Lyme Disease: Diagnosis, Treatment Guidelines, and Controversy

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ABSTRACT

The Centers for Disease Control and Prevention estimates that approximately 30,000 people per year are diagnosed with Lyme disease (LD) in the United States. LD can be effectively treated if diagnosed early in the course of disease. A more difficult disease path may follow if early symptoms go unnoticed and untreated. Complicating this clinical situation is the controversy over LD serologic diagnostic reliability and the terminology and treatment approaches to later stage LD. Nurse practitioners should have a working knowledge of the clinical presentation of LD at various stages and the diagnostic testing and treatment regimen guidelines recommended.

Keywords: controversy, diagnosis, late stage, Lyme disease, treatment

Lyme disease (LD) in the United States is caused by the spirochete *Borrelia burgdorferi*. Humans are infected with *B burgdorferi* via the bite of an infected *Ixodes* tick.[1,2] The Center for Disease Control and Prevention (CDC) estimates that approximately 30,000 people per year are diagnosed with LD in the US.[3] Although LD is primarily acquired in only 13 states, LD is the most common vector-borne disease in the US. LD can be effectively treated if diagnosed early in the course of disease. If early signs and symptoms go unnoticed and the spirochete infection remains undiagnosed and untreated, a more difficult disease path may follow. Complicating this clinical situation is the controversy that has erupted over LD serologic diagnostic reliability and the terminology and treatment approaches to later-stage LD. The nurse practitioner (NP) in primary- and emergent-care settings should have a good working knowledge of the clinical presentation of LD at various stages and the diagnostic testing and treatment regimen recommended by the Infectious Disease Society of America (IDSA) and the CDC.

TRANSMISSION

LD in the US is transmitted by the *Ixodes scapularis* or *Ixodes Pacificus* tick species, commonly known as the black-legged or deer tick (Figure 1). LD-infected ticks are found most prevalently in the northeast and mid-Atlantic states from Virginia to Maine, the north-central states mostly in Wisconsin and Minnesota, as well as on the West Coast, particularly northern California. The ticks are very small and can easily attach to hard-to-see areas of their human host. Adult ticks are approximately the size of a sesame seed and are most active during the cooler months. The nymphs are approximately the size of a poppy-seed and are most active in the spring and summer months. The size of the ticks and their propensity to attach in hard-to-see areas of the body, such as the scalp, groin, and axilla, make it quite difficult to recognize a bite has occurred. Avoidance of tick-borne disease includes wearing long pants and long-sleeved shirts, and treatment of clothing with permethrin spray is recommended to prevent attachment of ticks. A thorough inspection for ticks should be undertaken by anyone spending time in wooded areas. Prompt removal of potentially infected ticks substantially decreases or eliminates the chance of transmission of tick-borne infections such as LD.[3-5] If a tick is allowed to remain in place for 36 hours or more, transmission of disease can occur. Although dogs and outdoor pets cannot directly spread LD to humans, they may carry the infected ticks that spread LD and can transfer the ticks to their owners.[3] *Ixodes* ticks may also be infected with

Figure 1. The *Ixodes* tick.

(photo courtesy of CDC/James Gathany, 2006, ID8686; available at: phil.cdc.gov/phil/details.asp 8686.lores.jpg).

human granulocytic anaplasmosis (HGA) and babesiosis and are able to transmit these infections as a single infection or coinfection.[5] NPs treating patients who live in or have traveled through regions with a high LD incidence should maintain a high degree of suspicion and undergo testing for LD if warranted by symptoms.

SYMPTOMS

LD is characterized by skin, joint, neurologic, and cardiac manifestations. There are four identified phases of LD infection with unique symptomatology, diagnostic regimens, and treatment recommendations.[3–5] There is general agreement among researchers and governing bodies alike on the description and etiology of the first three phases, but the fourth stage has been an area of conflict and even recrimination, as evidenced by an unprecedented investigation by the State of Connecticut into the IDSA committee charged with creating the guidelines for diagnosis and treatment.[6,7]

Early Localized LD

Symptoms of early localized LD begin 3 to 30 days after the tick bite. Symptoms of erythema migrans (EM), as well as fatigue, chills, fever, headache, muscle aches, joint aches, and swollen lymph nodes, are commonly seen. EM is commonly referred to as a "bull's-eye" rash because of the reddened center surrounded by clearing and a reddened outer ring (Figure 2). EM occurs in approximately 70% to 80% of infected individuals and is normally warm to the touch but not itchy or painful. The EM rash begins anywhere from 3 to 30 days after the bite occurs, but,

Figure 2. Erythema migrans.

(photo courtesy of CDC/James Gathany 2007, ID9874; available at: phil.cdc.gov/phil/details.asp 9874.lores.jpg).