





TICKBORNE DISEASES IN MICHIGAN: A REFERENCE FOR HEALTH CARE PROVIDERS

	Lyme disease <i>Borrelia burgdorferi</i>	Anaplasmosis <i>Anaplasma phagocytophilum</i>
Vector	Blacklegged (deer) tick 	Blacklegged (deer) tick 
Incubation Period	3 – 30 days	1 – 2 weeks
Signs and Symptoms	<p>Early localized disease:</p> <ul style="list-style-type: none"> • Characteristic erythema migrans (EM) rash • Fever & chills • Headache • Myalgia & arthralgia • Lymphadenopathy <p>Disseminated disease (weeks to months after exposure):</p> <ul style="list-style-type: none"> • Multiple EM lesions • Nervous system abnormalities including nerve paralysis (facial muscles), meningitis • Arthritis in large joints, especially the knee • Myocarditis, pericarditis, or atrioventricular node block 	<ul style="list-style-type: none"> ▪ Fever, chills ▪ Severe headache ▪ Malaise ▪ Myalgia ▪ Gastrointestinal symptoms ▪ Cough ▪ Rash (rare cases) ▪ Stiff neck* ▪ Confusion* <p><i>*May present later (5 days after onset of symptoms) and may be prevented by early treatment</i></p>
General Laboratory Findings	<ul style="list-style-type: none"> • Elevated erythrocyte sedimentation rate • Mildly elevated hepatic transaminases • Microscopic hematuria or proteinuria • In Lyme meningitis, CSF typically shows lymphocytic pleocytosis, slightly elevated protein, and normal glucose 	<p>Typically observed during the first week of clinical disease:</p> <ul style="list-style-type: none"> • Mild anemia • Thrombocytopenia • Leukopenia (characterized by relative and absolute lymphopenia and a left shift) • Mild to moderate elevations in hepatic transaminases may occur in some patients • Visualization of morulae in the cytoplasm of granulocytes is highly suggestive of a diagnosis; however, blood smear examination is insensitive.
Laboratory Diagnosis	<ul style="list-style-type: none"> • Demonstration of diagnostic IgM or IgG antibodies in serum. A <u>two-tier</u> testing protocol is recommended – EIA or IFA should be performed first; if positive or equivocal it is followed by a Western blot. • Isolation of organism from a clinical specimen • In suspected Lyme meningitis, testing for intrathecal IgM or IgG antibodies may be helpful 	<p>Antibodies to <i>A. phagocytophilum</i> are detectable 7-10 days after illness onset.</p> <ul style="list-style-type: none"> • Demonstration of a four-fold change in IgG-specific antibody titer by IFA test in paired serum samples; or • Detection of DNA by PCR of whole blood. This method is most sensitive within the first week of illness; sensitivity may decrease after administration of antibiotics.
Treatment	<p>The below antibiotics are recommended for the treatment of early Lyme disease. Consult the reference below for more information:</p> <p>Adults & Children</p> <ul style="list-style-type: none"> • Doxycycline • Cefuroxime axetil • Amoxicillin <p>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; Vol 72, Issue 1:e1-e48</p>	<p>Anaplasmosis, ehrlichiosis, and Rocky Mountain spotted fever are treated in the same manner with doxycycline*. Clinical suspicion of any of these diseases is sufficient to begin treatment. Delay in treatment may result in severe illness and even death.</p> <p><i>* Note: Unless otherwise indicated, use doxycycline as first-line treatment for suspected anaplasmosis in patients of all ages. The use of doxycycline to treat suspected anaplasmosis in children is recommended by both the CDC and the American Academy of Pediatrics. At the recommended dose and duration needed to treat anaplasmosis, no evidence has been shown to cause staining of permanent teeth.</i></p>

	Babesiosis <i>Babesia microti</i>	Rocky Mountain spotted fever <i>Rickettsia rickettsii</i>
Vector	Blacklegged (deer) tick 	American dog tick 
Incubation Period	1 – 9+ weeks	2 – 14 days
Signs and Symptoms	<ul style="list-style-type: none"> • Fever, chills, sweats • Malaise, fatigue • Myalgia, arthralgia, headache • Gastrointestinal symptoms, such as anorexia and nausea (less common: abdominal pain, vomiting) • Dark urine • Less common: cough, sore throat, emotional lability, depression, photophobia, conjunctival injection • Mild splenomegaly, mild hepatomegaly, or jaundice may occur in some patients <p><i>Note: Not all infected persons are symptomatic or febrile. Symptoms may develop within several weeks to months.</i></p>	<ul style="list-style-type: none"> ▪ Fever, chills ▪ Severe headache ▪ Malaise ▪ Myalgia ▪ Gastrointestinal symptoms ▪ Cough ▪ Conjunctival injection, ± photophobia ▪ Altered mental status ▪ Focal neurologic deficits, including cranial or peripheral motor nerve paralysis or sudden transient deafness ▪ Maculopapular rash ▪ Petechial rash
General Laboratory Findings	<ul style="list-style-type: none"> • Decreased hematocrit due to hemolytic anemia • Thrombocytopenia • Elevated serum creatinine and blood urea nitrogen (BUN) values • Mildly elevated hepatic transaminase values 	<ul style="list-style-type: none"> • Thrombocytopenia • Mildly elevated hepatic transaminase levels • Hyponatremia
Laboratory Diagnosis	<ul style="list-style-type: none"> • Identification of intraerythrocytic <i>Babesia</i> parasites by light-microscopic examination of a peripheral blood smear; or • Positive <i>Babesia</i> (or <i>B. microti</i>) polymerase chain reaction (PCR) analysis <p>Supportive laboratory criteria:</p> <ul style="list-style-type: none"> • Demonstration of <i>Babesia</i>-specific antibody titer by indirect fluorescent antibody (IFA) testing for total immunoglobulin (Ig) or IgG. 	<p>Antibodies to <i>R. rickettsii</i> are detectable 7-10 days after illness onset.</p> <ul style="list-style-type: none"> • Demonstration of a four-fold change in IgG-specific antibody titer by immunofluorescence assay (IFA) test in paired serum samples; or • Detection of DNA in a skin biopsy of rash by polymerase chain reaction (PCR) assay (generally unreliable for acute blood samples). • Immunohistochemical (IHC) staining of organism
Treatment	<p>Treatment decisions and regimens should consider the patient's age, clinical status, immunocompetence, splenic function, comorbidities, pregnancy status, other medications, and allergies. Expert consultation is recommended for persons who have or are at risk for severe or relapsing infection or who are at either extreme of age.</p> <p>For ill patients, babesiosis is treated for at least 7-10 days with a combination of two medications – typically either atovaquone PLUS azithromycin; OR clindamycin PLUS quinine (this combination is the standard of care for severely ill patients).</p>	<p>Rocky Mountain spotted fever, anaplasmosis, and ehrlichiosis are treated in the same manner with doxycycline*. Clinical suspicion of any of these diseases is sufficient to begin treatment. Delay in treatment may result in severe illness and even death.</p> <p><i>* Note: Unless otherwise indicated, use doxycycline as first-line treatment for suspected RMSF in patients of all ages. The use of doxycycline to treat suspected RMSF in children is recommended by both the CDC and the American Academy of Pediatrics. At the recommended dose and duration needed to treat RMSF, no evidence has been shown to cause staining of permanent teeth.</i></p>

Tickborne diseases are reportable in Michigan. For more information, please see the
["Healthcare Professionals Guide to Disease Reporting in Michigan"](https://www.michigan.gov/cdinfo) -- www.michigan.gov/cdinfo