

Diagnose
and manage
**tick-borne
diseases**
earlier



Get the insights you need from our
menu of tick-borne illness tests





When diagnosing tick-borne disease, timing is everything

As ticks expand their habitat across the US, the incidence of tick-borne disease has seen a corresponding increase. More than just Lyme disease, tick-borne illness can vary in severity and symptoms across different patients, and in different geographic regions.

Diagnosing and treating tick-borne illness can be delayed because patients are often unfamiliar with, or do not recognize, the symptoms of a tick-borne illness.

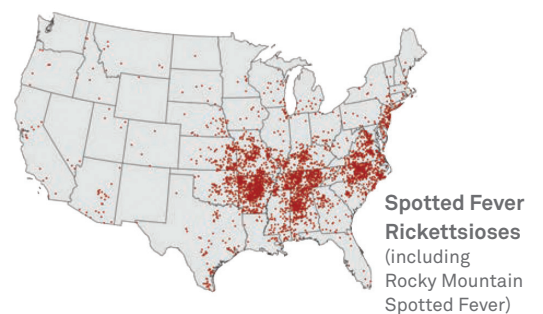
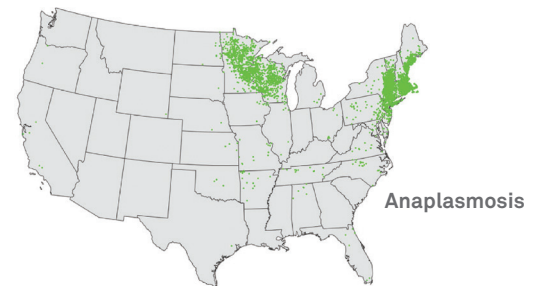
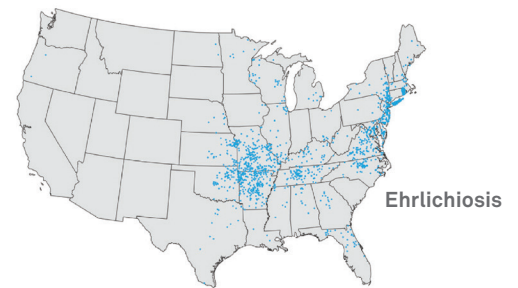
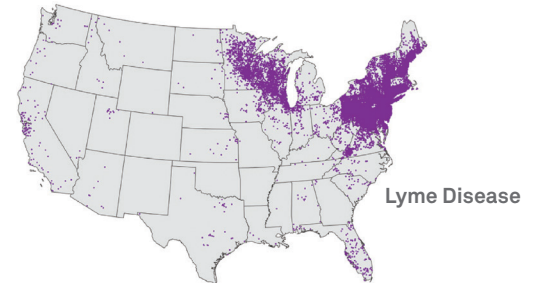
Quest Diagnostics understands the challenges that you and your patients face, and we have built a broad test menu of tick-borne disease testing solutions to help you identify and treat tick-borne illness sooner.

With both molecular and serologic testing available, Quest can give you the insights you need to make a timely, differential diagnosis—helping you and your patients make informed decisions about the appropriate treatment path.



Tick-borne disease— a growing problem

Tick-borne disease is increasing in prevalence across the US. There are multiple types of tick-borne illnesses, which can vary by region.¹



About Lyme disease

Lyme disease is a growing health issue; in fact, according to the Centers for Disease Control and Prevention (CDC), recent estimates suggest that each year approximately 476,000 Americans are diagnosed and treated for Lyme disease.²

Epidemiology

Lyme disease is caused by the bacterium *Borrelia burgdorferi*, which is transmitted through the bite of an infected tick.

- The black-legged tick, *Ixodes scapularis*, also called the deer tick, in the East and upper Midwest; the western black-legged tick, *Ixodes pacificus*, on the Pacific coast
- Approximately 35,000 cases reported every year; the true number of cases diagnosed annually is probably around 476,000²
- Peak months for infection are May through August, but infection can occur during any month

Symptoms and diagnosis

The earliest symptom of Lyme disease in most cases is the erythema migrans rash, which develops from 3 to 30 days after the bite.

- Up to 30% of patients never develop any kind of rash despite being infected
- Other early symptoms may include fever, chills, aches, and swollen lymph nodes
- Later symptoms in untreated patients may include arthritis, neurologic symptoms, and carditis

The diagnosis of Lyme disease is based on the presence of the signs and symptoms of the disease, and exposure to infected ticks. The patient may not have any awareness of having been bitten.

Quest Diagnostics offers both of the CDC-recommended 2-step testing processes for the serological diagnosis of Lyme disease

The standard two-tier test (STTT) includes an enzyme immunoassay or immunofluorescence assay that detects antibodies against the *B burgdorferi* bacterium, followed by a second immunoblot used for confirmation.¹

Step 1: Enzyme immunoassay (EIA) or immunofluorescence assay (IFA)—if negative, no further testing is recommended; if positive or indeterminate, the second step should be performed

Step 2: Immunoblot test—results are considered positive only if the EIA/IFA and immunoblot are both positive

Test name	Lyme Disease Ab with Reflex to Blot (IgG, IgM)	Test code	6646
------------------	--	------------------	------

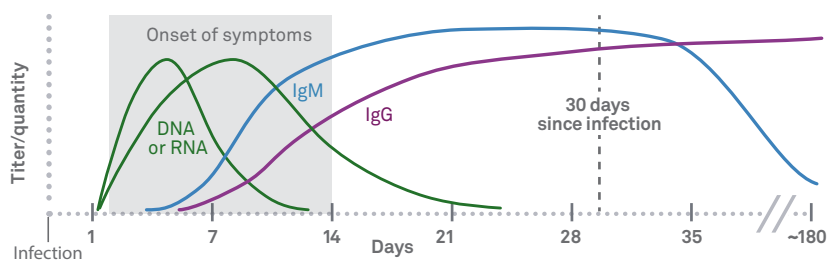
A modified two-tier test (MTTT) is part of an updated recommendation from the CDC for earlier detection and diagnosis of the disease. MTTT utilizes immunoassays rather than immunoblots in the second tier of the algorithm and may be able to assist in the identification of early Lyme disease within the first 30 days of infection.

Step 1: Test serum in an immunoassay measuring combined IgG and IgM antibodies to specific borrelial proteins

Step 2: Verify the results using a separate IgG and IgM immunoassay in place of a Western blot (immunoblot)

Test name	Lyme Disease Antibody with Reflex to Immunoassay (IgG, IgM)	Test code	39733
------------------	---	------------------	-------

When to choose STTT vs MTTT Lyme serology algorithm²



Modified two-tiered testing (MTTT) / Standard two-tiered testing (STTT)

— Note: This curve is a generalization and can vary for different organisms.

During early stage Lyme disease (first 30 days of infection), the MTTT has been shown to have improved sensitivity and detect more cases of Lyme compared to STTT. Either MTTT or STTT are appropriate for diagnosis after early stage Lyme disease.

Knowing which tests to choose and when

The CDC guidelines for the diagnosis of tick-borne diseases recommend lab testing to confirm diagnosis.¹ Depending on the timing and presence of symptoms, Quest offers tick-borne disease testing panels which can help provide the insight you need for diagnosis.

This test panel is most helpful in acute cases, and for differentiating pathogens and possible coinfection.

Tick-borne Disease, Acute Molecular Panel



When: 1-2 weeks after disease onset



The science: Real-time polymerase chain reaction (PCR)



Panel information (panel components can be ordered separately. See back page):

Test code	94322
Preferred specimen	3 mL whole blood collected in an EDTA (lavender-top) tube

When symptoms are unclear, and it is uncertain if or when a tick bite may have occurred, Quest's serology panel is the ideal choice.

Tick-borne Disease, Antibody Panel



When: Days/months/years after disease onset. This may confuse result interpretation in a couple of different ways (specific to Lyme):

- IgM antibodies in some individuals are known to persist for much longer than 2-3 months.
- CDC does not recommend testing for IgM with STTT if signs or symptoms exceed 30 days.



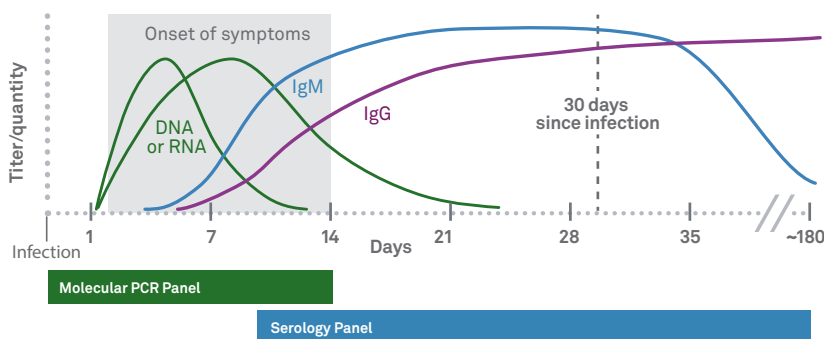
The science: Detection of IgM and IgG antibodies 4-7 days, respectively, or later after disease onset



Panel information (panel components can be ordered separately. See back page):

Test code	36942
Preferred specimen	2 mL serum collected in a serum separator tube (SST) and transferred to a plastic transport tube

A general pattern for molecular vs serologic testing²



— Note: This curve is a generalization and can vary for different organisms.





A comprehensive menu for tick-borne illness testing

With the acquisition of the US laboratory services of Imugen, Quest has created a more powerful and comprehensive testing portfolio for tick-borne diseases. With the addition of Imugen's tick-borne illness test menu, healthcare providers now have access to:



Full suite of molecular and serological testing, all under 1 roof and with 1 convenient set of test orders



Expanded test menu, providing a broader, more in-depth testing portfolio for tick-borne illnesses



A more comprehensive and differentiating test for *Borrelia* diagnosis with the addition of the Imugen *Borrelia* PCR test to the Quest portfolio.

Take advantage of the power of Quest to help you offer the best care to your patients

Test name	Description	Test code	CPT code(s)
<i>Borrelia</i> Species DNA, Real-Time PCR, with Reflexes, Blood	In the first stage, a PCR assay detects the potential presence of <i>Borrelia</i> species DNA. If <i>Borrelia</i> species DNA is detected, then an additional species-specific PCR assay is performed to identify and differentiate between <i>B burgdorferi</i> (Lyme disease) and <i>B miyamotoi</i> (tick-borne relapsing fever). A positive result for <i>Borrelia</i> species but negative result for <i>Borrelia burgdorferi</i> and <i>Borrelia miyamotoi</i> , may indicate that infection is caused by other <i>Borrelia</i> species.	39219	87801, 87476 ^a , 87478 ^a
<i>Borrelia</i> Species DNA, Real-Time PCR, with Reflexes, Synovial Fluid/CSF	In the first stage, a PCR assay detects the potential presence of <i>Borrelia</i> species DNA. If <i>Borrelia</i> species DNA is detected, then an additional species-specific PCR assay is performed to identify and differentiate between <i>B burgdorferi</i> (Lyme disease) and <i>B miyamotoi</i> (tick-borne relapsing fever). A positive result for <i>Borrelia</i> species but negative result for <i>Borrelia burgdorferi</i> and <i>Borrelia miyamotoi</i> , may indicate that infection is caused by other <i>Borrelia</i> species.	39218	87801, 87476 ^a , 87478 ^a
<i>Borrelia miyamotoi</i> Antibodies (IgG, IgM), Immunoassay	Positive antibody results suggest <i>B miyamotoi</i> infection; however, other tick-borne organisms may induce cross-reactive antibodies. Negative IgG and IgM results do not exclude the possibility of <i>B miyamotoi</i> infection.	39684	86619 (x2)

^a When appropriate, *Borrelia burgdorferi* DNA, Qualitative Real-Time PCR, Miscellaneous (test code 39209) and *Borrelia miyamotoi* DNA, Real-Time PCR, Miscellaneous (test code 93795) will be performed at an additional charge (CPT Code(s): 87476, 87478).

Make timely, differential tick-borne disease diagnoses with comprehensive testing from Quest



Panel components for Tick-borne Disease, Acute Molecular Panel and Tick-borne Disease, Acute Molecular Panel, Non-Lyme	Test code	CPT code(s)
<i>Borrelia</i> Species DNA, Qualitative Real-Time PCR, Miscellaneous ^b	15777	87801
<i>Anaplasma phagocytophilum</i> DNA, Qualitative Real-Time PCR ^b	17320	87468
<i>Babesia microti</i> DNA, Real-Time PCR ^b	37314	87469
<i>Borrelia miyamotoi</i> DNA, Real-Time PCR, Miscellaneous ^b	93795	87478
<i>Ehrlichia chaffeensis</i> DNA, Real-Time PCR ^b	11353	87484

Molecular panel name	Test code	CPT code(s)
Tick-borne Disease, Acute Molecular Panel ^b	94322	87801, 87468, 87469, 87478, 87484
Tick-borne Disease, Acute Molecular Panel, Non-Lyme ^b	32338	87468, 87469, 87478, 87484, (Excludes test code 15777)

Molecular test name	Test code	CPT code(s)
<i>Borrelia</i> Species DNA, Real-Time PCR, with Reflexes, Blood ^a	39219	87801, 87476, 87478
<i>Borrelia</i> Species DNA, Real-Time PCR, with Reflexes, Synovial Fluid/CSF ^a	39218	87801, 87476, 87478
<i>Borrelia miyamotoi</i> DNA, Real-Time PCR, Tick ^b	93794	87478
Tick ID with Reflex to <i>Borrelia</i> Species DNA, Real-Time PCR, Tick	90558	87168
<i>Borrelia</i> Species DNA, Qualitative Real-Time PCR, Tick ^b	15510	87801
<i>Rickettsia</i> Species DNA, Real-Time PCR ^b	70191	87798

Non-molecular tests	Test code	CPT code(s)
Malaria/ <i>Babesia</i> /Other Blood Parasites	831	87207
Tick (and Other Arthropods) Identification	3946	87168

^b This test was developed, and its analytical performance characteristics have been determined by Quest Diagnostics. It has not been cleared or approved by FDA. This assay has been validated pursuant to the CLIA regulations and is used for clinical purposes.

^c Available from Quest Diagnostics Nichols Institute, Chantilly, VA.

Panel components for Tick-borne Disease, Antibody Panel with Reflex to Blot (IgG, IgM)	Test code	CPT code(s)
Lyme Disease Ab with Reflex to Blot (IgG, IgM)	6646	86618
<i>Anaplasma phagocytophilum</i> Antibodies (IgG, IgM) ^b	34464	86666 (x2)
<i>Babesia microti</i> Antibodies (IgG, IgM), IFA ^b	34300	86753 (x2)
<i>Babesia duncani</i> (WA1) Antibody (IgG), IFA ^b	17231	86753
<i>Ehrlichia chaffeensis</i> (IgG, IgM) ^b	34271	86666 (x2)

Antibody panel name	Test code	CPT code(s)
Tick-borne Disease, Antibody Panel with Reflex to Blot (IgG, IgM)	36942	86666 (x2), 86753 (x3), 86618, 86666 (x2)

Antibody test name	Test code	CPT code(s)
<i>Anaplasma phagocytophilum</i> and <i>Ehrlichia chaffeensis</i> Antibody Panel ^b	10611	86666 (x4)
<i>Borrelia miyamotoi</i> Antibodies (IgG, IgM) ^b	39684	86619 (x2)
Colorado Tick Fever Antibody Panel, IFA	34986	86790 (x2)
Febrile Antibodies Panel	91121	86757 (x4), 86622 (x2), 86768 (x5)
Febrile Antibodies and Francisella Panel	91122	86757 (x4), 86622 (x2), 86768 (x5), 86000
<i>Francisella tularensis</i> Antibody, Direct Agglutination (DA)	35176	86000
Lyme Disease Antibodies (IgG, IgM), Immunoblot	8593	86617 (x2)
Lyme Disease Antibody (IgG), Immunoblot	29477	86617
Lyme Disease Antibodies (IgG, IgM), Immunoblot, CSF	70028	86617 (x2)
Lyme Disease Antibody with Reflex to Immunoassay (IgG, IgM)	39733	86618
Lyme Disease Antibody Index for CNS Infection	34194	82040, 82042, 82784 (x2), 86618 (x4)
<i>Rickettsia</i> (RMSF) Antibodies (IgG, IgM) with Reflex to Titers	6419	86757 (x2)
<i>Rickettsia</i> Antibody Panel with Reflex to Titers	37507	86757 (x4)
<i>Rickettsia conorii</i> Antibody Panel, IFA ^c	15332	86757(x2)
<i>Rickettsia</i> (Typhus Fever) Antibodies (IgG, IgM) with Reflex to Titers	37503	86757 (x2)
Rickettsial Disease Panel	37478	86638 (x4), 86757 (x4)

For complete test details, visit QuestDiagnostics.com/tick

References

1. CDC. Tickborne diseases of the United States: a reference manual for healthcare providers. 6th edition, 2022. Accessed January 5, 2023. <https://www.cdc.gov/ticks/tickbornediseases/TickborneDiseases-P.pdf>
2. CDC. Emerging tickborne diseases: CDC public health grand rounds emerging tickborne diseases. March 21, 2017. Accessed June 9, 2021. <https://www.cdc.gov/grand-rounds/pp/2017/20170321-tickborne-diseases.html>

The CPT® codes provided are based on American Medical Association guidelines and are for informational purposes only. CPT coding is the sole responsibility of the billing party. Please direct any questions regarding coding to the payer being billed.

Test codes may vary by location. Please contact your local laboratory for more information.

Image content features models and is intended for illustrative purposes only.

QuestDiagnostics.com

Quest, Quest Diagnostics, any associated logos, and all associated Quest Diagnostics registered or unregistered trademarks are the property of Quest Diagnostics. All third-party marks—® and ™—are the property of their respective owners. © 2023 Quest Diagnostics Incorporated. All rights reserved. SB8608 02/2023