



Clinician Information for Lyme Disease Diagnosis and Laboratory Testing

Lyme Disease Diagnosis - page one

Doctors diagnose Lyme disease based on the patient's clinical signs and symptoms, objective physical findings (erythema migrans, facial palsy, or arthritis), a history of possible exposure to infected ticks, and confirmatory laboratory testing.

Lyme disease diagnosis can be difficult because the symptoms can be vague, especially with the absence of erythema migrans (reddish, circular, ring-like rash often referred to as a “bull's-eye” rash).

When diagnosing Lyme disease a doctor should ask the following questions:

1. Does the patient have symptoms consistent with Lyme disease (early Lyme disease, early disseminated Lyme disease, or late Lyme disease)?
2. Does the patient have a recent history of an environmental exposure in an area endemic for Lyme disease (particularly a wooded, brushy, or grassy habitat)?
3. Does the patient remember being bitten by a tick? People in many instances may be unaware of a tick bite because ticks are extremely small and their bites are often painless.
4. What type of lab test was done? What do the results of the test mean?

Symptoms and stages of Lyme disease:

There are three stages of Lyme disease: early Lyme disease, early disseminated Lyme disease, and late Lyme disease.

Early Lyme disease or stage 1 – (localized infection) symptoms appear 1-30 days after a tick bite.

- Not all patients with early Lyme disease will have all symptoms, and many of the symptoms can occur with other diseases as well. Symptoms include:
 - Circular rash called erythema migrans or EM that appears at the site of the tick bite 7-14 days after the tick bite. The EM rash occurs in approximately 70-80% of infected persons. The rash often has a “bull's-eye” appearance as the center of the rash may clear and as the rash enlarges. The EM rash may be warm to the touch but usually not painful.
 - Other common symptoms: fatigue, chills, fever, headache, muscle aches, joint aches, and swollen lymph nodes.



Early disseminated Lyme disease or stage 2 – symptoms appear weeks to months after a tick bite.

- If a patient infected with Lyme disease is left untreated, the infection may spread to other parts of the body affecting certain body functions. Symptoms of stage 2 Lyme disease include:
 - Multiple erythema migrans (usually smaller than the primary rash).
 - Nervous system symptom involvement:
 - Lymphocytic meningitis
 - Cranial neuritis
 - Facial palsy (may be bilateral)
 - Radiculoneuropathy
 - Encephalomyelitis (rare and must be confirmed by demonstration of antibody production against *B. burgdorferi* in the CSF).

*NOTE: headache, fatigue, paresthesia, or mildly stiff neck alone is not criteria for neurologic involvement.

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Early disseminated Lyme disease or stage 2 continued from page one...

- Cardiovascular system symptom involvement:
 - Acute onset of high-grade atrioventricular conduction defects, usually resolve in days to weeks and are sometimes associated with myocarditis.
*NOTE: palpitations, bradycardia, bundle branch block, or myocarditis alone are not criteria for early cardiovascular involvement.

Late (or chronic) Lyme disease or stage 3 – symptoms appear months to years after infection and may occur after a period of latency.

- Brief bouts of arthritis are the typical manifestation of late Lyme disease. Since only 80% of cases have visible acute (or early localized) presentation of Lyme disease, late Lyme disease may be the first indicator of a Lyme disease infection.
 - Musculoskeletal system symptom involvement:
 - Recurrent, brief attacks (weeks or months) of joint swelling in one for a few joints, sometimes followed by chronic arthritis in one or a few joints.

Additional Lyme Disease Diagnosis Resources

Utah Department of Health - Bureau of Epidemiology:

- Physician Guide to Lyme Disease -

- <http://health.utah.gov/epi/diseases/lymedisease/physicianlymedisease.pdf>

Center for Disease Control and Prevention (CDC) - Lyme Disease:

- Diagnosis webpage -

- http://www.cdc.gov/ncidod/dvbid/Lyme/ld_humandisease_diagnosis.htm

Infectious Disease Society of America:

- Lyme Disease Case Study Course webpage -

- <http://lymecourse.idsociety.org/>

Various other Lyme disease resources:

- Division of Vector-Borne Infectious Diseases - CDC -

- http://www.cdc.gov/ncidod/dvbid/lyme/ld_resources.htm

Lyme Disease Confirmatory Lab Testing

Recommended tests for Lyme disease testing are blood tests that measure antibodies made in response to the infection. However, blood tests cannot diagnose Lyme disease alone, but are used to confirm diagnosis.

A two-step process is recommended when testing blood for evidence of Lyme disease. Both steps can be done using the same blood sample.

The first test of the two-step process uses either an ELISA or IFA test to test the blood for antibodies; the ELISA or IFA do not test for the presence of the bacteria that causes Lyme disease in the blood, just for the presence of antibodies. It can take up to 2-6 weeks for the antibodies to appear in the blood. Therefore, a blood test immediately following a bite of an infected tick will not be able to determine whether or not a person has been infected since not enough time has passed for antibodies to develop.

STEP 1 – The first step uses an ELISA or IFA test. These tests are designed to be very sensitive. If the ELISA or IFA is negative, it is highly unlikely that the person has Lyme disease, and no further testing is recommended. If the ELISA or IFA is positive or indeterminate (sometimes called "equivocal"), a second step should be performed to confirm the results. Other bacterial infections and diseases may cause an ELISA or IFA to be positive when, in fact, the patient does not have Lyme disease. Therefore, the Western Blot, a more accurate test, is used (6-12 weeks after infection) to confirm all positive or equivocal ELISA or IFA results.

STEP 2 – The second step uses a Western Blot test. Used appropriately, this test is designed to be specific (meaning that it will usually be positive only if a person has been truly infected). If the Western Blot is negative, it suggests that the first test was a false positive, which can occur for several reasons. Sometimes two types of Western Blot are performed, "IgM" and "IgG." Patients who are positive by IgM but not IgG should have the test repeated a few weeks later if they remain ill. If they are still positive only by IgM and have been ill longer than one month, this is likely a false positive.

It is not recommended to test blood by Western Blot without first testing it by ELISA or IFA. Doing so increases the potential for false positive results. Such results may lead to patients being treated for Lyme disease when they don't have it and not getting appropriate treatment for the true cause of their illness.

If symptoms and patient history strongly suggest Lyme disease, a doctor may decide to begin treatment without blood test confirmation.

For more detailed recommendations for test performance and interpretation of serologic tests for Lyme disease, read the August 11, 1995 MMWR Weekly Report "Notice to Readers Recommendations for Test Performance and Interpretation from the Second National Conference on Serologic Diagnosis of Lyme Disease", found at:

<http://www.cdc.gov/mmwr/preview/mmwrhtml/00038469.htm>

Source: CDC - Division of Vector-Borne Infectious Diseases - Lyme Disease