

# Lyme Disease Diagnosis

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Doctors diagnose Lyme disease based on the patient's clinical signs and symptoms, objective physical findings, history of possible exposure to infected ticks, and confirmatory lab testing.

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 “bulls-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, which may include facial (Bell's) palsy.
  - Cardiovascular system symptom involvement:
    - Acute onset of high-grade atrioventricular conduction defects, usually resolve in days to weeks and are sometimes associated with myocarditis.

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 or a few joints, sometimes followed by chronic arthritis in one or a few joints.

# Lyme Disease Confirmatory Lab Testing

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

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.

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

**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 to confirm all positive or equivocal ELISA or IFA results.

**STEP 2** – The second step uses a Western Blot test 6-12 weeks after infection. Used properly, 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. When a Western Blot is used during the first four weeks of disease, both IgM and IgG procedures should be performed. 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.

The two steps of Lyme disease testing are designed to be used together. 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 and may lead to misdiagnosis and improper treatment.

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

**TEST RESULTS INTERPRETATION:** It is recommended that an IgM immunoblot be considered positive if two of the following three bands are present: 24 kDa (OspC), 39 kDa (BmpA), and 41 kDa (Fla). It is further recommended that an IgG immunoblot be considered positive if five of the following 10 bands are present: 18 kDa, 21 kDa (OspC), 28 kDa, 30 kDa, 39 kDa (BmpA), 41 kDa (Fla), 45 kDa, 58 kDa (not GroEL), 66 kDa, and 93 kDa.