

### Overview

The **Lyme Disease Test** is a test used to detect the presence of antibodies to *Borrelia burgdorferi* in a blood sample.

*Borrelia burgdorferi* is the bacteria that causes Lyme disease. *B. burgdorferi* is transmitted by blacklegged ticks that are commonly found on vegetation and animals such as deer, dogs, mice, horses, and birds in endemic areas. When a person is bitten by a tick carrying *B. burgdorferi*, the bacteria can enter the body through the skin, often causing a characteristic rash, fever, headache, and fatigue. Untreated Lyme disease can spread throughout the body, affecting the joints, heart, and nervous system. Generally, Lyme disease is effectively treated with a few weeks of antibiotics.

When Lyme disease occurs, the body's immune system produces antibodies that are specific to *B. burgdorferi*. IgM antibodies are produced within the first few weeks, followed by the production of IgG antibodies. This test detects IgM and IgG antibodies towards the VlsE1 and pepC10 antigens from *B. burgdorferi* in an initial screening test. Any preliminary positive or equivocal results from the initial screening test are then confirmed with additional testing following modified two-tier test methodology.

### What are the symptoms of Lyme disease?

Early signs and symptoms usually appear 3–30 days after the tick bite and can include:

- Characteristic rash: An erythema migrans (EM) rash is the most common sign of Lyme disease, occurring in 70–80% of cases and generally appearing around seven days after the tick bite. The rash may feel warm but is usually not itchy or painful. It expands gradually over several days reaching up to 30 cm or more in size, sometimes clearing as it enlarges, resulting in a target or “bulls-eye” appearance.
- Fever and/or chills
- Headache
- Fatigue
- Muscle and joint aches
- Swollen lymph nodes

Later signs and symptoms of Lyme disease may show up weeks to months after the tick bite and can include:

- Severe headaches and neck stiffness
- More EM rashes
- Facial palsy (loss of muscle tone on one or both sides of the face)
- Arthritis causing severe joint pain and swelling
- Intermittent pain in tendons, muscles, joints, and bones
- Irregular heart beat
- Shortness of breath or dizzy episodes
- Shooting pain, numbness, or tingling in the hands or feet

### Who should consider the Lyme Disease Test?

Testing for Lyme disease is recommended in people showing symptoms of infection or are at risk of infection. Risk factors for Lyme disease include having recently removed a tick from your body or walked in a wooded area where ticks live without covering exposed skin or wearing repellent (particularly in the northeast or midwestern areas of the United States where most Lyme disease cases occur).

### Understanding your Lyme Disease Test results

This section includes general interpretation guidelines for understanding your **Lyme Disease Test** report. These guidelines may not apply to everyone. Ask your healthcare provider what your results mean for you.

**Table 1. Lyme Disease Screening Test Results and Interpretation**

Screening Test Result	Interpretation
<b>Negative</b>	No significant amount of antibodies to <i>B. burgdorferi</i> detected in the sample tested. No laboratory evidence of infection with <i>B. burgdorferi</i> (Lyme disease). Negative results may occur in patients recently infected ( $\leq 14$ days) with <i>B. burgdorferi</i> . If recent infection is suspected, repeat testing on a new sample collected in 7-14 days is recommended.
<b>Equivocal</b>	See Table 2 below.
<b>Positive</b>	See Table 2 below.

**Table 2. Lyme Disease Confirmatory Test Results and Interpretation**

Confirmatory Test Result	Interpretation
<b>Negative</b>	No significant amount of antibodies to <i>B. burgdorferi</i> detected in the sample tested. No laboratory evidence of infection with <i>B. burgdorferi</i> (Lyme disease). Negative results may occur in patients recently infected ( $\leq 14$ days) with <i>B. burgdorferi</i> . If recent infection is suspected, repeat testing on a new sample collected in 7-14 days is recommended.
<b>Equivocal</b>	Antibodies to <i>B. burgdorferi</i> detected in the sample tested. Results are consistent with <i>B. burgdorferi</i> infection (Lyme disease) in the recent or remote past. Antibodies may remain detectable for months to years following resolution of infection. Timing of infection (acute/recent vs. past) cannot be determined by these assays. Clinical correlation is required. Results should not be used to monitor or establish adequate response to therapy. Response to therapy is confirmed through resolution of clinical symptoms. Consider repeat testing in 7-14 days if clinically warranted.
<b>Positive</b>	Antibodies to <i>B. burgdorferi</i> detected in the sample tested. Results are consistent with <i>B. burgdorferi</i> infection (Lyme disease) in the recent or remote past. Antibodies may remain detectable for months to years following resolution of infection. Timing of infection (acute/recent vs. past) cannot be determined by these assays. Clinical correlation is required. Results should not be used to monitor or establish adequate response to therapy. Response to therapy is confirmed through resolution of clinical symptoms.

### What can affect Lyme Disease Test results?

False-negative and false-positive Lyme disease test results are common. In particular, an infected person may receive a negative test result in the first eight weeks after the tick bite, as their body has not produced enough antibodies to be detectable in laboratory assays. Early antibiotic therapy can also prevent an antibody response and result in a false-negative. Antibodies to *B. burgdorferi* can persist in the blood for months or even years after an infection is cured, so a positive result may be from a previous infection or false-positive results can occur due to other bacterial, viral, or autoimmune diseases.

### What are the next steps if I receive a positive test result?

Contact your healthcare provider as soon as possible. Oral antibiotic treatment in the early stages of Lyme disease usually results in rapid and complete recovery. Early diagnosis and prompt treatment can also help prevent late Lyme disease. In the later stages of Lyme disease, longer courses of antibiotics and/or intravenous treatment with antibiotics may be required.

### How can I reduce my risk of Lyme disease?

Reducing exposure to ticks is the best way to reduce the risk of Lyme disease.

Before and during time outdoors, specific steps include:

- Treat clothing and gear with products that contain 0.5% permethrin
- Apply an insect repellent containing DEET, picaridin, IR3535, Oil of Lemon Eucalyptus (OLE), para-menthane-diol (PMD), or

2-undecanone

- Wear long pants and tuck them into socks or boots
- Avoid walking in wooded areas with high grass and leaf litter
- Walk in the center of trails

After returning indoors, it is helpful to:

- Check clothing, gear, and pets for ticks and remove any that are found
- Wash clothing in hot water and tumble dry on high heat for 10 minutes to kill any attached ticks
- Shower within two hours of coming indoors
- Conduct a full body check for ticks

Take steps to reduce the risk of ticks in your backyard, including:

- Clear tall grasses and brush
- Create barriers (e.g., 3 ft wide section of gravel) on the edges of wooded areas
- Mow the lawn frequently
- Stack wood neatly and in a dry area
- Remove old furniture and trash

### References

1. Lyme Disease. (Reviewed Jan 2022). *CDC*.
2. Lyme Disease Tests. (Updated Nov 2020). *MedlinePlus, NIH*.
3. *Borrelia* VlsE1/pepC10 IgG/IgM Test System Package Insert. (Reviewed May 2021). *ZEUS Scientific, Inc.*
4. *B. burgdorferi* IgG/IgM Test System Package Insert. (Reviewed Dec 2017). *ZEUS Scientific, Inc.*
5. Suggested Reporting Language, Interpretation and Guidance Regarding Lyme Disease Serologic Test Results. (Reviewed May 2021). *APHL*.