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PREVENTING, DIAGNOSING, AND MANAGING TICKBORNE DISEASES

- Hundreds of New Yorkers are diagnosed with a tickborne disease (TBD) each year. Reports of TBDs have been increasing in New York City (NYC) as the geographic range and seasonality of several tick species expands.
- Most New Yorkers diagnosed with a TBD reported travel to an endemic area, including upstate New York, Long Island, and surrounding states.
- Tick surveillance continues to identify blacklegged ticks in Staten Island and the Bronx, along with the emergence of Gulf Coast ticks in Staten Island, that have tested positive for several TBD pathogens.
- Locally acquired cases of Lyme disease and babesiosis continue to be reported in Staten Island and the Bronx.
- Be aware of endemic and emerging ticks and TBDs in and around NYC, how to test for TBDs or request assistance for specialized testing, and where to find guidance on treatment.

Nearly 500,000 people are diagnosed and treated for tickborne diseases (TBDs) each year in the United States (US). In New York City (NYC), reports of TBDs have been increasing as the geographic range of several tick species has expanded.¹⁻³ The TBD that is most reported in NYC is Lyme disease, followed by anaplasmosis and babesiosis.² Very few cases of ehrlichiosis, spotted fever rickettsioses, including Rocky Mountain

spotted fever (RMSF), or Powassan virus disease are reported in NYC.²

Most cases of TBDs are associated with travel outside of NYC, commonly to upstate New York, Long Island, Connecticut, Massachusetts, New Jersey, and Pennsylvania.² Not all areas of NYC are suitable for all ticks because of their complex life cycle that requires an appropriate habitat and host animals. However, tick surveillance shows the blacklegged tick and lone star tick are established in Staten Island and the northern Bronx, where cases of Lyme disease and babesiosis without associated travel have been reported for several years (**Box 1^{2,4}**). Tick surveillance has also detected 2 new tick species in NYC. Gulf Coast ticks were first identified in Staten Island in

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BLACKLEGGED TICK



LONE STAR TICK



AMERICAN DOG TICK



GULF COAST TICK

ASIAN
LONGHORNED TICK

2018,⁴ and Asian longhorned ticks have become well established in Staten Island and are displacing populations of blacklegged ticks.²

The geographic expansion of several tick species and the increase in TBDs over the past several decades are associated with increases in suburban development and deforestation in the northeastern US.¹ The changing landscape puts people in close contact with host species, such as small rodents and deer, that enable the spread and growth of tick populations.¹ Furthermore, changing climate patterns can alter the natural environment and long-standing ecological relationships, causing changes in seasonality and location of TBDs.¹

TICKS OF CONCERN

The main ticks of concern in the northeastern US are the blacklegged tick (*Ixodes scapularis*), lone star tick (*Amblyomma americanum*), and American dog tick (*Dermacentor variabilis*).⁵ Other ticks of concern have expanded their range to the northeast, such as the Gulf Coast tick (*Amblyomma maculatum*), which has migrated northward from the south and mid-Atlantic US and is now established in Staten Island.^{2,5}

The **blacklegged tick** is a vector for several TBD pathogens, including the bacteria that can cause Lyme disease (*Borrelia burgdorferi*) and anaplasmosis (*Anaplasma phagocytophilum*), the intraerythrocytic parasite that causes babesiosis (*Babesia microti*), the Powassan virus that causes

Powassan virus disease, and *Borrelia miyamotoi*, the bacteria that causes *Borrelia miyamotoi* disease (sometimes called hard tick relapsing fever).⁵

In NYC, the blacklegged tick is established in Staten Island and areas of the Bronx, including Pelham Bay Park and Hunter Island.² Testing of these ticks has consistently detected *B burgdorferi* in up to 50% of those sampled (unpublished data, NYC Vector Surveillance). The pathogens *A phagocytophilum*, *B microti*, and *B miyamotoi* have each been detected in less than 7% of ticks sampled in recent years (unpublished data, NYC Vector Surveillance). Since 2017, only 8 ticks, and of those, only one tick in 2021, have been collected from the Bronx and have tested positive for Powassan virus (unpublished data, NYC Vector Surveillance).² The blacklegged tick is found in most New York counties outside of NYC.^{6,7}

Cases of anaplasmosis have been increasing, most notably among Manhattan and Brooklyn residents.² Cases of Lyme disease and babesiosis have plateaued recently, but local transmission is ongoing in Staten Island and in focal areas of the Bronx.² Powassan virus disease is rare, and no locally acquired cases have been reported in NYC.² *B miyamotoi*, a spiral-shaped bacterium distantly related to *B burgdorferi*, has also been found in blacklegged ticks in the northeastern US.⁸ At this time, infection with *B miyamotoi* is thought to be an uncommon cause of illness,

BOX 1. TICKBORNE DISEASES IN NEW YORK CITY^{a-c,2,4}

- Lyme disease continues to be the most reported tickborne disease (TBD), though cases leveled off from 2018 to 2020, with an average of 764 cases per year and a slight increase to 820 cases in 2021. Similarly, cases of babesiosis also leveled off from 2018 to 2020, with an average of 84 cases per year, and a slight increase to 102 cases in 2021
- Cases of anaplasmosis increased from 65 in 2018 to 125 in 2021, a 92% increase
- TBDs reported with less frequency include ehrlichiosis (average, 13 cases/y, 2018-2021), spotted fever group rickettsioses, including Rocky Mountain spotted fever (average, 2 cases/y, 2018-2021), and, rarely, tularemia and Powassan virus disease
- Blacklegged and lone star ticks are established in Staten Island and the Bronx, and Gulf Coast ticks are established only in Staten Island. Testing of these ticks has detected several TBD pathogens
- Most cases of TBDs are among residents of Manhattan and Brooklyn who were infected while traveling to endemic areas surrounding New York City
- Local transmission of TBDs occurs primarily in Staten Island, where
 - 50% of people with Lyme disease did not travel in 2021, similar to previous years
 - Locally acquired babesiosis cases continue to occur in similar numbers with fluctuations year to year; 5 cases were reported in 2021

^aTBDs include anaplasmosis, babesiosis, ehrlichiosis, Lyme disease, and Rocky Mountain spotted fever

^bFor residents of outer boroughs diagnosed with erythema migrans (EM) from April 1 to October 31, travel history during the 3- to 30-day incubation period was obtained from either provider or patient. Manhattan residents were excluded as there is no evidence of local transmission of Lyme disease in the borough; a previous study showed 97% of people with EM reported travel, and Manhattan has fewer potential blacklegged tick habitats

^cUnpublished data, 2021, New York City Tickborne Disease Surveillance

though it is not a reportable condition, so national case counts are unknown.⁸

The **lone star tick** transmits the bacteria that can cause ehrlichiosis (*Ehrlichia chaffeensis*, *E. ewingii*), Heartland virus (a virus that can cause Heartland virus disease), and Bourbon virus (a virus that can cause Bourbon virus disease).⁵ In NYC, this tick is prevalent in Staten Island and the northern Bronx.² Ehrlichiosis cases in NYC are predominantly travel-associated (unpublished data, NYC TBD Surveillance). Heartland and Bourbon viruses have been detected in ticks in New York State but not among ticks in or residents of NYC.² The bite of a lone star tick is associated in some people with the development of alpha-gal syndrome, an allergy to mammalian meat and meat products.⁹ The lone star tick bite has also been associated with southern tick associated rash illness (STARI).¹⁰ Although STARI is not a reportable disease in NYC, case counts are believed to be low.

The **American dog tick** is found in all NYC boroughs, though numbers have been decreasing over time.² It transmits the bacterium *Rickettsia rickettsii*, which causes RMSF, and the bacterium *Francisella tularensis*, which causes tularemia.⁵

The **Gulf Coast tick** (*A. maculatum*) has been identified in some parks in Staten Island as of 2018.⁴ Tick testing detected the presence of *Rickettsia parkeri*, which causes a spotted fever syndrome similar to that caused by *R. rickettsii* and *Rickettsia akari*, and often results in an eschar at the bite site.^{2,4,5}

The **Asian longhorned tick** (*Haemaphysalis longicornis*) was reported in the US for the first time in 2017.⁹ Populations of this tick have been expanding in parks in Staten Island and in the Bronx, and have begun to displace established populations of blacklegged ticks in Staten Island.² This tick is thought to feed mostly on livestock and animals.⁹ It does not prefer to bite humans and has not been shown to transmit human pathogens in the US.⁹ In parts of Asia, however, it is a vector for severe fever with thrombocytopenia syndrome virus.¹¹

EDUCATE PATIENTS ABOUT TICKBORNE DISEASES

Inform patients that living in or traveling to tick endemic areas puts them at risk for acquiring TBDs. Educate patients who visit, live, work, or travel in endemic areas on the prevention of tick bites and TBDs (**Boxes 2^{9,12,13}** and **3^{9,14-16}**)

and on the correct removal of an embedded tick (**Box 4¹²**). Ticks are most active in NYC during the spring, summer, and fall.¹² Advise patients to take precautions against ticks during these months and be aware of signs and symptoms of TBDs. Most infections result from an undetected tick bite; early detection and prompt removal

BOX 2. WHAT TO TELL PATIENTS ABOUT TICK BITE PREVENTION^{9,12,13}

- Avoid wooded areas and overgrown grasses
- Use insect repellent as directed (**Box 3**)
- Wear light-colored clothing and long-sleeved shirts tucked into pants and long pants tucked into socks
- Check yourself, children, and pets for ticks when returning indoors from tick-endemic areas
- Remove any ticks immediately (**Box 4**)
- Shower within 2 hours of returning indoors

See Resources for Patients for more information

BOX 3. INSECT REPELLENT^{9,14-16}

Generally, the higher the percentage of the active ingredient, the longer the duration of protection. Use a repellent that has one of the following active ingredients:

- DEET^a
- Picaridin
- IR3535

Use a repellent that is registered with the Environmental Protection Agency^b

- Carefully read labels to find a product that repels ticks, not just mosquitoes
- Follow directions on the repellent's label
- Do not spray products directly onto the face and avoid the eyes and mouth
- Determine from the label how long protection should last; reapply when spending a longer time outdoors in tick habitats
- Apply permethrin to clothing, shoes, and gear, but not to skin

Use a repellent that is safe for children

- Apply the product to your hands and then put it on the child, avoiding the eyes, mouth, and hands; apply sparingly on the ears
- DEET-based repellents are approved for use on children
 - For children aged older than 2 months, use a repellent with up to 30% DEET
 - Do not apply more than once a day
 - Wash or bathe skin and clothing with soap and water when returning indoors

^aRepellents with more than 50% DEET do not offer longer protection

^bProducts with active ingredients not registered by the Environmental Protection Agency have not been evaluated for effectiveness

reduce the chance of disease.¹³ Erythema migrans (EM)—a red ring-like or expanding rash—is diagnostic for Lyme disease, but care should be taken to distinguish EM from other causes of skin rash. EM may manifest differently on different skin tones; see [The Many Forms of Lyme Disease Rashes](#). True EM should prompt the patient to seek medical attention (**Resources**).¹³ Advise patients to contact you or go immediately to the emergency department if they develop symptoms of fever, rash, headache, myalgia, fatigue, or arthralgia in the days following a tick bite.⁹

TICKBORNE DISEASE VACCINES

The US Food and Drug Administration has approved, and the Advisory Committee on Immunization Practices has recommended, an inactive vaccine for the prevention of tickborne encephalitis (TBE) for select individuals. TBE is not endemic to the US; consider vaccination for patients who are laboratory workers or travelers with outdoor exposure in European and Asian countries where TBE is endemic.¹⁷

Clinical trials of new vaccines for Lyme disease are currently underway and may be available within the next several years.¹⁸

DIAGNOSING TICKBORNE DISEASES

TBDs often present with nonspecific and variable signs and symptoms, such as chills, acute fever, headache, and myalgias that may mimic other illnesses.⁵ Rash is associated with certain TBDs; however, rashes may be less apparent on patients with different skin tones. Evaluate rashes and skin lesions with careful consideration for patients of all races. See, for instance, [The Many Forms of Lyme Disease Rashes](#).

Lyme disease

EM is reported among 70% to 80% of patients with Lyme disease.⁵ An EM >5 cm is sufficient for a diagnosis of Lyme disease without other signs or symptoms, though care should be taken to distinguish EM from other causes of skin rash.¹³ Acute Lyme disease can also manifest as cranial neuritis (most often facial palsy), oligoarthritis, and/or carditis (most often atrioventricular block).⁵

Rickettsial diseases

Laboratory findings for anaplasmosis, ehrlichiosis, and spotted fever group rickettsioses (SFGRs), including RMSF, may include

thrombocytopenia, anemia, and elevated liver function tests.⁵ A rash is sometimes seen with ehrlichiosis, particularly among children, but is rare with anaplasmosis (<10%).⁵ RMSF is a rapidly progressive disease that can be fatal without prompt treatment. Most people with RMSF (90%) develop a maculopapular or petechial rash that typically occurs 2 to 5 days after fever onset.⁵ Infection with *R parkeri* presents similarly to rickettsialpox (*R akari*), with sparse maculopapular or papulovesicular eruptions on the trunk and extremities.¹⁹ Eschars are common with *R parkeri*, but not with RMSF.^{5,19}

Babesiosis

Babesiosis can result in hemolytic anemia and thrombocytopenia, and is more severe in persons who are asplenic, immunocompromised, or advanced in age.⁵

Powassan virus disease

While rare, Powassan virus disease can result in meningitis and encephalitis.⁵

Considerations

A history of a tick bite is not a prerequisite for considering TBDs for patients with compatible illness, since only a small proportion of patients

BOX 4. HOW TO REMOVE A TICK¹²

- To remove an embedded tick
 - Use pointed-tip tweezers and grab the tick at the point where it is closest to the skin (this is the head of the tick); do not grab the body of the tick, as that can cause the mouth parts to break off and remain in the skin and increase the risk of an infection
 - Gently pull up on the tick with slow, even pressure to ease out the mouth parts. After removing the tick, wash your hands and skin with soap and water or rubbing alcohol
- Do not
 - Handle the tick with bare hands
 - Squash or squeeze the tick
 - Use petroleum jelly (Vaseline®), nail polish remover, or heat to remove the tick. These methods can increase the risk of infection
- Dispose of a crawling tick or an embedded tick that has been removed by wrapping it tightly in tape and throwing it out or flushing it down the toilet. To save a tick for identification, put it in a container with alcohol or in a sealed bag/container
- Advise patients to contact a health care provider immediately if they develop fever, aches and pains, or a rash

See Resources for Patients for more information on tick identification and removal, including a [video demonstrating correct removal](#)

diagnosed with these diseases recall being bitten by a tick.² Recent travel during warmer months to upstate New York, Long Island, and other parts of the Northeast, mid-Atlantic, and upper Midwest should prompt consideration of TBDs.^{2,5,9}

While relatively rare, coinfection with more than one TBD pathogen can occur from a single tick bite if the species, such as the blacklegged tick, is capable of harboring more than one TBD pathogen.⁵ Testing for multiple TBDs when clinically appropriate can aid in the diagnosis of TBD coinfections.

Testing for most TBDs is available at most commercial labs (**Box 5**^{5,9,19-21}). However, testing for rare or emerging TBDs may only be available through the NYC Department of Health and Mental Hygiene. Contact the Provider Access Line at 866-692-3641 for assistance.

For more detailed guidance on diagnostic testing, see [Tickborne Diseases of the United States](#).

LYME DISEASE PROPHYLAXIS

Antibiotic prophylaxis may be used for Lyme disease but not for other TBDs.²² New guidelines from the Infectious Diseases Society of America (IDSA) indicate that doxycycline is acceptable for prophylaxis in adults and children.²² A single dose of doxycycline (200 mg for adults or 4.4 mg/kg for children of any age weighing less than 45 kg) may be offered to patients to reduce the risk of Lyme disease when all of the following circumstances exist^{13,22}:

- the patient has spent time in a Lyme-endemic region,
- the tick has been attached for ≥ 36 hours, based on engorgement or history,
- prophylaxis can be started within 72 hours of tick removal,
- the tick can be reliably identified as an *Ixodes* spp tick, and
- the patient does not have any contraindications to treatment with doxycycline.

BOX 5. TESTING FOR TICKBORNE DISEASES^{5,9,19-21}

Optimal diagnostic tests depend on timing relative to symptom onset and disease

Rickettsial diseases

- Polymerase chain reaction (PCR) tests for anaplasmosis and ehrlichiosis are most sensitive during the first week of illness. For Rocky Mountain spotted fever (RMSF), PCR can be done on whole blood but is less sensitive, and a negative result cannot rule out infection
- Serologic assays may lead to false-negative results when performed in the 1 to 2 weeks following illness onset. Additionally, antibodies may persist for several years and, if detected, may not be indicative of current illness. Repeat serologic testing on a convalescent specimen after 2 to 4 weeks with a fourfold or greater rise in antibody titers confirms a diagnosis
- False-positive serologic results may occur with RMSF. Antibodies to spotted fever group rickettsioses (SFGRs) other than RMSF may reflect past exposures to a wide variety of SFGR species, including *Rickettsia akari*, and not reflect incident cases of RMSF. *R akari* is the causative agent of rickettsialpox. For rickettsialpox testing, contact the NYC Provider Access Line at 866-692-3641 to arrange for testing at the Centers for Disease Control and Prevention (CDC)

Lyme disease

- The CDC recommends a 2-step test for Lyme disease. If the first antibody test is negative, no further testing is recommended. If positive or equivocal, perform a Western blot test or a second enzyme immunoassay (modified 2-tier test). The overall result is positive only when the first test is positive or equivocal and the Western blot is positive, or when a modified 2-tier test is positive or equivocal

Babesiosis

- PCR and identification of intraerythrocytic *Babesia* parasite by blood smear should be used to confirm a diagnosis
- Serology: Indirect immunofluorescence antibody testing for immunoglobulin G offers evidence of infection but cannot distinguish between active and prior infection

Tick testing

Testing ticks for diseases is generally not recommended because

- Results may be unreliable; laboratories that test ticks are not required to meet the same quality standards as clinical laboratories
- A positive test does not mean that the tick was attached long enough to transmit the pathogen
- A negative test might provide a false sense of security as a patient might have unknowingly been bitten by a different tick

Parents of children under age 12 years should be advised to continue monitoring for signs and symptoms of Lyme disease, as the efficacy of single-dose doxycycline prophylaxis in children is not well studied.²²

TREATING TICKBORNE DISEASES

Most TBDs are treatable with antimicrobial agents. Confirm the diagnosis with laboratory testing, but do not delay treatment waiting for laboratory confirmation. Clinical suspicion of anaplasmosis, ehrlichiosis, and SFGRs is sufficient to begin treatment, as delays may result in severe illness and even death. For further guidance on testing for and treating TBDs, see *Tickborne Diseases of the United States*.

Updated guidelines for babesiosis

IDSA recommendations for testing and treating babesiosis have recently been updated.²¹ A single positive antibody test is not sufficient for a diagnosis of acute babesiosis and may reflect a *Babesia* infection that occurred years before or a false-positive test result.²¹ Confirm an acute babesiosis diagnosis with a peripheral blood smear examination or PCR test.²¹

The antibiotic combination of atovaquone and azithromycin is the preferred treatment for patients experiencing babesiosis; clindamycin and quinine is an alternative combination.^{21,23} The duration of antimicrobial therapy for babesiosis is 7 to 10 days in immunocompetent patients. For immunocompromised patients, therapy should be at least 6 consecutive weeks

(including 2 final weeks during which parasites are no longer detected on peripheral blood smear).^{21,23}

REPORTING

Lyme disease, babesiosis, anaplasmosis, ehrlichiosis, SFGRs, tularemia, and Powassan virus disease are reportable in NYC. Report confirmed TBDs within 24 hours via [NYCMED](#).

For more information, see *Provider Reporting: How to Report Diseases, Events, and Conditions to the NYC Health Department*.

SUMMARY

As tick populations in and around NYC continue to evolve, remain vigilant for the risk TBDs pose to patients who live in or visit tick endemic areas. New tick species in NYC, such as Asian longhorned ticks and Gulf Coast ticks, are part of the changing landscape of ticks and TBD prevalence. Stay up to date on local epidemiology and clinical practice guidelines to inform testing and treatment considerations. Prompt treatment based on clinical presentation is critical to preventing severe disease; do not delay treatment while awaiting confirmatory test results. Encourage patients to seek care if they experience symptoms compatible with TBDs after exposure to a tick habitat or following a recent tick bite. Educate patients on how to prevent tick bites by avoiding grassy, wooded areas, using repellent, wearing protective clothing, and checking themselves for ticks.

RESOURCES FOR PROVIDERS

General information

- US Department of Health and Human Services and Centers for Disease Control and Prevention (CDC). *Tickborne Diseases of the United States*: <https://www.cdc.gov/ticks/tickbornediseases/index.html>
- CDC. Instructions for submitting diagnostic specimens for testing by the rickettsial reference diagnostic laboratory: https://www.cdc.gov/nceid/dvbd/specimensub/rickettsial_shipping.html

Erythema migrans poster

- CDC. The Many Forms of Lyme Disease Rashes (Erythema Migrans): https://www.cdc.gov/lyme/resources/NCEZID_rash_poster3r1-508.pdf

Training

- Northeast Regional Center for Excellence in Vector-Borne Diseases: <https://www.neregionalvectorcenter.com>

Reporting

- New York City Department of Health and Mental Hygiene (NYC DOHMH). *Provider Reporting: How to Report Diseases, Events, and Conditions to the NYC Health Department*: <https://www1.nyc.gov/assets/doh/downloads/pdf/hcp/reporting-guide.pdf>
- NYC DOHMH. NYC MED: <https://a816-healthpsi.nyc.gov/NYCMED/Account/Login>

RESOURCES FOR PATIENTS

General information

- New York City Department of Health and Mental Hygiene (NYC DOHMH). Ticks: www.nyc.gov/health/ticks
- Centers for Disease Control and Prevention (CDC). Ticks: <https://www.cdc.gov/ticks>
- University of Rhode Island. TickEncounter Resource Center: <https://tickencounter.org>

Tick identification and removal

- NYC DOHMH. NYC Tick ID and Removal: <https://www1.nyc.gov/assets/doh/downloads/pdf/zoo/nyc-tick-id-and-removal-card.pdf>
Wallet card available in many languages; call 311 to order free copies
- New York State Department of Health. Tick prevention: removal (video): <https://youtu.be/oGrK4ZKUfhQ>

Insect repellent

- US Environmental Protection Agency. Find the repellent that is right for you: <https://www.epa.gov/insect-repellents/find-repellent-right-you>

- NYC DOHMH. Insect repellent safety: <https://www1.nyc.gov/site/doh/health/health-topics/insect-repellent-safety.page>

Educational materials

- NYC DOHMH. *Ticks Taking Over? Take Back Your Yard*:
English: <https://www1.nyc.gov/assets/doh/downloads/pdf/zoo/tick-yard-control.pdf>
Spanish: <https://www1.nyc.gov/assets/doh/downloads/pdf/zoo/tick-yard-control-sp.pdf>
Call 311 to order free copies
- NYC DOHMH. *All About Ticks: A Workbook for Kids and Their Parents*:
English: <https://www1.nyc.gov/assets/doh/downloads/pdf/zoo/tick-workbook.pdf>
Spanish: <https://www1.nyc.gov/assets/doh/downloads/pdf/zoo/tick-workbook-sp.pdf>
Call 311 to order free copies
- CDC. Tick Bite: What To Do: https://www.cdc.gov/ticks/pdfs/FS_TickBite.pdf

REFERENCES

- Centers for Disease Control and Prevention (CDC) Division of Vector-Borne Diseases. Understanding Lyme and Other Tickborne Diseases. Reviewed May 11, 2022. Accessed June 3, 2022. <https://www.cdc.gov/nceid/dvbd/media/lyme-tickborne-diseases-increasing.html>
- New York City Department of Health and Mental Hygiene (NYC DOHMH). 2022 Health Advisory #10: Tick-borne Disease Advisory. June 1, 2022. Accessed June 3, 2022. <https://www1.nyc.gov/assets/doh/downloads/pdf/han/advisory/2022/tick-borne-diseases.pdf>
- Rosenberg R, Lindsey NP, Fischer M, et al. *Vital signs*: trends in reported vectorborne disease cases—United States and territories, 2004–2016. *MMWR Morb Mortal Wkly Rep*. 2018;67(17):496–501. Accessed June 3, 2022. <https://www.cdc.gov/mmwr/volumes/67/wr/mm6717e1.htm>
- Bajwa WI, Tsynman L, Egizi AM, Tokarz R, Maestas LP, Fonseca DM. The Gulf Coast tick, *Amblyomma maculatum* (Ixodida: Ixodidae) and spotted fever group *Rickettsia* in the highly urbanized northeastern US. Pre-print December 10, 2021. Accessed June 3, 2022. <https://www.biorxiv.org/content/10.1101/2021.12.08.471803v1.full>
- CDC. *Tickborne Diseases of the United States*. Reviewed January 10, 2019. Accessed June 3, 2022. <https://www.cdc.gov/ticks/tickbornediseases/index.html>
- New York State Department of Health (NYS DOH). Deer Tick Surveillance: Adults (Oct to Dec) Excluding Powassan virus: Beginning 2008. Updated March 23, 2022. Accessed June 3, 2022. <https://health.data.ny.gov/Health/Deer-Tick-Surveillance-Adults-Oct-to-Dec-excluding/vzbp-i2d4>
- NYS DOH. Deer Tick Surveillance: Nymphs (May to Sept) Excluding Powassan Virus: Beginning 2008. Updated March 23, 2022. Accessed June 3, 2022. <https://health.data.ny.gov/Health/Deer-Tick-Surveillance-Nymphs-May-to-Sept-excludin/kibp-u2ip>
- CDC. Tick-borne Relapsing Fever: *B miyamotoi*. Reviewed September 10, 2019. Accessed June 3, 2022. <https://www.cdc.gov/relapsing-fever/miyamotoi>
- CDC. Ticks. Reviewed October 21, 2021. Accessed June 3, 2022. <https://www.cdc.gov/ticks/index.html>
- CDC. Southern Tick-Associated Rash Illness. Reviewed November 19, 2018. Accessed June 3, 2022. <https://www.cdc.gov/stari/symptoms/index.html>
- Zhuang L, Sun Y, Cui XM, et al. Transmission of severe fever with thrombocytopenia syndrome virus by *Haemaphysalis longicornis* ticks, China. *Emerg Infect Dis*. 2018;24(5):868–871. doi:10.3201/eid2405.151435
- NYC DOHMH. Ticks. Accessed June 3, 2022. <http://www.nyc.gov/health/ticks>
- Wormser GP, Dattwyler RJ, Shapiro ED, et al. The clinical assessment, treatment, and prevention of Lyme disease, human granulocytic anaplasmosis, and babesiosis: clinical practice guidelines by the Infectious Diseases Society of America [correction in *Clin Infect Dis*. 2007;45(7):941]. *Clin Infect Dis*. 2006;43(9):1089–1134. doi:10.1086/508667
- NYC DOHMH. Insect Repellent Safety. Accessed June 3, 2022. <https://www1.nyc.gov/site/doh/health/health-topics/insect-repellent-safety.page>
- United States Environmental Protection Agency. Regulation of Skin-applied Repellents. Updated June 8, 2021. Accessed June 3, 2022. <https://www.epa.gov/insect-repellents/regulation-skin-applied-repellents>
- Balk SJ; American Academy of Pediatrics. Choosing an insect repellent for your child. July 9, 2021. Accessed June 3, 2022. <https://www.healthychildren.org/English/safety-prevention/at-play/Pages/Insect-Repellents.aspx>
- CDC. Tick-borne Encephalitis Vaccine. Reviewed March 28, 2022. Accessed June 3, 2022. <https://www.cdc.gov/tick-borne-encephalitis/healthcare-providers/hcp-vaccine.html>
- CDC. Lyme Disease Vaccine. Reviewed December 22, 2021. Accessed June 3, 2022. <https://www.cdc.gov/lyme/prev/vaccine.html>
- CDC. Other Spotted Fever Group Rickettsioses: Information for Health Care Providers. Reviewed March 29, 2021. Accessed June 3, 2022. <https://www.cdc.gov/other-spotted-fever/healthcare-providers/index.html>
- Mead P, Petersen J, Hinckley A. Updated CDC recommendation for serologic diagnosis of Lyme disease. *MMWR Morb Mortal Wkly Rep*. 2019;68(32):703. doi:10.15585/mmwr.mm6832a4
- Krause PJ, Auwaerter PG, Bannuru RR, et al. Clinical practice guidelines by the Infectious Diseases Society of America (IDSA): 2020 guideline on diagnosis and management of babesiosis. *Clin Infect Dis*. 2021;72(2):e49–e64. doi:10.1093/cid/ciaa1216
- Lantos PM, Rumbaugh J, Bockenstedt LK, et al. Clinical practice guidelines by the Infectious Diseases Society of America (IDSA), American Academy of Neurology (AAN), and American College of Rheumatology (ACR): 2020 guidelines for the prevention, diagnosis and treatment of Lyme disease. *Clin Infect Dis*. 2021;72(1):e1–e48. doi:10.1093/cid/ciaa1215
- Corrigendum to: Clinical practice guidelines by the Infectious Diseases Society of America (IDSA): 2020 guideline on diagnosis and management of babesiosis. *Clin Infect Dis*. 2021;73(1):172–173. doi:10.1093/cid/ciab275

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