

Overview

Useful For

Aiding in the diagnosis of *Borrelia miyamotoi* infection in conjunction with clinical findings

Preferred method for detection of *B miyamotoi* using blood specimens

Testing Algorithm

For more information see [Acute Tick-Borne Disease Testing Algorithm](#).

Special Instructions

- [Acute Tickborne Disease Testing Algorithm](#)

Method Name

Real-Time Polymerase Chain Reaction (PCR)

NY State Available

Yes

Specimen

Specimen Type

Whole Blood EDTA

Ordering Guidance

This assay does not detect the *Borrelia* species that cause Lyme disease. If Lyme disease is suspected, order SLYME / Lyme Antibody Modified 2-Tier with Reflex, Serum.

Specimen Required

Container/Tube: Lavender top (EDTA)

Specimen Volume: 1 mL

Collection Instructions: Send whole blood specimen in original tube. **Do not aliquot.**

Forms

If not ordering electronically, complete, print, and send a [Microbiology Test Request](#) (T244) with the specimen.

Specimen Minimum Volume

0.3 mL

Reject Due To

| | |
|-------|--------|
| Gross | Reject |
|-------|--------|

| | |
|---------------|--------|
| hemolysis | |
| Gross lipemia | Reject |

Specimen Stability Information

| Specimen Type | Temperature | Time | Special Container |
|------------------|--------------|--------|-------------------|
| Whole Blood EDTA | Refrigerated | 7 days | |

Clinical & Interpretive

Clinical Information

Borrelia miyamotoi is a spirochetal bacterium, closely related to the *Borrelia* species that causes tick-borne relapsing fever (TBRF), and it is more distantly related to the *Borrelia* species that cause Lyme disease. This organism causes a febrile illness like TBRF, with body and joint pain, fatigue, and, rarely, rash. *B miyamotoi* has been detected in *Ixodes scapularis* and *Ixodes pacificus* ticks. These ticks are also the vectors for Lyme disease, anaplasmosis, and babesiosis.

The preferred method for detecting *B miyamotoi* is real-time polymerase chain reaction. Less sensitive and specific methods for detecting *B miyamotoi* and agents of TBRF include serologic testing and identification of spirochetes in peripheral blood films or spinal fluid preparations. This assay does not detect the *Borrelia* species that cause Lyme disease.

Reference Values

Negative

Reference values apply to all ages.

Interpretation

A positive result indicates the presence of *Borrelia miyamotoi* DNA and is consistent with active or recent infection. While positive results are highly specific indicators of disease, they should be correlated with symptoms and clinical findings of tick-borne relapsing fever.

Cautions

Inadequate specimen collection or improper storage may invalidate test results.

After adequate treatment, *Borrelia miyamotoi* DNA may remain detectable for an unknown period of time.

Supportive Data

The following assay verification data supports the use of this assay for clinical testing.

Accuracy/Diagnostic Sensitivity and Specificity:

Clinical Samples:

Sixty-two clinical EDTA blood specimens received in the clinical laboratory for *Ehrlichia/Anaplasma* polymerase chain reaction (PCR) were tested using the *Borrelia miyamotoi* PCR assay. Results were compared to the MDH 16S rRNA TaqMan assay. In addition, 2 retrospectively identified *B miyamotoi*-positive specimens were confirmed by the *B miyamotoi* PCR assay and the MDH TaqMan assay.

Spiking studies:

To supplement the clinical specimens, negative whole blood and spinal fluid (CSF) specimens were spiked with genomic or plasmid DNA of *B miyamotoi* near the limit of detection and tested in a blinded fashion. The sensitivity of the PCR assay was 100% and the specificity with spiked specimens was 100%. The samples were extracted and tested in a blinded fashion.

Analytical Sensitivity/Limit of Detection:

The limit of detection is 2800 target copies/mL (5.6 target copies/mcL) of whole blood or CSF.

Analytical Specificity:

No PCR signal was obtained from the extracts of 31 bacterial, viral, parasitic, and fungal isolates from similar organisms or from organisms commonly found in the specimens tested.

Precision:

Interassay and intra-assay precision were 100%.

Reference Range:

The reference range of this assay is negative. This assay is designed to detect only species of clinical significance and is to be used for patients with a clinical history and symptoms consistent with tickborne relapsing fever. It should not be used to screen healthy patients.

Reportable Range:

This is a qualitative assay, and the results are reported as negative or positive for *B miyamotoi* DNA.

Clinical Reference

1. Gugliotta JL, Goethert HK, Berardi VP, Telford SR III: Meningoencephalitis from *Borrelia miyamotoi* in an immunocompromised patient. N Engl J Med. 2013 Jan 17;368(3):240-245
2. Fomenko NV, Borgoyakov VY, Panov VV: Genetic features of DNA of *Borrelia miyamotoi* transmitted by *Ixodes persulcatus*. Mol Genet Microbiol Virol 2011;26:60-65. doi: 10.3103/S0891416811020054
3. Platonov AE, Karan LS, Kolyasnikova NM, et al: Humans Infected with Relapsing Fever Spirochete *Borrelia miyamotoi*, Russia. Emerg Infect Dis. 2011 Oct;17(10):1816-1823

Performance**Method Description**

The assay is performed on the Roche LightCycler (LC) 480 instrument, following DNA extraction on the Roche MagNA Pure. The LC 480 instrument amplifies and monitors the development of target nucleic acid (amplicon) after each cycle of polymerase chain reaction (PCR).

The DNA target for this PCR assay is a gene encoding the glycerophosphodiester phosphodiesterase (*glpQ*) gene specific to *Borrelia* species in the relapsing fever group. This gene is not found in *Borrelia* species that cause Lyme disease.

The specific base pair DNA target sequence is amplified by PCR. The detection of amplicon is based on fluorescence resonance energy transfer, which utilizes 1 hybridization probe with a donor fluorophore, fluorescein, at the 3' end, and a second hybridization probe with an acceptor fluorophore, LC-Red 640, at the 5' end. When the target amplicon is present, the LC-Red 640 emits a measurable and quantifiable light signal at a specific wavelength. Presence of the specific organism nucleic acid is confirmed by performing a melting temperature analysis of the amplicon; the presence or absence of a melting peak in the appropriate temperature range is used to determine if a specimen is positive or negative. (Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Monday through Saturday

Report Available

Same day/1 to 4 days

Specimen Retention Time

1 week

Performing Laboratory Location

Rochester

Fees & Codes**Fees**

- Authorized users can sign in to [Test Prices](#) for detailed fee information.
- Clients without access to Test Prices can contact [Customer Service](#) 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact [Customer Service](#).

Test Classification

This test was developed and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. It has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

87478

LOINC® Information

| Test ID | Test Order Name | Order LOINC® Value |
|---------|--------------------------------------|--------------------|
| BMIPB | Borrelia miyamotoi Detection, PCR, B | 82475-5 |

| Result ID | Test Result Name | Result LOINC® Value |
|-----------|---------------------|---------------------|
| 618298 | B. miyamotoi PCR, B | 82475-5 |