Diagnosing Tick-borne Disease

Evaluating patients for Tick-borne diseases including Lyme disease, babesiosis, human granulocytic anaplasmosis (HGA), human monocytic ehrlichiosis (HME), and Rocky Mountain spotted fever (RMSF).

* Formerly known as human granulocytic ehrlichiosis (HGE)

1

Patient resides, works, or recreates in an area likely to have ticks and is exhibiting **fever, headache, malaise, lymphadenopathy and/or rash.**

Remember to always ask about tick bites and exposures to tick habitats.

2

Does the patient have a rash?

Yes

See reverse for additional rash characteristics

- Erythema Migrans (EM) → **Diagnosis: Lyme disease**
- Maculopapular → **Consider HGA/HME**
- Maculopapular to Petechial → **Consider RMSF**
- Cutaneous ulcer → **Consider tularemia**

No

Blood Smear

- Parasites in RBC → **Consider babesiosis**
- Morulae in WBC → **Consider HGA/HME**

Complete blood count

- Low hematocrit and/or low platelets → **Consider babesiosis or RMSF**
- Low WBC and/or low platelets → **Consider HGA/HME**
- Normal CBC → **Consider Lyme disease†, RMSF, or tularemia**

† Lyme disease may have low WBC

Note:

Patients with suspected acute tick-borne disease may require treatment prior to lab confirmation.

See reverse for information on further testing.

Other Considerations

- Rash occurs in approximately 60 – 80% of Lyme disease cases and 5-10% of HGA/HME cases.
- Elevated liver function tests (LFTs) can be seen in Lyme disease, HGA/HME, RMSF or tularemia.
- Co-infections with Lyme disease, babesiosis, and HGA/HME may occur. All of these diseases are transmitted by ticks.
- Bell's palsy presentation can indicate Lyme disease infection.
- Maculopapular or petechial rash of wrists and/or ankles (early) or palms and/or soles (later) is characteristic of RMSF; if suspected, treat immediately.
- **Lyme disease, babesiosis, HGA/HME, RMSF and tularemia should all be reported to the local health department. Tularemia should be reported immediately by phone.**

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Rash Characteristics of Tick-borne Diseases

Lyme Disease (Erythema Migrans)	• Rapidly expanding • Majority are **homogeneous** in color • Central clearing or central erythema in **minority** of cases • Central punctum may be present; occasional ulceration • Pruritis, pain, warmth variably present
Babesiosis	• Petechiae, ecchymosis
HGA / HME	• Rash rare in HGA/HME, typically maculopapular when present
RMSF	• Maculopapular rash develops first on wrists, ankles, palms, soles; seen in 80- 90% of cases • Petechial rash can be a later development in 40-60% of cases
Tularemia (ulceroglandular)	• Cutaneous ulcer at site of inoculation • Local or regional lymphadenopathy typical

Testing for Tick-borne Diseases

ELISA= Enzyme-linked immunosorbent assay;
IFA= indirect fluorescent assay;
PCR= polymerase chain reaction

Lyme Disease	• EM rash is diagnostic. No confirmatory testing required. • Available testing includes ELISA (C6 Lyme peptide or standard) or IFA. If positive or equivocal, Western blot testing should be performed for confirmation. • Testing may be negative during first 4-6 weeks of infection*
Babesiosis	• CBC may show anemia and/or thrombocytopenia • Blood smear may show intraerythrocytic parasites • Serology* • PCR
HGA / HME	• CBC may show leukopenia and/or thrombocytopenia • Blood smear may show WBC morulae • Serology* • PCR • Immunoblot
RMSF	• CBC may show thrombocytopenia and/or anemia • Serology* • PCR
Tularemia	• Serology* • IFA • Growth in culture

* Serologic testing during the acute presentation of these diseases may be negative. Convalescent serologic testing (4-6 weeks after onset) may be required to confirm diagnosis. Antimicrobial treatment may be required prior to laboratory confirmation of diagnosis.

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This card is intended to serve as a diagnostic framework for tick-borne disease, not to make a final diagnosis.
Additional information on diagnosis and treatment can be found at http://www.cdc.gov/ncidod/diseases/list_tickborne.htm

Adapted from Massachusetts Dept. of Public Health Tick-borne Disease Physician's Reference Manual