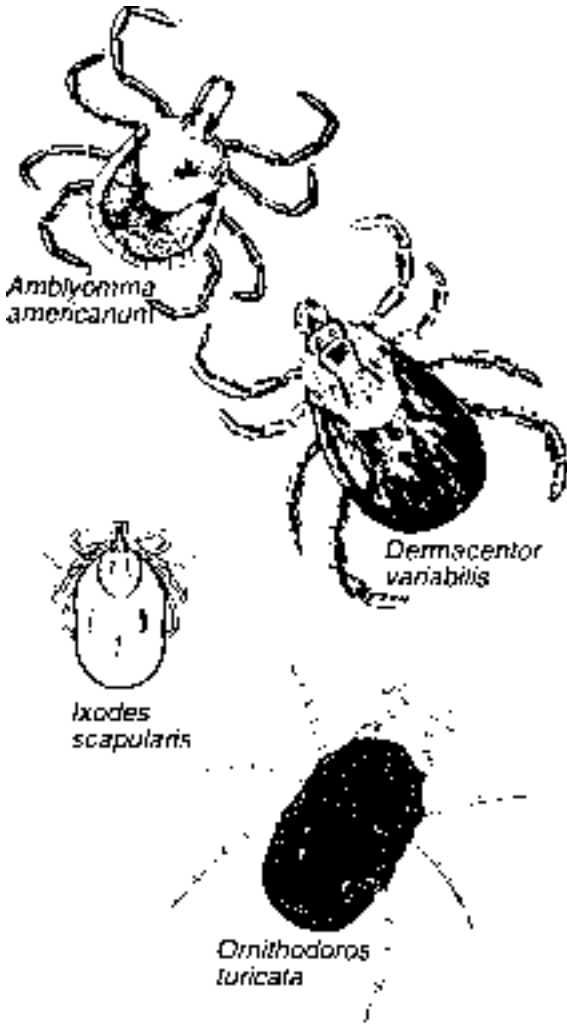


A Guide to the Diagnosis of TICK-BORNE DISEASES



Consider these tick-borne illnesses when the following conditions exist:

The patient has visited

- the northeast US
 - **Babesiosis** (sporadic cases elsewhere)
 - **Lyme borreliosis** (most prevalent in the northeast, but occurs nationwide)
- the southeast US
 - **RMSF** (although occurs nationwide)
- the mountainous areas of the northwest US or Canada
 - **CTE, TBRF**
- old cabins or caves
 - **TBRF**

Symptoms include

- a malaria-like illness
 - **Babesiosis**
- Bell's palsy
 - **Lyme borreliosis, TBRF**
- relapsing febrile episodes
 - **TBRF**
- diphasic febrile episodes
 - **CTF**
- migratory joint pain
 - **Lyme borreliosis**
- ulcerated skin lesions
 - **Tularemia**
- erythema migrans lesion
 - **Lyme borreliosis**
- maculopapular or petechial rash, extending to palms and soles
 - **RMSF**
- diffuse maculopapular or petechial rash
 - **Ehrlichiosis**

Findings include

- hemolytic anemia
 - **Babesiosis**
- leukopenia and thrombocytopenia
 - **CTF, Ehrlichiosis**
- lymphadenopathy
 - **Tularemia**
- previous splenectomy
 - **Babesiosis**

Vectors of Tick-borne Disease

Hard ticks:

Amblyomma americanum (lone star tick), located primarily in the southern and south central states, can transmit ehrlichiosis, RMSF, Lyme borreliosis, and tularemia.

Dermacentor andersoni (Rocky Mountain wood tick), located in the western and mountain states, can transmit CTF, RMSF, and tularemia.

Dermacentor variabilis (American dog tick), located throughout the US, except the mountain states, can transmit RMSF and tularemia.

Ixodes pacificus (Western black-legged tick), located along the Pacific coast, can transmit babesiosis, ehrlichiosis, and Lyme borreliosis.

Ixodes scapularis (black-legged tick), located in the eastern US, can transmit babesiosis and Lyme borreliosis.

Soft ticks:

Ornithodoros hermsi, located in the northwestern states, can transmit TBRF.

Ornithodoros turicata, located in the southwestern and south central states, can transmit TBRF.

Abbreviations for tick-borne diseases:

- CTF = Colorado tick fever
- RMSF = Rocky Mountain spotted fever
- TBRF = Tick-borne relapsing fever

Tick Exposure

Tick exposure includes a history of:

- attached tick
- tick found on clothing and/or hair
- exposure to dogs or other animals
- leisure activities in wooded areas (i.e. camping or hiking)
- outdoor employment (i.e. forest management)

Preventive Measures

Wear light-colored clothing so ticks are more easily seen.

Wear long-sleeved shirts and long pants; tuck shirts into pants and pants into socks.

Periodically examine skin, clothing, hair. Use insect repellants or acaricides applied to skin (i.e. DEET) or clothing (i.e. permethrin).

Inspect and remove ticks from pets frequently.

Proper Tick Removal

Remove tick as soon as possible.

Use tweezers to grasp tick at attachment site as close to skin as possible.

Gently pull tick straight out using slow, steady pressure without twisting.

If removal with the fingers is necessary, use a protective barrier.

Avoid contact with tick fluids; do not crush, squeeze, or puncture the tick.

Do not apply hot matches, nail polish, petroleum jelly, or other chemicals to tick.

Carefully clean site with soap and water.

Send ticks to the Texas Department of Health Laboratories for testing.

ProtectTexas™

Texas Department of Health
Zoonosis Control Division

Stock No. 6-33

2/04

A Guide to the Diagnosis of Tick-borne Diseases

	Babesiosis	Colorado tick fever	Ehrlichiosis	Rocky Mountain spotted fever	Lyme borreliosis	Tularemia	Tick-borne relapsing fever
Pathogen	Protozoa: <i>Babesia microti</i> , <i>Babesia</i> sp.	Double-stranded RNA virus: reovirus	Bacteria (rickettsiae): <i>Ehrlichia chaffeensis</i> , <i>Ehrlichia</i> sp.	Bacteria (rickettsiae): <i>Rickettsia rickettsii</i>	Bacteria (spirochete): <i>Borrelia burgdorferi</i> , <i>Borrelia</i> sp.	Bacteria: <i>Francisella tularensis</i>	Bacteria (spirochete): <i>Borrelia hermsli</i> , <i>B. turicatae</i> , <i>Borrelia</i> sp.
Vector	<i>Ixodes scapularis</i> , <i>I. pacificus</i>	<i>Dermacentor andersoni</i>	<i>Amblyomma americanum</i> , <i>Ixodes scapularis</i> , possibly other species	<i>D. variabilis</i> , <i>D. andersoni</i> , <i>A. americanum</i>	<i>I. scapularis</i> , <i>I. pacificus</i> , <i>A. americanum</i>	<i>D. andersoni</i> , <i>D. variabilis</i> , <i>A. americanum</i> ; also deerflies (<i>Chrysops discalis</i>)	<i>Ornithodoros hermsli</i> , <i>O. turicata</i> , <i>Ornithodoros</i> sp.
Reservoir	White-footed mouse, other mammals	Small mammals	Medium sized mammals, possibly white-tailed deer	Small mammals, ticks	Small and medium sized mammals	Rabbits, hares, rodents, ticks	Small and medium sized mammals, ticks
Incubation period	1 to 6 weeks	3 to 6 days	About 10 days	5 to 7 days (range 3 to 14 days)	7 to 10 days	3 to 5 days (range 1 to 14 days)	About 7 days (range 4 to 18 days)
Signs and symptoms	Gradual onset of flu-like symptoms with irregular fever; mild to severe hemolytic anemia	Sudden onset of acute febrile illness with diphasic fever; leukopenia, thrombocytopenia	Sudden onset of acute non-specific febrile illness with high fever, headache, myalgias, malaise; leukopenia, thrombocytopenia, elevated liver enzymes; maculopapular or petechial rash may be present	Sudden onset of flu-like symptoms including high spiking fever, headache, maculopapular or petechial rash	Gradual onset of flu-like symptoms; erythema migrans (EM) in 60% of cases; additionally upon dissemination, dermatologic, cardiac, neurologic (including Bell's Palsy), and rheumatologic manifestations	Sudden onset of fever; with tick-borne disease, regional lymphadenopathy with or without ulcerated skin lesion	Sudden onset of fever and severe chills
Complications	Severe infection in asplenic patients	Meningoencephalitis, hemorrhage, pericarditis, pneumonitis, hepatitis	ARDS, renal failure, liver damage, secondary opportunistic infections	Pneumonitis, myocarditis, renal failure, encephalitis, gangrene of extremities	Late symptoms may become chronic	Secondary pneumonia, mild hepatitis, pharyngitis	Neurologic involvement
Treatment	Clindamycin with oral quinine; whole blood exchange in severe infections	Supportive	Tetracyclines, chloramphenicol	Tetracyclines, chloramphenicol	Early: doxycycline, amoxicillin Late: IV antibiotics	Streptomycin, gentamicin, tetracyclines, chloramphenicol	Tetracyclines
Laboratory diagnosis	Organisms detected in Giemsa or Wright-stained peripheral blood smear; indirect fluorescent antibody test	Isolation of virus from red blood cells; four-fold titer increase between acute and convalescent serum samples	Observation of inclusion bodies (morulae) in neutrophils or atypical lymphocytes; four-fold titer increase between acute and convalescent serum samples	Direct fluorescent antibody test on tissue; four-fold titer increase between acute and convalescent serum samples	Isolation of spirochetes; positive serologic, antigen detection, PCR tests	Isolation of organism from blood or tissue sample; four-fold titer increase between acute and convalescent serum samples	Spirochetes detected in Giemsa or Wright-stained peripheral blood smear; four-fold titer increase between acute and convalescent serum samples
Diagnostic hints	Symptoms similar to malaria; many patients asplenic or immunocompromised; protozoa infect erythrocytes	Diphasic fever; history of recent travel to CO, UT, SD, MT, WY, ID, WA, OR, CA, NM, or NV	Symptoms similar to Rocky Mountain spotted fever with less diffuse or no rash	Classic triad of fever, rash, and headache occurs in 60 to 70% of cases; rash initially on extremities, then covering entire body including palms and soles	Diagnosis should be based on compatible clinical findings with probable exposure to ticks	Spring and summer infection usually tick-borne; winter infection usually rabbit associated	Fever breaks in 3 to 6 days followed by an afebrile period of one week; 3 to 5 relapses of decreasing severity; history of visiting old cabins or caves
Geographic area	Northeast coastal region (MA, NY); rare sporadic cases elsewhere	Between 4,000 and 10,000 feet elevation in mountain states of western US, Canada	Midwest, southeast, south central states	All states, most endemic in south Atlantic states	All states, primarily NY, NJ, CT, MA, RI, WI, MN	All states, 50% of cases reported in AR, TN, TX, OK, MO	Remote, undisturbed natural settings; caves, old cabins
Incidence in US	100+ cases reported since 1969	200 to 400 cases reported annually	430+ cases reported since 1986	600 to 1,200 cases reported annually	9,000+ cases reported annually	150 to 300 cases reported annually	Sporadic; actual number of cases unknown
Other	Most patients do not recall tick bite; transstadial transmission of organism in ticks	Transstadial transmission of organism in ticks	90% of patients have history of tick bite; transstadial transmission of organism in ticks	50% of patients have history of tick exposure; transovarial and transstadial transmission of organism in ticks	Most prevalent vector-borne disease in US; most patients do not recall tick bite; transstadial transmission of organism in ticks	50% of cases due to tick bites; other cases due to deerfly or animal bites or contact with organism through infected tissues, inhalation, or ingestion	Soft ticks can remain alive and infective for years; most patients do not recall tick bite; transovarial and transstadial transmission of organism in ticks