

DATE:	04/30/2024
TO:	Health Alert Network
FROM:	Debra L. Bogen, MD, FAAP, Acting Secretary of Health
SUBJECT:	Lyme Disease and Other Tickborne Diseases in Pennsylvania
DISTRIBUTION:	Statewide
LOCATION:	Statewide
STREET ADDRESS:	n/a
COUNTY:	n/a
MUNICIPALITY:	n/a
ZIP CODE:	n/a

This transmission is a “Health Advisory” provides important information for a specific incident or situation; may not require immediate action.

HOSPITALS: PLEASE SHARE WITH ALL MEDICAL, PEDIATRIC, INFECTION CONTROL, NURSING AND LABORATORY STAFF IN YOUR HOSPITAL; EMS COUNCILS: PLEASE DISTRIBUTE AS APPROPRIATE; FQHCs: PLEASE DISTRIBUTE AS APPROPRIATE; LOCAL HEALTH JURISDICTIONS: PLEASE DISTRIBUTE AS APPROPRIATE; PROFESSIONAL ORGANIZATIONS: PLEASE DISTRIBUTE TO YOUR MEMBERSHIP

Summary

- Tick bite-related emergency department visits have increased recently in Pennsylvania.
- Health care providers should have a heightened clinical suspicion for tickborne diseases in persons with clinically compatible symptoms.
- Rare tickborne diseases, including *B. miyamotoi* and Powassan virus, continue to be found in ticks in multiple Pennsylvania counties and human cases have been reported.
- Alpha gal allergy syndrome has been reported in Pennsylvania residents; health care providers should consider alpha gal allergy syndrome in persons presenting with mammalian meat allergies.
- For questions, please call 1-877-PA-HEALTH (1-877-724-3258) or your local health department for more information.

The Pennsylvania Department of Health (DOH) has identified recent sustained increases in tick bite-related emergency department visits in nearly all regions of the state. This trend was expected, as tick exposures in Pennsylvania generally increase during spring and summer months, and serves as an important reminder that tickborne diseases occur seasonally in Pennsylvania. In addition, an increase in persons seeking care for Lyme disease (LD) is anticipated in the coming weeks to months as the peak period for LD is late May through early August. From April through August, health care providers should have a heightened clinical suspicion for tickborne diseases, although tickborne diseases can occur any time of the year.

Because of changes to the national case definition, LD reporting in Pennsylvania is now entirely based on laboratory reports DOH receives directly from lab-based reporting and no longer includes clinical reports. Prior to January 1, 2022, LD cases were classified based on laboratory and clinical information obtained from health care providers. Since that date, clinical information is no longer required, and LD cases are reported based only on laboratory criteria. All other tickborne diseases,

confirmed or suspected, should be reported to the DOH web-based electronic disease surveillance system, PA-NEDSS:

<https://www.nedss.state.pa.us/nedss/default.aspx>

PENNSYLVANIA TICK SURVEILLANCE DATA

Recent tick collections during 2022-2023 by the Pennsylvania Department of Environmental Protection (DEP) documented the presence of *Ixodes scapularis* (known commonly as the blacklegged tick or deer tick) infected with *Borrelia burgdorferi* (the bacterium that causes Lyme disease) in all 67 Pennsylvania counties.

EPIDEMIOLOGY OF TICKBORNE DISEASES IN PENNSYLVANIA

In Pennsylvania, LD is the most commonly reported tickborne disease and is usually reported during the months of May through September throughout the Commonwealth. In 2022, Pennsylvania ranked ninth in the nation for the number of LD cases reported by population. In 2022, 8,413 LD cases were reported in Pennsylvania, representing an incidence of 64.9 cases/100,000 persons. Most were reported between May and August, with 47.9% reported between June and August. Of Pennsylvania's 67 counties, all reported LD, ranging from 8 cases in Sullivan County to 601 cases in Chester County. Incidence ranged from 10.4 cases/100,000 persons in Lehigh County to 431.6 cases/100,000 persons in Potter County. 2022 is the first year for which LD cases were reported using the new case definition which eased the burden of investigating LD reports; therefore, an increase in case count from prior years was expected.

Anaplasmosis, a bacterial disease transmitted by deer ticks, has been on the rise in the United States and Pennsylvania. Anaplasmosis cases have doubled nearly every year for the past five years and are now found in almost every county in Pennsylvania. DEP tick studies have found deer ticks infected with *Anaplasma phagocytophilum* in every Pennsylvania county. In 2022, Pennsylvania reported 581 anaplasmosis cases.

Several other non-Lyme tickborne diseases are also reported annually in Pennsylvania, including babesiosis, ehrlichiosis, and spotted fever rickettsiosis. Additionally, human cases of Powassan virus disease, a tickborne arbovirus, were documented in 2011 and 2017-2023. Results from the DEP tick studies conducted during 2019-2023 found additional evidence of Powassan in multiple counties. The instructions and submission form for Powassan virus and other arboviruses can be found here: <https://www.health.pa.gov/topics/Labs/Pages/West-Nile.aspx>

In 2022, Pennsylvania reported its first human case of Heartland virus, an arbovirus transmitted by the lone star tick. Neighboring states have identified Bourbon virus in lone star ticks collected from the environment. Lone star ticks are established in some areas of Pennsylvania.

Additionally, the DEP tick studies conducted in 2020-2021 found about 1.3% of adult *I. scapularis* ticks in Pennsylvania are infected with *Borrelia miyamotoi*. *B. miyamotoi* was found in ticks in 39 Pennsylvania counties. To date, *B. miyamotoi* disease has been reported in fewer than 20 persons in Pennsylvania. *B. miyamotoi* disease should also be considered in persons presenting with symptoms of tickborne diseases (TBDs). More information on *B. miyamotoi* disease can be found here: <https://www.cdc.gov/relapsing-fever/miyamotoi/index.html>

In 2023, the DOH collected alpha gal allergy syndrome (AGS) positive reports from testing labs to conduct interviews with cases. AGS is an allergy to mammalian meat products associated with the bite of a lone star tick. Lone star ticks are present in PA, although populations are low at this time. AGS is reported in about 50 persons in PA per year. Persons with AGS may experience mild

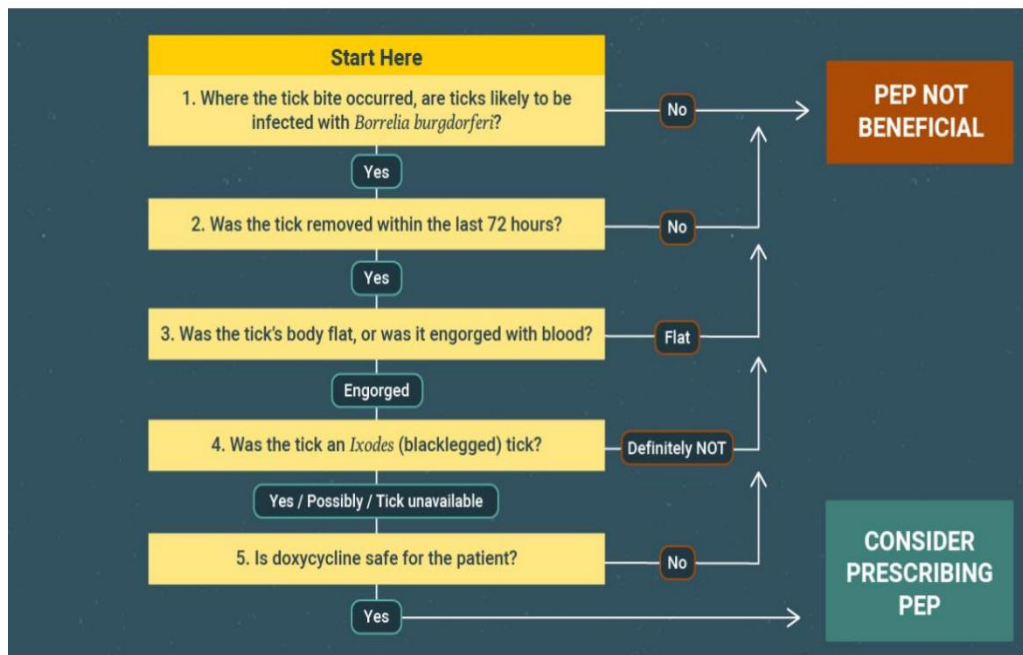
gastrointestinal irritation to anaphylaxis requiring hospitalization after consuming mammalian meat products. To learn more about AGS in the United States, see this publication. <https://www.cdc.gov/mmwr/volumes/72/wr/mm7230a2.htm>

To learn more about lone star ticks and their populations in PA, see the DEP site on tick surveillance. <https://www.dep.pa.gov/Business/ProgramIntegration/Vector-Management/Ticks/Pages/default.aspx>

LYME DISEASE POST EXPOSURE PROPHYLAXIS (PEP)

In Pennsylvania, where LD is endemic, a single dose of doxycycline may be indicated following an *Ixodes scapularis* (deer tick) tick bite to aide in the prevention of LD. The following decision-making tool can assist with determining whether Lyme PEP is beneficial. The answer to the first question, “Where the tick bite occurred, are ticks likely to be infected with *Borrelia burgdorferi*?” will always be “Yes” if the bite occurred in Pennsylvania.

Lyme Disease PEP: Clinical Decision-Making Aid



Although PEP can be used to prevent LD, it is not 100% effective. If the patient develops signs or symptoms of LD after PEP, please treat accordingly.

Please note, Lyme PEP has only been shown to be beneficial for the prevention of LD. It has not been shown to be beneficial for the prevention of anaplasmosis, *B. miyamotoi*, ehrlichiosis, or spotted fever rickettsiosis and may only delay onset in these cases.

DIAGNOSIS AND TREATMENT OF TICKBORNE DISEASES

The CDC has produced a reference manual for health care providers that provides comprehensive information on tick identification, disease distribution, clinical signs and symptoms, laboratory testing, and treatment for the tickborne diseases that are endemic to North America. This manual is freely available at: [Tickborne Diseases of the United States | Tick-borne Diseases | Ticks | CDC](#)

LABORATORY INFORMATION

DOH's Bureau of Laboratories (BOL) has capacity to perform LD testing for all uninsured or underinsured Pennsylvania residents. Other requests will be considered on a case-by-case basis. Since LD is endemic, DOH wants to ensure all Commonwealth residents have access to this important testing. Specimens from patients suspected with LD infection may be submitted to BOL for screening and confirmatory testing of LD. A healthcare provider's order and BOL Lyme disease testing form ([BOL Micro Specimen Submission Form.pdf \(pa.gov\)](#)) must accompany the serum sample. For access to the specimen collection guidance document, contact BOL at 484-870-6416 or ldettinger@pa.gov. BOL employs a two-step serological process consistent with CDC recommendations. This process tests blood for evidence of antibodies against the LD bacteria. Both steps can be done using the same serum sample.

LYME DISEASE TESTING RECOMMENDATIONS

Antibody Testing

In most cases, serum testing is recommended. For persons presenting with compatible symptoms, the following tests may be conducted:

1. Standard two-tier test (STTT)
 - a. The first tier is a serum antibody test and may be an enzyme immunoassay (EIA) or immunofluorescence assay (IFA) for IgM and/or IgG.
 - b. If the EIA/IFA is positive, this will reflex to a Western immunoblot. If this is positive, the STTT is considered positive.
2. Modified two-tier test (MTTT)
 - a. Recently approved MTTTs will run two EIA tests concurrently or sequentially. A positive result on both is considered a positive test result.
 - b. The FDA has approved some MTTT testing platforms at commercial labs.

Antibodies normally persist in the blood for months or even years after the infection is gone; therefore, the test cannot be used to determine if a person no longer has LD. Regular IgG immunoblot testing in persons who have previously had LD is not recommended.

Culture

Less commonly, *B. burgdorferi* may be isolated in culture; however, this may not yield positive results in persons who have LD as *B. burgdorferi* is difficult to isolate in culture.

Nuclei Acid Amplification Test (NAAT) Testing

A group-specific NAAT test may also be conducted; however, this has been shown to be less useful for LD caused by *B. burgdorferi* (the predominant cause in Pennsylvania) and more useful in LD caused by *B. mayonii* (the establishment of *B. mayonii* has yet to be documented in Pennsylvania).

Immunohistochemical Assay

In cases in which biopsy or autopsy tissue is obtained, immunohistochemical assays to detect *B. burgdorferi* group-specific antigens may be conducted.

Laboratory Tests that are Not Recommended

- Capture assays for antigens in urine
- Culture, immunofluorescence staining, or cell sorting of cell wall-deficient or cystic forms of *B. burgdorferi*
- Lymphocyte transformation tests
- Quantitative CD57 lymphocyte assays

- “Reverse Western blots”
- In-house criteria for interpretation of immunoblots
- Measurements of antibodies in joint fluid (synovial fluid)
- **IgM or IgG tests without a previous ELISA/EIA/IFA***

*PA’s LD testing data indicate a significant proportion of tests are IgG western blots or immunoblots only, without a corresponding ELISA/EIA/IFA. Under the 2022 LD case definition, these are not counted as cases; therefore, even if positive, they are not included in annual case counts.

For further information on LD testing and the interpretation of test results, please see [APHL Guidance and Interpretation of Lyme Disease and Serologic Test Results](#).

TICK BITE PREVENTION AND TICK REMOVAL

Individuals with exposure to wooded and brushy areas with high grass and leaf litter are at greatest risk of tick exposure. It is important to remind patients to reduce the likelihood of a tick bite by:

- walking in the center of trails and avoiding areas with high grass and leaf litter;
- using EPA approved insect repellents on exposed skin and over clothing;
- using products that contain 0.5% permethrin on shoes, clothing, and gear;
- wearing light-colored clothing, which will make it easier to see crawling ticks;
- conducting full-body tick checks (including pets) after spending time in tick habitats;
- bathing or showering within 2 hours after coming indoors; and
- placing clothing worn outdoors in the dryer on high heat for 10 minutes to kill ticks.

If an attached tick is found, it should promptly be removed using fine-tipped tweezers. The tick should be grasped as close to the skin’s surface as possible and pulled upward with steady, even pressure. CDC’s directions for tick removal can be found here:

<https://www.cdc.gov/lyme/removal/index.html>.

It is common for individuals who remove a tick to want it to be tested. However, testing of individual ticks is discouraged for the following reasons:

- If the tick tests positive for disease-causing organisms, that does not necessarily mean that the bitten individual has been infected.
- If the bitten individual has been infected, they are likely to develop symptoms before results of the tick test are available. Patients with symptoms should not wait for tick testing results before starting treatment.
- Negative results can lead to false assurance. For example, the individual may have been unknowingly bitten by a different tick that was infected.
- After sharing these limitations, if a person still would like to have the tick tested, they can find more information on tick testing [here](#).

Anecdotal reports indicate overuse of antibiotics may be occurring as a result of tick testing. **Tick testing results should not be used as a clinical tool and diagnosis and treatment of a patient should never be based on tick testing results.** Data indicate the median attachment time for ticks that are tested is well below the minimum attachment time needed for transmission of most tick-borne disease. Additionally, studies show that even fully engorged, *B. burgdorferi* infected ticks have a low chance of transmitting LD to a patient.¹ **Patients should be treated based only on symptoms and their own laboratory testing results and not based on tick testing results.**

LYME AND OTHER TICKBORNE DISEASES WEBINAR

The Pennsylvania DOH has released a [Lyme and Other Tickborne Diseases webinar](#) on TRAIN PA for healthcare providers. Continuing education credits (CME, CEU) are available upon completion of the webinar. If you do not already have a Train username and password, you may register for TRAIN PA and register for the course.

MORE INFORMATION ON LYME AND OTHER TICKBORNE DISEASES

- Lyme Disease Q&A for Health Care Providers in Pennsylvania - https://www.health.pa.gov/topics/Documents/Diseases%20and%20Conditions/Lyme%20Q_A%20for%20HCP.pdf
- Anaplasmosis Q&A for Health Care Providers in Pennsylvania - https://www.health.pa.gov/topics/Documents/Diseases%20and%20Conditions/Vectorborne/Anaplasmosis%20Q_A%20for%20HCP.pdf
- New England Journal of Medicine Interactive Perspective Tickborne Diseases - [Tickborne Diseases | NEJM](#)
- CDC Poster: The Many Forms of Lyme Disease Rashes (Erythema Migrans) - https://www.cdc.gov/lyme/resources/NCEZID_rash_poster3r1-508.pdf

TICKBORNE DISEASE DASHBOARD

DOH recently launched a new online dashboard to provide health care providers and residents with more timely information about various tickborne diseases in Pennsylvania. The dashboard will allow health care providers and residents to see where ticks are most active so that they can be well prepared to protect themselves from tickborne diseases and take appropriate precautions while enjoying outdoor activities. The dashboard can be found on our tickborne diseases website here: <http://www.health.pa.gov/ticks>.

Citations

¹ Hofhuis A, van de Kasstele J, Sprong H, van den Wijngaard CC, Harms MG, Fonville M, Docters van Leeuwen A, Simões M, van Pelt W. Predicting the risk of Lyme borreliosis after a tick bite, using a structural equation model. PLoS One. 2017 Jul 24;12(7).

For questions, please call your local health department or the Pennsylvania Department of Health at 1-877-PA HEALTH (1-877-724-3258).

Individuals interested in receiving future PA-HANs can register at:

<https://ondemand.mir3.com/han-pa-gov/login/>

Categories of Health Alert messages:

Health Alert: conveys the highest level of importance; warrants immediate action or attention.

Health Advisory: provides important information for a specific incident or situation; may not require immediate action.

Health Update: provides updated information regarding an incident or situation; unlikely to require immediate action.

This information is current as of April 30, 2024, but may be modified in the future.