that appear 4 to 6 weeks after infection. Neurologic complications occur in 10 - 20 percent of Lyme disease patients. Symptoms include severe headache and stiff neck, facial paralysis, optic atrophy with blindness, weakness and/or pain of the chest or extremities, and coma. These symptoms can persist for weeks, often fluctuating in severity. Heart symptoms also occur in 6 - 10 percent of Lyme disease patients. The electrical conduction in the heart may be affected and an inflammation of the heart muscle, or heart block, may occur.

Acrodermatitis Chronica Atrophicans (ACA) is a late cutaneous manifestation which may occur during the second stage to several years after the onset of the disease. ACA is mainly described in Europe and is rarely reported in the United States.

**Lyme disease is a reportable condition under the Army Medical Surveillance System. Contact your local Preventive Medicine Activity to report any suspected cases.**

ACA begins with a bluish-red discoloration that progresses to atrophy of the skin, which can be complicated by sclerodermic changes. The course of the manifestation is chronic and progressive. Studies show that cerebrospinal fluid infections involve *Borrelia burgdorferi* and *Borrelia garinii*, where as most ACA skin lesions involve *Borrelia afzelii*.

The third stage typically involves the onset of arthritis. Joint problems characteristic of rheumatoid arthritis generally occur within two months but not more than two years after onset of the rash. Attacks of arthritis usually last from a few days to a few weeks at a time and primarily affect the knees and other large joints. During this stage a small percentage of patients also suffer from sleepiness, loss of memory, mood swings and an inability to concentrate.

### **HOW IS LYME DISEASE DIAGNOSED?**

The Centers for Disease Control in Atlanta, Ga. have recommended the following guidelines for confirming Lyme disease: 1) ECM within 30 days of known tick bite (30% of patients do not recall ever being bitten by a tick); 2) involvement of 1 of 3 organ systems along with positive serologic findings or 3) isolation of *Borrelia* genospecies from tissues.

Indications of a probable infection of Lyme disease are: 1) involvement of 2 out of 3 organ systems with no prior ECM; or 2) a single organ system involved with a history of a tick bite.

Military members and their dependents are highly mobile and may be exposed to one or more of the *Borrelia* genospecies during their travels. When serological tests are necessary, clinicians should insure that laboratory tests for the presence of all three *Borrelia* species. NOTE: Patients with early stage Lyme disease symptoms often produce negative serological tests. This is due to the low number of systemic spirochetes during early Lyme disease infection.

### **WHAT IS THE TREATMENT FOR LYME DISEASE?**

Lyme disease is treatable with antibiotics. Current recommendations for treatment include: For ECM in adults use doxycycline (100 mg bid) or amoxicillin (500 mg qid). Doxycycline should not be used for children or pregnant females. Cefuroxime or erythromycin are treatment alternatives. For ECM manifestations a 10-day course of treatment is usually adequate. Later disease

manifestations of Lyme disease require longer courses of intravenous therapy (20-30 days). Neurologic symptoms are more responsive to parenteral antibiotic therapy.

### **HOW IS LYME DISEASE PREVENTED?**

The best course of action against Lyme disease and other tick-borne diseases is prevention. Use the following guidelines when venturing outdoors along trails, in wooded lots, or areas with tall stands of vegetation:

⇒Wear trousers tucked into boots or socks and a long sleeved shirt that is tucked in at the waist.

⇒Use the "buddy system" and check for ticks often. Promptly remove attached ticks.

⇒When available, apply repellents containing DEET to exposed skin in accordance with labeled instructions.

⇒When available, wear Permethrin treated clothing (sold as Permanone®).

⇒After returning home, check yourself thoroughly for ticks. Carefully inspect warm, moist, and hairy areas of your body.

### **HOW ARE EMBEDDED TICKS REMOVED?**

Ticks embedded into the skin can be removed by using forceps or tweezers to grasp the tick's mouth parts as close to the skin as possible. Slowly remove the tick by pulling with a single steady motion. Do not jerk, twist, or rip the tick from the attachment site. This will cause the tick mouth parts to be left in the skin, increasing the chances of developing a secondary infection. Clean the wound and apply an antiseptic.

**Do not use home remedies to remove ticks!** Removing ticks with fire, hot matches, cigarettes, fingernail polish, petroleum jelly, or other such methods can cause the tick to regurgitate it's gut contents into your blood stream, increasing the chances of getting Lyme or other tick borne diseases.

**AFTER ANY TICK BITE STAY ALERT FOR THE SIGNS AND SYMPTOMS OF LYME DISEASE. IF A TICK BITE IS FOLLOWED BY A SKIN RASH AND/OR "FLU" LIKE SYMPTOMS, PROMPTLY SEE A PHYSICIAN FOR EVALUATION AND TREATMENT.**