



LYME DISEASE

KEYWORDS

JUDY HANDLY

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ABSTRACT Lyme disease is often associated with heavily wooded or grassy areas where mice and deer live. It's most common in the Northeast, the Pacific Northwest, and the northern Midwest states. Lyme disease has 3 stages: early localized, early disseminated, and late. Erythema migrans is the first and best clinical indicator; it occurs in $\geq 75\%$ of patients. In endemic areas, few patients who have arthralgias, fatigue, difficulty concentrating, or other non-specific symptoms but who have had no history of EM or other symptoms of early-localized or early-disseminated Lyme disease actually have Lyme disease. Diagnose clinically if typical rash is present; otherwise, do acute and convalescent serologic testing (ELISA confirmed by Western blot). Treat with oral or parenteral antibiotics depending on disease manifestations

INTRODUCTION

Lyme disease, the most common vector-borne illness in the United States, is a multisystem illness caused by infection with the spirochete *Borrelia burgdorferi* and the body's immune response to the infection. The disease is transmitted to humans via tick bites, from infected ticks of the genus *Ixodes*.

DEFINITION

Lyme disease is a tick-transmitted disease caused by the bacterium *Borrelia burgdorferi*, which is found in small animals like mice and deer. *Ixodes* ticks (also called black-legged or deer ticks) that feed on these animals can then transmit *Borrelia burgdorferi* to people through tick bites.

EPIDEMIOLOGY

Lyme disease was recognized in 1976 because of close clustering of cases in Lyme, Connecticut and is now the most commonly reported tick-borne illness in the US. It has been reported in 49 states, but $> 90\%$ of cases occur from Maine to Virginia and in Wisconsin, Minnesota, and Michigan. On the West Coast, most cases occur in northern California and Oregon. Lyme disease also occurs in Europe, across the former Soviet Union, and in China and Japan. Onset is usually in the summer and early fall. Most patients are children and young adults living in heavily wooded areas.

PATHOPHYSIOLOGY

B. burgdorferi enters the skin at the site of the tick bite. After 3 to 32 days, the organisms migrate locally in the skin around the bite, spread via the lymphatics to cause regional adenopathy or disseminate in blood to organs or other skin sites. Initially, an inflammatory reaction (erythema migrans) occurs before significant antibody response to infection (serologic conversion).

- Meningismus as a sign of aseptic meningitis
- Cranio neuropathy, especially cranial nerve VII and Bell palsy (peripheral seventh nerve palsy with decreased unilateral function, including the forehead)

In patients with late disease, the typical physical finding is arthritis. Arthritis is located mostly in large joints, especially the knee. Warmth, swelling from effusion, and limited

SIGNS AND SYMPTOMS

Signs and symptoms of Lyme disease vary by disease stage. Physical findings in patients with early localized disease are as follows:



Erythema migrans (EM) – Rash

- Fever
- Myalgias
- Malaise
- Arthralgia
- Headache
- Tender local adenopathy (local, not diffuse)

Physical findings in patients with early disseminated disease are as follows:

- EM (single or multiple lesions)
- Headache
- Fever
- Tender adenopathy (regional or generalized)
- Conjunctivitis (uncommon, never prominent)
- Carditis (usually manifests as heart block)

range of motion help distinguish arthritis from simple arthralgia.

DIAGNOSIS

In endemic areas, patients with probable erythema migrans and a recent source of tick exposure should be started on treatment without blood tests. For serologic testing, the CDC recommends a two-tier testing procedure.

Step 1: EIA or ELISA - Total Lyme titer or IgG and IgM titers

Step 2: Western blot testing

Western blot testing is performed only if step 1 test results are positive or equivocal. If signs and symptoms have been present for 30 days or less, both IgM and IgG Western blot testing are performed; if signs and symptoms have been present for more than 30 days, only IgG Western blot testing is performed.

Other studies that may be used are as follows:

Joint aspiration - To exclude other causes of effusion (eg, septic arthritis, gout, pseudogout)

CSF analysis - In patients with meningitis

ECG - To identify Lyme carditis

MANAGEMENT

Antibiotic selection, route of administration, and duration of therapy for Lyme disease are guided by the patient's clinical manifestations and stage of disease, as well as the presence of any concomitant medical conditions or allergies.

Treatment of Lyme disease is as follows:

- Adult patients with early localized or early disseminated Lyme disease associated with erythema migrans: Doxycycline, amoxicillin, or cefuroxime axetil
- Children under 8 years and pregnant or nursing women with early localized or early disseminated Lyme disease: Amoxicillin or cefuroxime axetil
- Neurologic Lyme disease: IV penicillin, ceftriaxone, or cefotaxime; oral doxycycline, when not contraindicated, in patients with Lyme-associated meningitis, facial nerve palsy, or radiculitis

Treatment of Lyme arthritis is as follows:

- Oral antibiotics for 28 days
- Re-treatment with oral antibiotics for mild residual joint swelling
- Re-treatment with IV antibiotics for refractory cases
- Oral antibiotics for another month in patients with positive PCR of synovial fluid
- NSAIDs in patients with negative PCR, supplemented if necessary with hydroxychloroquine
- Consideration of arthroscopic synovectomy in patients unresponsive to symptomatic therapy

Lyme carditis may be treated with either oral or parenteral antibiotic therapy for 14 days (range, 14-21 days). Hospitalization and continuous monitoring, with consideration for temporary pacing, are advisable for patients with any of the following:

Associated symptoms (eg, syncope, dyspnea, or chest pain)

Second-degree or third-degree AV block

First-degree heart block with prolongation of the PR interval to more than 30 milliseconds (the degree of block may fluctuate and worsen very rapidly in such patients)

PREVENTION

Precautions against tick bite should be taken by people in endemic areas. Deer tick nymphs, which attack humans, are small and difficult to see. Once attached to the skin, they gorge on blood for days. Transmission of *B. burgdorferi* does not usually occur until the infected tick has been in place for > 36 h. Thus, searching for ticks after potential exposure and removing them promptly can help prevent infection.

A single dose of doxycycline 200 mg po has been shown to reduce the likelihood of Lyme disease after a deer tick bite. Patients with a known tick bite can easily be instructed to monitor the bite site and seek care if rash or other symptoms occur; the diagnostic dilemma of Lyme is most prominent when there is no history of tick bite.

REFERENCE

- <http://kidshealth.org/parent/medical/brain/lyme.html> | • <http://www.coastalmedical.com/documents/watermanpediatrics/Lyme%20Disease.pdf> | • <http://www.msdmanuals.com/professional/infectious-diseases/spirochetes/lyme-disease> |