Tick-borne Disease Diagnostic Reference

When to Consider Tick-Borne Diseases (TBDs)

- TBD signs and symptoms may be nonspecific and include fever, headache, myalgia and gastrointestinal manifestations. Rash is not associated with all TBDs and may not be an early indicator.
- New Yorkers can be exposed to TBDs throughout all of NYS.
- Diagnostic testing can help guide clinical management, but do not delay therapy if a TBD is suspected. Prompt treatment can prevent severe disease.
- Coinfection is uncommon but more likely associated with TBDs caused by blacklegged ticks.
- Ticks emerge when snow melts and stay active until temperatures fall below freezing.
- Ticks found crawling and unattached on skin are not considered a risk for TBD transmission.

Ticks Found in NYS

Blacklegged ticks: Lyme disease, babesiosis, anaplasmosis, Powassan virus and *Borrelia miyamotoi*

Lone star ticks: Ehrlichiosis, Heartland and Bourbon viruses, and tularemia

American dog ticks: Tularemia and Rocky Mountain Spotted Fever *(Rickettsia rickettsii)*

Woodchuck ticks: Powassan virus

Asian longhorned ticks: Not been found to carry pathogens that cause TBDs in the U.S.

TBDs to Consider

	Lyme Disease	Babesiosis	Anaplasmosis and Ehrlichiosis	RMSF	Powassan, Heartland and Bourbon Viruses, B.miyamotoi, and Tularemia
Manifestations	• EM • Cranial neuritis (usually facial palsy) • Acute oligoarthritis • Carditis (usually atrioventricular block)	• Hemolytic anemia • Thrombocytopenia • Illness is more severe if asplenic, immunocompromised or an older adult	• Thrombocytopenia • Leukopenia • Anemia • Mildly to moderately elevated hepatic transaminases Some rickettsial diseases, especially RMSF, can be life-threating if untreated		• Powassan meningitis or encephalitis • Travel to the Midwestern U.S. (Bourbon virus)
Rash or Eschar	• EM and occasional multiple secondary annular rashes	• Not applicable	• Rare in anaplasmosis • Uncommon in ehrlichiosis in adults and typically maculopapular. Occurs in up to 60% of pediatric cases	• Maculopapular (initially on wrists, forearms and ankles, then trunk and sometimes palms and soles, followed by a petechial rash) • Less than 50% of patients have a rash in the first three days of illness	• Rash is uncommon *(B. miyamotoi)*
Testing	• EM alone is diagnostic and should be treated empirically • A two-tiered serologic test (most sensitive two weeks after illness onset) where the initial EIA or IFA is positive or equivocal, followed by a western blot or other FDA-cleared EIA test that is also positive or equivocal • If symptoms began more than 30 days from the test date, use IgG serologic results only. Disregard IgM results, even if positive • PCR is typically insensitive for most specimens	• PCR • Intraerythrocytic *Babesia* parasite on blood smear • Serology (IFA for IgG offers evidence of infection but cannot distinguish between active and prior infection)	• PCR on whole blood (most sensitive during the first week of illness) • Serology • A negative acute test does not rule out infection	• Serology • PCR on whole blood (less sensitive in early stages of disease) • A negative acute test does not rule out infection • PCR of skin biopsy of rash available for detection of rickettsial DNA	•Testing for rare or emerging TBDs, particularly viral diseases, may not be available at commercial labs. For assistance, please contact the local health department where the patient resides • *B. miyamotoi* testing is available at several commercial diagnostic labs • RMSF antibody tests often cross-react with *R. akari* and *R. parkeri*
			• Confirm a serologic diagnosis with a demonstration of a fourfold rise in IgG titers by IFA in serum samples collected two to four weeks apart. Single antibody results cannot be independently relied on for confirmation • IgM antibodies are less specific than IgG antibodies and more likely to generate false positives • IgM results alone should not be used for lab diagnoses. Antibody titers are frequently negative in the first seven to ten days of illness		
Treatment	• For post-exposure prophylaxis and TBD treatment guidance, visit **cdc.gov/ticks/tickbornediseases** • Consult with an infectious disease specialist • Antibodies may normally persist in the blood for months or years after infection, so testing cannot be used to determine a cure				

Images

EM rash

Maculopapular rash

Petechial rash

Eschar

EIA: Enzyme immunoassay
IgG: Immunoglobulin G
EM: Erythema migrans
IgM: Immunoglobulin M
FDA: Food and Drug Administration
PCR: Polymerase chain reaction
IFA: Immunofluorescence assay
RMSF: Rocky Mountain spotted fever

For more information, visit health.ny.gov/tickfree

Images on this poster were adapted from the Centers for Disease Control and Prevention.

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