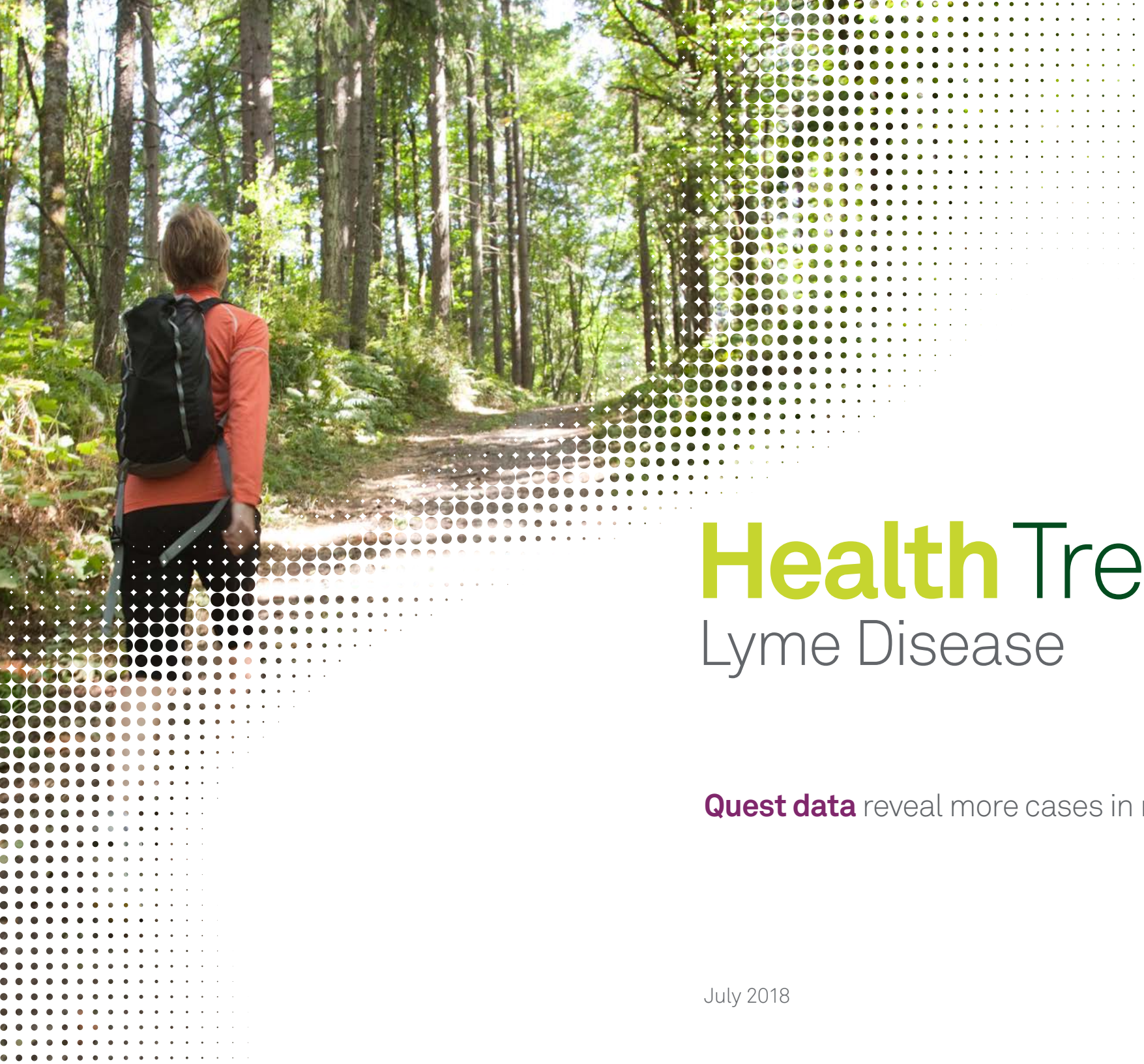


Health Trends™

Lyme Disease

Quest data reveal more cases in more places.

July 2018

Quest Diagnostics™

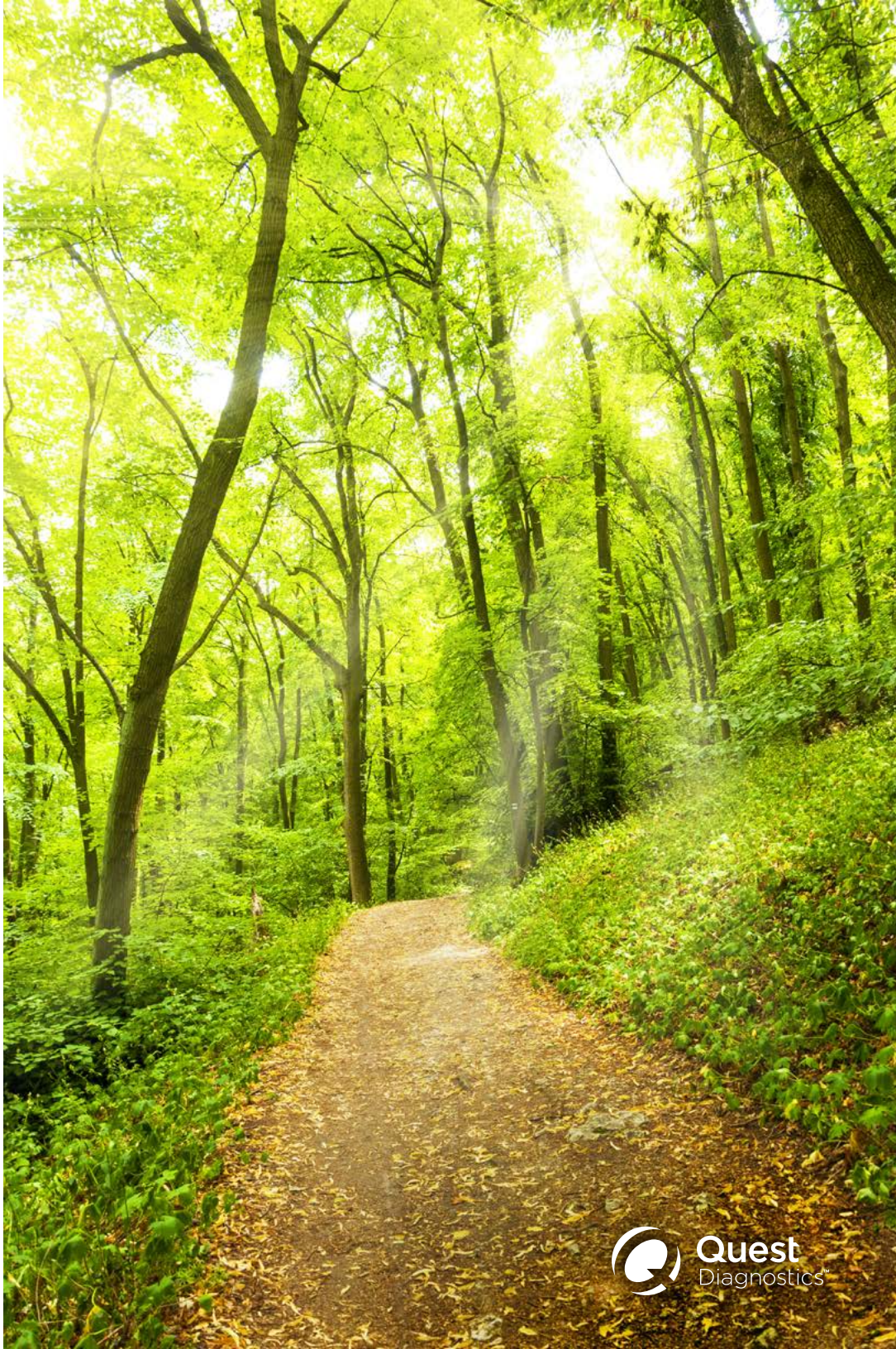
Health Trends™
Lyme Disease

In recent years, tick-borne diseases – most notably Lyme disease – have captured public attention and spurred discussion about the best ways to diagnose and treat disease, as well as minimize risk.

In this Quest Diagnostics Health Trends™ report, Quest identifies rates of Lyme disease based on six million de-identified results of immunoglobulin (IgG) laboratory tests ordered by physicians for patients in all 50 states and the District of Columbia. While IgG test results are indicative of Lyme disease, only a physician can diagnose the condition. For more on our analysis, please refer to the Methodology on **page 9**.

To our knowledge, this report provides the first and most current nationally representative analysis of Lyme disease based on laboratory data. We hope it sheds insights to help practitioners, patients, and policymakers address this evolving disease threat.

For more information about Quest Diagnostics, visit **www.QuestDiagnostics.com**



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Lyme Disease

Facts about Lyme

Lyme disease is a potentially serious bacterial infection that is spread by bites from infected blacklegged ticks and deer ticks. The bacterium, called *Borrelia burgdorferi*, causes more than 300,000 illnesses each year, according to the Centers for Disease Control and Prevention (CDC).

Where ticks live:


Brushy or wooded areas


Long grass


Fallen leaves


On animals

People who have been infected with Lyme by a tick may have flu-like and/or other symptoms including:


Fever


Skin rash


Headache


"Bullseye" shaped mark at the tick-bite location


Fatigue

However, in some cases, symptoms may be mild or absent.

Source: https://www.cdc.gov/lyme/index.html

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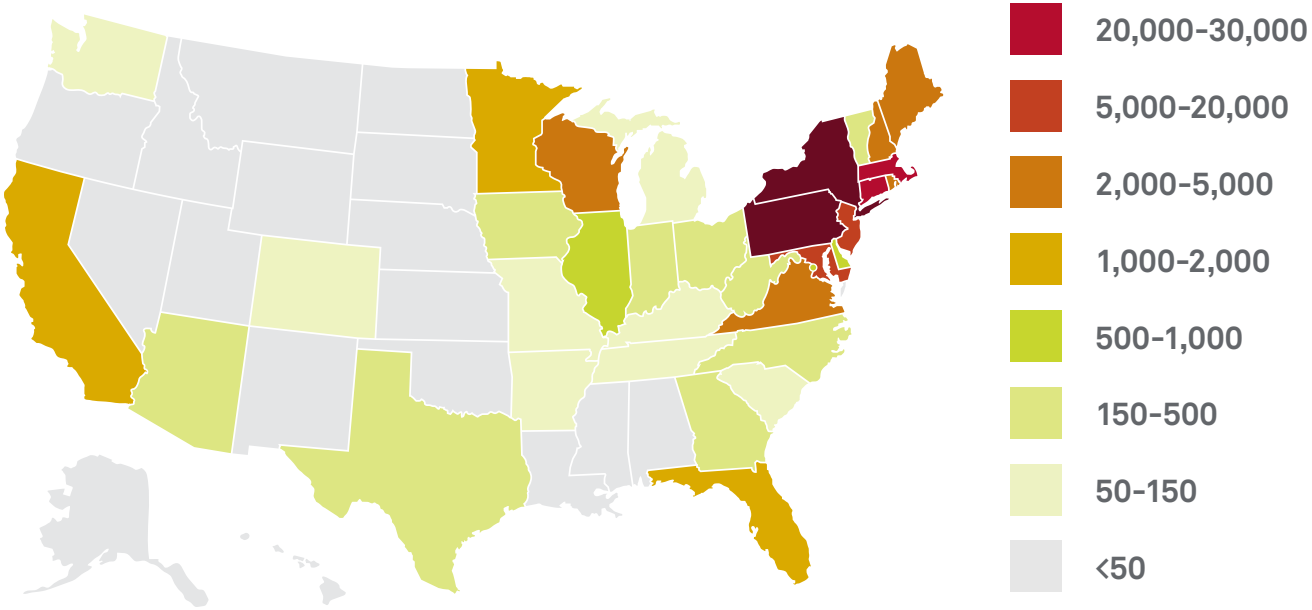
Lyme Disease

Increasing incidence, with more infections

While Lyme disease has been concentrated in certain areas of the United States, the number of positive test results for Lyme is increasing, including in areas not historically associated with high rates of the disease.

Where people are being infected:



During an 8-year surveillance period from 2010-2017, positive test results identifying infection with *B. burgdorferi* that causes Lyme disease were found in each of the 50 states and in Washington, District of Columbia.

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Lyme Disease

Lyme Facts

More Cases

Where people are being infected

Rates of infections are rising

More Places

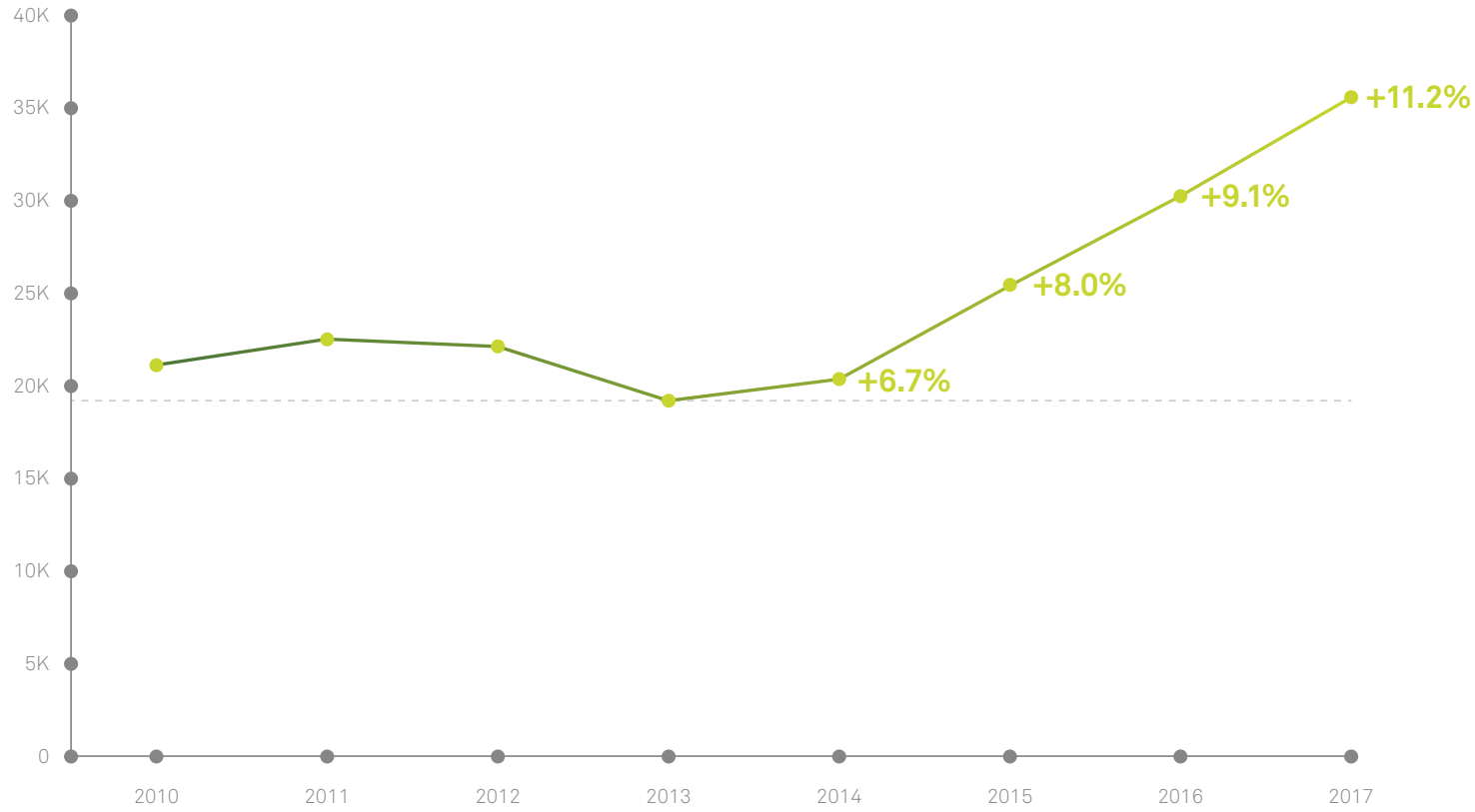
Where Lyme has been

Where Lyme is making new inroads

Safety

Rates of positive test results are rising dramatically

Positive IgG test results 2010 through 2017



After years of consistent rates of positive test results, Lyme disease increased steadily from 2014 to 2017. The rate of positive test results rose progressively from 6.7% in 2014 to 11.2% in 2017.

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Lyme Disease

Where Lyme is and where it is spreading

Pennsylvania and New England, where Lyme has been most common, experienced a sharp increase in positive test results from 2015 to 2017.

Number of infected patients:

New England

2015 7,718

2017 11,549 **+49.6%**

Pennsylvania

2015 5,619

2017 10,001 **+78.0%**

In 2017, New England and Pennsylvania (states historically associated with Lyme disease) had 11,549 and 10,001 positive test results, respectively. Compared to 2015, this represents a 49.6% increase in disease occurrence for New England and 78.0% increase for Pennsylvania.

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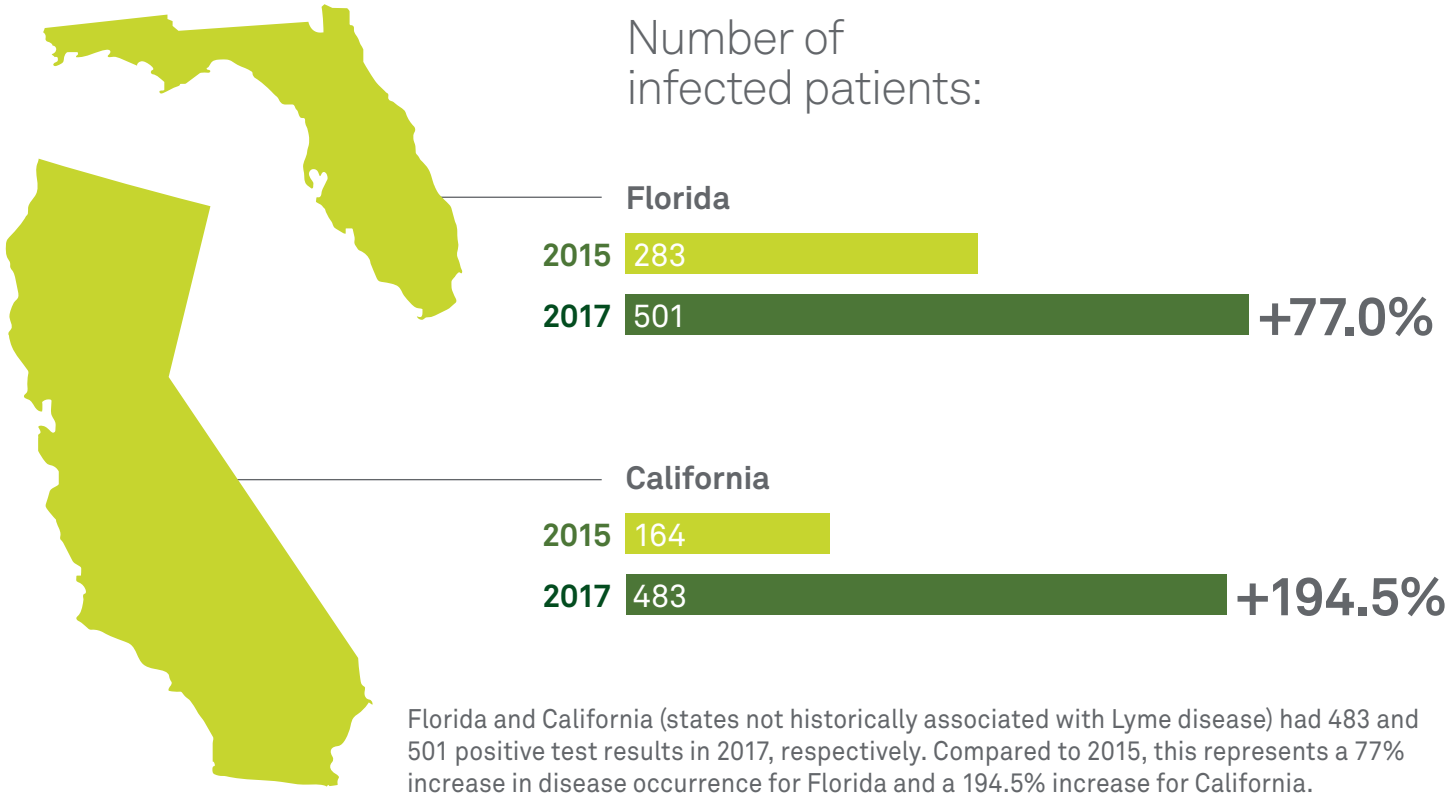
Lyme Disease

Where Lyme is making new inroads

Incidence of Lyme is also increasing dramatically in places where it was not previously common. Outside of the northeastern US, which is historically associated with Lyme disease, the two states with the largest absolute increases in the number of positive test results from 2015 to 2017 were Florida and California. Notable increases were also observed in Georgia, Arizona, Ohio, Texas, Tennessee, and Virginia.



Florida and California (states not historically associated with Lyme disease) had 483 and 501 positive test results in 2017, respectively. Compared to 2015, this represents a 77% increase in disease occurrence for Florida and a 194.5% increase for California.

Protecting against Lyme disease

There are many ways to prevent the disease, while still enjoying summer and fall hobbies and activities. Here are several prevention tips to follow:

Don't pitch a tent or set up camp in a location with leaf litter

Wear a hat and secure long hair by tying it back

Stay away from high grass

Tuck pants inside socks or boots

Wear long-sleeved, light-colored shirts and pants

Wear gardening gloves

If you have been bitten by a tick or there is reason to believe you might have contracted a tick-borne disease, your physician can order a laboratory test.

A leader in infectious disease testing, Quest recently introduced a tick-borne test service that aids the physician in identifying infection of one or more tick-borne diseases, including Lyme disease in a single patient specimen.

Health Trends™
Lyme Disease

Study Methodology

This study examines patterns and trends in de-identified laboratory test results performed by one or more Quest Diagnostics laboratories in the United States. The study includes Lyme testing data of patients in all 50 states and the District of Columbia. It is based on an analysis of immunoglobulin (IgG) test results for Lyme disease performed by the company's laboratories. IgG testing identifies antibodies produced by the body to the *Borrelia burgdorferi* bacterium responsible for Lyme disease. These antibodies may reflect recent or long-standing disease, including post-treated disease. Therefore, the test results may in some cases indicate current or long-standing (including post-treated) Lyme disease. However, physicians would typically order IgG testing based on suspicion of recent infection. Physicians diagnose Lyme disease based on various factors, including laboratory test results and symptoms.

The study's strengths are its size and national scope and use of an objective laboratory method, versus surveys or polls, which may be subject to user misrepresentation or error. Study limitations include geographic disparities and inability to confirm laboratory findings through access to medical records or clinical evaluation.

Quest Diagnostics Health Trends studies are performed on aggregate de-identified data in compliance with applicable privacy regulations and the company's strict privacy policies, and follow procedures approved by the Western Institutional Review Board.

About Quest Diagnostics Health Trends™

Quest Diagnostics manages the largest database of de-identified clinical laboratory data, based on 44 billion laboratory test results. As part of the company's commitment to empowering better health, the company shares clinically significant insights in Quest Diagnostics Health Trends studies that empower patients, healthcare practitioners, and policymakers. Quest Diagnostics Health Trends studies are developed in collaboration with top researchers, and institutions, published in peer-reviewed medical journals and made available to the public online. Quest Diagnostics Health Trends reports have yielded novel insights to aid the management of allergies and asthma, clinical (prescription) drug misuse, chronic kidney disease, diabetes, heart disease, influenza, and wellness. The company also produces the **Drug Testing Index (DTI)™**, a series of reports on national workplace drug positivity trends. More information can be found online at: **www.QuestDiagnostics.com/HealthTrends.**

Quest Diagnostics empowers people to take action to improve health outcomes.

For more information, visit **www.QuestDiagnostics.com**

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