NJHealth New Jersey Department of Health
Communicable Disease Service

Babesiosis

5/15/2025

DISEASE REPORTABLE WITHIN 24 HOURS OF DIAGNOSIS

Cases should be reported to the local health department where the patient resides. If patient residence is unknown, report to your own local health department. Contact information is available at: http://localhealth.nj.gov.

If the individual does not live in New Jersey, report the case to the New Jersey Department of Health at: (609) 826-5964.

1 THE DISEASE AND ITS EPIDEMIOLOGY

A. Etiologic Agent

Babesiosis is a parasitic infection caused by protozoan parasites of the genus *Babesia*, which infect red blood cells. Of the more than 100 species that have been described as parasitic for mammals, only a few are known to infect humans (*B. microti, B. divergens, B. duncani*, and a currently unnamed strain designated MO-1). Of these, *Babesia microti* is the predominant species causing illness in the northeastern and midwestern United States. Serologic and molecular tests available for *B. microti* infection do not typically detect other *Babesia* agents.

B. Clinical Description

Infection is often asymptomatic; but may be life-threatening in some individuals. Some people develop symptoms such as fever, chills, sweats, headache, myalgia, arthralgia, loss of appetite, nausea or fatigue. Because *Babesia* parasites damage red blood cells, babesiosis can cause hemolytic anemia.

Clinical findings include low hemoglobin and hematocrit and elevated lactate dehydrogenase (LDH), which may be accompanied by splenomegaly, hepatomegaly, or jaundice. Thrombocytopenia is common. Parasitemia levels in red blood cells range from 1% to 10% in patients with an intact spleen to as high as 85% in asplenic patients.

Risk factors for severe babesiosis include asplenia or hyposplenia, advanced age, congestive heart failure, other causes of impaired immune function (e.g., HIV, malignancy, immunosuppressive drugs, autoimmune disease, corticosteroid therapy), and neonatal exposure to *B. microti* through transfusion, transplacental transmission, or tick transmission.

Some immunosuppressive therapies or conditions may affect the clinical manifestations (e.g., the patient might be afebrile). Severe cases can be associated with marked thrombocytopenia, disseminated intravascular coagulation, hemodynamic instability, acute respiratory distress syndrome, myocardial infarction, renal failure, hepatic compromise, altered mental status, and death.

The tick that transmits *Babesia microti can also transmit* the organisms that cause Lyme disease, hard-tick relapsing fever, anaplasmosis, and Powassan. Co-infections have been documented and may complicate the clinical picture.

Treatment

Most asymptomatic persons do not require treatment. For ill patients, babesiosis is usually treated with one of two combination therapies.

C. Vectors and Reservoirs

The primary vector for babesiosis in New Jersey is the blacklegged or deer tick, *Ixodes scapularis*.

Ticks become infected as larvae or nymphs when they feed on infected animals, particularly the white-footed mouse. Nymphal ticks pose the greatest threat of transmitting infectious organisms to animals and humans because they are small in size (<2 mm) and may go undetected. Nymphs are most abundant between May and July, and they are typically found in wooded areas, brush, and grassy areas near woodland edges. Although adult ticks are capable of transmitting babesiosis, they are larger in size and easier to detect. As such, adult ticks are often removed before they can transmit babesiosis. Deer are important sources of food for adult ticks but do not transmit *Babesia* to ticks.

D. Modes of Transmission

Babesiosis is most often acquired from the bite of an infected tick. In most cases, the tick must be attached for 36 to 48 hours before the parasite can be transmitted. Ticks can attach to any part of the human body but are often found in hard-to-see areas such as the groin, armpits, and scalp. As a result, cases of diagnosed babesiosis frequently have no known history of a tick bite.

Person-to-person transmission may occur through blood transfusion or organ donation. Prior to blood supply screening in endemic areas, *Babesia microti* had been the most commonly reported transfusion-transmitted pathogen in the United States. Until 2018, there were no FDA-licensed tests for screening blood donors for *Babesia*, although some blood collection centers had voluntarily implemented investigational testing. In May 2019, the FDA issued final Recommendations for Reducing the Risk of Transfusion-Transmitted Babesiosis. These recommendations include donation testing year-round when blood is collected in N.J.

Rare cases of congenital/perinatal transmission have been reported.

E. Incubation Period

Symptoms typically appear in 1-4 weeks after a tick bite or 1-9 weeks (up to 24 weeks) after a contaminated blood transfusion. Symptom onset may be acute or gradual.

F. Period of Communicability or Infectious Period

Babesiosis is not generally transmitted from person-to-person with the exception of blood transfusion or rarely solid organ transplant. Anyone with a positive *Babesia spp.* test result should be excluded from blood donation for at least 2 years. Individuals with a history of babesiosis should discuss their babesiosis history with the blood donation agency prior to donation. Asymptomatic blood donors have been shown to be infectious for as long as 12 months after the initial infection.

Two cases of babesiosis have been reported in kidney recipients from a single donor.

G. Epidemiology

Reports of babesiosis have been increasing in the United States since the disease was originally recognized in 1966. Babesiosis became nationally notifiable in 2011. The geographic distribution of babesiosis has expanded in a pattern similar to Lyme Disease but at a slower pace. In 2020, 98% of reported cases were from 10 states: Connecticut, Maine, Massachusetts, Minnesota, New Hampshire, New Jersey, New York, Rhode Island, Vermont, and Wisconsin. In 2020, CDC was notified of a total of 1,827 cases of babesiosis by 24 of the 40 states in which babesiosis was a reportable condition. This was an 24% decrease from the total of 2,418 cases for 2019, which was the highest number of cases reported for any year since babesiosis became nationally notifiable. The COVID-19 pandemic likely had an impact on public health activities including case identification and case investigations, as well as possibly impacting transmission rates in 2020. The median age of reported cases was 65 years. Most cases developed symptoms in the spring or summer months, and primarily between June and August.

After Lyme disease, there are more reported cases of babesiosis in New Jersey than any other tickborne disease. Between 2019 and 2023, an average of 286 cases per year were reported in New Jersey (ranging from 236 to 407), with the highest incidence rates in the northwestern counties (refer to NJDOH Vector-borne Disease Dashboard).

2 NEW! 2025 CASE DEFINITION

NJDOH follows the most current case definition as published on the CDC National Notifiable Disease Surveillance System (NNDSS) website.

Babesiosis Case Definition: https://ndc.services.cdc.gov/conditions/babesiosis/

Case definitions enable public health to classify and count cases consistently across reporting jurisdictions and should not be used by healthcare providers to determine how to meet an individual patient's health needs.

A. Clinical Criteria (for the purposes of surveillance):

Objective— fever as reported by patient or healthcare provider, anemia, or thrombocytopenia

Subjective— chills, sweats, headache, myalgia, or arthralgia

NOTE: People can be asymptomatically infected with *Babesia* organisms but will meet the public health surveillance case definition only if they meet clinical criteria.

B. Laboratory Criteria*:

Confirmatory Laboratory Evidence:

- Identification of intraerythrocytic *Babesia* organisms by light microscopy in a Giemsa, Wright, or Wright-Giemsa–stained blood smear; **OR**
- Detection of Babesia spp. DNA in a whole blood specimen through nucleic acid testing such as polymerase chain reaction (PCR) assay, nucleic acid amplification test (NAAT), or genomic sequencing that amplifies a specific target, in a sample taken within 60 days of illness onset; **OR**
- Serological evidence of a four-fold change[1] in IgG-specific antibody titer to B. microti antigen by indirect immunofluorescence assay (IFA) in paired serum samples (one taken within two weeks of illness onset and a second taken two to ten weeks after acute specimen collection)[2]

Presumptive Laboratory Evidence:

- Serological evidence** of an elevated IgG*** or total antibody reactive to B. microti antigen by IFA at a titer ≥1:256 in a sample taken within 60 days of illness

Supportive Laboratory Evidence:

- Serological evidence** of an elevated IgG*** or total antibody reactive to B. divergens antigen by IFA at a titer of ≥1:256
- Serological evidence** of an elevated IgG*** or total antibody reactive to B. duncani antigen by IFA at a titer of ≥1:512

[1] A four-fold change in titer is equivalent to a change of two dilutions (e.g., 1:64 to 1:256).

[2] A four-fold rise in titer should not be excluded as confirmatory laboratory criteria if the acute and convalescent specimens are collected within two weeks of one another.

* Note: The categorical labels used here to stratify laboratory evidence are intended to support the standardization of case classifications for public health surveillance. The categorical labels should not be used to interpret the utility or validity of any laboratory test methodology.

** Antibodies can be indicative of active or previously resolved infections, so it is recommended that laboratory results be evaluated in conjunction with information on symptoms and exposure whenever possible. If symptom information is available, specimens meeting supportive laboratory criteria should be collected within 60 days of illness onset.

*** While a single IgG serologic test is adequate for surveillance purposes, molecular testing or blood smear are recommended for clinical diagnosis, especially in cases where species other than B. microti are suspected

C. Case classification

CONFIRMED

Meets confirmatory laboratory evidence criteria AND at least one of the objective or subjective clinical criteria

PROBABLE

- Meets presumptive laboratory evidence AND meets at least one of the objective clinical criteria

POSSIBLE

Meets supportive laboratory evidence

NOTE: If clinical information is provided by either a healthcare provider or the patient that does not meet clinical criteria, the case should be classified as “NOT A CASE.”

D. Criteria to Distinguish a New Case of Babesiosis an Existing Case

A new case is one that has not been previously enumerated within the same calendar year (January through December). Using calendar year allows case counting which more closely corresponds with the seasonality of babesiosis than using a number of months between case reports.

3 LABORATORY TESTING

Testing for symptomatic persons is often performed through detection of parasites in blood smears. PCR testing is often more sensitive than microscopy and can provide species-level identification. Antibody detection tests are useful for detection in individuals with low levels of parasitemia, for diagnosis after infection has cleared by therapy, and for distinguishing between *Babesia* and *Plasmodium falciparum* infection. Culture is rarely performed.

Parasite identification by blood smear

Diagnosis of babesiosis is typically made by identifying the organism on a thin smear of peripheral blood. Multiple thick and thin smears may be necessary to identify the parasite. It can be difficult to distinguish between *Babesia* and *Plasmodium* parasites. If the laboratory is not confident in their identification of the organism, fresh EDTA whole blood, stained and unstained smears and a completed BACT-109 form should be sent to NJDOH Public Health and Environmental Laboratories (PHEL) for confirmatory testing. If the smear result is inconclusive at PHEL, molecular testing for *Babesia microti* will be performed.

Molecular methods

In some infections, the morphologic characteristics observed on microscopic examination of blood smears do not allow an unambiguous differentiation between *Babesia* and *Plasmodium*. Moreover, potential blood donors may have subclinical symptoms and very low parasitemia, undetectable in blood smears. In such cases, the diagnosis can be derived from molecular techniques, such as PCR. PCR testing for *B. microti* is available at several commercial laboratories.

Serologic methods

Serological testing for babesiosis is available at commercial laboratories, however non-microti serologic tests are less sensitive positive test results may cross reactive with B. microti. The indirect fluorescent antibody test (IFA) detects *B. microti* antibodies in 88-96% of patients with *B. microti* infection. Titers generally rise to ≥1:1024 during the first weeks of illness and decline gradually over 6 months to titers of 1:16 to 1:256 but may remain detectable at low levels for a year or more. Specificity is 100% in patients with other tickborne diseases or persons not exposed to the parasite. Cross-reactions may occur in serum specimens from patients with malaria infections, but generally titers are highest with the homologous antigen. The extent of cross-reactivity between *Babesia* species is variable. A negative result with *B. microti* antigen for a patient exposed on the West Coast may be a false-negative reaction for *Babesia* infection. Individuals whose exposure could have occurred on the West Coast should be tested also for antibodies to *B. duncani*, because of the lack of cross-reactivity with *B. microti*.

4 PURPOSE OF SURVEILLANCE AND REPORTING

- To better understand the local epidemiology of infection with *Babesia*
- To promptly identify potential transfusion transmitted infections so that blood products from infected donors can be removed from circulation
- To recognize areas in New Jersey where babesiosis incidence has increased or decreased
- To focus preventive education

5 CASE INVESTIGATION

A. Investigation

Because of concerns about possible transfusion-transmitted babesiosis infections, local health departments are asked to initiate investigations of laboratory positive cases within 2 business days and enter critical details into CDRSS within 5 business days (disease investigation priority level 3). To assist with the investigation, the NJDOH CDS Babesiosis Investigation Worksheet can be used to obtain essential information from the healthcare provider and patient: http://www.nj.gov/health/cd/topics/babesiosis.shtml.

Information on the worksheet should be entered into CDRSS (do not send worksheets to NJDOH). If the patient received a blood transfusion within the past year, additional investigation is required (see Section Managing Special Situations).

A minimum of 3 attempts should be made to obtain information. Attempts to both the healthcare provider/infection preventionist and patient should be made before closing the case. After 3 attempts, enter what is known into CDRSS, including attempts to obtain information (dates and results of the attempts), and classify/close the case according to the case definition.

B. Key CDRSS Fields Specific for Babesiosis

CDRSS Screen	Required Information
Disease Information	• Ensure correct disease is selected.
Patient Personal Information	• Ensure name, sex, date of birth, race and ethnicity are entered.

CDRSS Screen	Required Information
Laboratory and Diagnostic Test Information	• Review test result to determine if it meets laboratory criteria for case definition. Note: FISH assays and immunoblots do not meet laboratory criteria for case definition and do not need to be investigated. • If lab test indicates a *Plasmodium* infection, close the case as NAC and create a malaria case. • Enter percent parasitemia (enter as new test name: *Babesia* infected red blood cells), if available.
Industry and Occupation	• Enter industry/occupation
Signs/Symptoms	• Inquire if the patient had each sign/symptom and update the response to Yes, No or Unknown accordingly. Not Asked should not be left as a default response. Enter onset and resolution dates, if known. • In addition to asking about clinical symptoms, ask healthcare provider about other lab work, specifically anemia, thrombocytopenia, and percent parasitemia if known. • Enter any complications of babesiosis or additional sign/symptoms in this section.
Additional Requirements: Babesiosis	• List all blood transfusions received by the patient in past 12 months, including transfusion dates, products, source of product and where received (see Suspected Transfusion Transmitted Infection Blood Product Worksheet). • If patient donated blood in the prior 12 months, document date and location. Notify the REP and CDS Vector Team (CDSVectorTeam@doh.nj.gov) by email. • NJDOH CDS Vector-borne Disease staff will complete questions related to transfusion-associated infections. • Indicate if patient is immunocompromised and specify immunocompromising condition.
Clinical Status	• Enter illness onset date, hospitalization (as part of this investigation), pre-existing conditions and mortality information.

CDRSS Screen	Required Information
Contact Tracing	• In transfusion transmitted infection case investigations, the donor and recipient information will be linked by CDS Vector-borne Disease staff.
Medical Facility and Provider Information	• For admitted/hospitalized patients, ensure patient status is marked as INPATIENT and admission and discharge dates are entered.
Risk Factors	• Answer all risk factor questions, including receipt of blood transfusion or organ transplant, tick exposure, and if the patient is asplenic. Notify the REP and CDS Vector Team (CDSVectorTeam@doh.nj.gov) by email if positive response to blood transfusion or organ transplant.
Treatment	• Document all medications received with duration/dates of treatment. Babesiosis is typically treated with combination therapy. • If treatment included exchange transfusion(s), document here along with the date(s).
Case Comments	• If requested information was not provided by the patient's healthcare provider, list the dates attempts were made to obtain information and the outcomes. For example, 1/12/24 faxed form to provider; 1/31/24, spoke with office manager and re-sent form; 2/15/24, refaxed form to provider. • Missing information should be obtained by interviewing the patient. If the patient is non-responsive, document attempts and call outcomes in Comments section as well.

6 CONTROLLING FURTHER SPREAD

A. Isolation and Quarantine Requirements / Protection of Contacts of a Case

There are no isolation or quarantine restrictions.

B. Blood donation

Persons who test positive for *Babesia* spp. should not donate blood for at least 2 years. Individuals with a history of babesiosis should discuss their babesiosis history with the blood donation agency prior to donation.

C. Organ donation

Persons who test positive for *Babesia* spp. should not donate organs for at least 2 years. Individuals with a history of babesiosis should discuss their babesiosis history with the organ donation agency prior to donation.

D. Managing Special Situations

Transfusion Transmitted Babesiosis

If the patient received one or more blood transfusions in the 12 months prior to illness onset, immediately notify the CDS Vector Team via email at CDSVectorTeam@doh.nj.gov so an appropriate donor investigation can be initiated. Using the Suspected Transfusion Transmitted Infection Blood Product Worksheet, contact the infection preventionist at the facility(s) where the transfusion(s) took place and request a list of the transfusions, including:

1. Date transfused
2. Healthcare facility where transfused
3. Type of blood product (red blood cells, platelets, plasma, other)
4. Unit numbers
5. Source of blood product (name of blood center that supplied product to hospital)

If necessary, contact the patient to determine whether transfusions may have taken place at other healthcare facilities. If indicated, the LHD should remind the patient of blood donation deferral timeframes. Enter this information to the “Additional Requirements” tab in CDRSS.

CDS Vector-borne Disease staff will work with the hospital blood bank to monitor the investigation of possible infected blood products, positive donors and other potentially infected recipients.

Transplant Transmitted Babesiosis

If the patient received one or more organ transplants in the 30 days prior to illness onset, contact the infection preventionist at the facility(s) where the transplant took place and request a list of the transplanted organs, including:

1. Date of transplant
2. Healthcare facility where transplant occurred
3. Organ(s) received
4. Source of organ (donation center/foundation)

Notify the CDS Vector Team (CDSVectorTeam@doh.nj.gov) by email with the information above. CDS will reach out to the healthcare facility for further investigation.

7 PREVENTION

Removing a Tick

1. Remove the tick as soon as possible.
2. Use fine-tipped tweezers to grasp the tick as close to the skin as you can.
3. Pull upward with steady, even pressure. Don't twist or jerk the tick.
4. After removing the tick, clean the bite area and your hands with rubbing alcohol or soap and water.
5. Dispose of the tick by putting it in alcohol, placing it in a sealed container (e.g. plastic bag), wrapping it tightly in tape, or flushing it down the toilet. Never crush a tick with fingers. Petroleum jelly, a hot match, nail polish, or other products should not be used to remove a tick.

For more information and CDC Tick Bite Bot: cdc.gov/ticks/after-a-tick-bite/

Tick Prevention

- **Know where ticks are:** ticks live in or near wooded or grassy areas. Always walk in the center of trails to avoid contact with ticks.
- **Keep your yard clean:** mow lawns, clear brush and remove leaf litter.
- **Apply insecticides:** use EPA-registered repellent with DEET on skin and permethrin on clothing, boots and camping gear. Always follow product instructions.
- **Cover up:** wear long sleeves and light-colored pants tucked into socks to prevent ticks from getting under clothes.

- **Shower:** showering (preferably within 2 hours) can help find and wash off unattached ticks.
- **Check your body for ticks:** use a hand-held or full-length mirror to view all parts of your body upon return from tick-infested areas. Parents should check their children for ticks under the arms, in and around the ears, inside the belly button, behind the knees, between the legs, around the waist and especially in their hair.
- **Examine gear and pets:** ticks can ride into the home on clothing and pets, then attach to a person later, so carefully examine pets, coats, and day packs.
- **Dry clothing:** tumble dry clothes in a dryer on high heat for 10 minutes to kill ticks on dry clothing after you come indoors.
- **Protect pets:** talk to your veterinarian about the best tick prevention products for your dog and tickborne diseases in your area.

For more information: https://www.cdc.gov/ticks/prevention/

Tick Testing and Identification

Tick testing of individual ticks is not useful because:

- If the test shows that the tick contained disease-causing organisms, that does not necessarily mean that the person has been infected.
- If someone has been infected, they will probably develop symptoms before results of the tick testing are available. Treatment should not be delayed while waiting for tick testing results.
- Negative results can lead to false assurance. For example, the person concerned may have been unknowingly bitten by a different tick that was infected.

Tick identification may be of value when discussing tick bite exposures with a healthcare provider. County mosquito control agencies or agricultural extension offices may offer tick identification services. Online identification resources include: the TickEncounter Resource Center at the University of Rhode Island.

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Tick Bite Prophylaxis

The Infectious Disease Society of America (IDSA) does not recommend antibiotic treatment following a tick bite as a means to prevent babesiosis. There is no evidence this practice is effective, and it may simply delay onset of disease. Instead, persons who experience a tick bite should be alert for symptoms suggestive of tickborne illness and consult a physician if fever, rash, or other symptoms of concern develop.

The tick that transmits babesiosis in N.J. also transmits Lyme disease and there are recommendations for antibiotics to prevent Lyme disease after a tick bite if certain conditions are met (refer to https://www.cdc.gov/ticks/tickbornediseases/tick-bite-prophylaxis.html).

8 ADDITIONAL INFORMATION

Additional Sources of Information

NJDOH: http://www.nj.gov/health/cd/topics/babesiosis.shtml

CDC: https://www.cdc.gov/parasites/babesiosis/index.html

References

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