New Test Announcement

St. Luke's Laboratory Services

Anaplasma phagocytophilum/Ehrlichia chaffeensis and other Tick-Borne Illnesses

Current Tests	Reference Laboratory	Sample Type	Sample Volume
Ehrlichia/Anaplasma, DNA Detection, PCR, Blood *(Detects A. phagocytophilum, E. chaffeensis, E. ewingii and E.muris-like agent.)*	Mayo (84319)	EDTA Whole Blood	5 mL
Peripheral Smear for Anaplasma	St. Luke's Laboratory	EDTA Whole Blood	5 mL
Peripheral Smear for Babesia	St. Luke's Laboratory	EDTA Whole Blood	5.0 mL
Lyme *(B. Burgdorferi)* **Ab IgG/IgM by EIA**	St. Luke's Laboratory	Serum	1.0 mL
Lyme Disease PCR, Blood	Mayo (87973)	EDTA Whole Blood	0.5 mL
***Babesia microti*, PCR**	Mayo (81147)	EDTA Whole Blood	1.0 mL
***Babesia microti*, IgG,/IgM**	Mayo (91608)	Serum	0.1 mL
***A. phagocytophilum* (HGA) Ab, IgG**	Mayo (81157)	Serum	0.5 mL
***E. chaffeensis* (HME) Ab, IgG**	Mayo (81478)	Serum	0.5 mL

Anaplasmosis/Ehrlichiosis are a group of emerging zoontic infections caused by *Anaplasma* and *Ehrlichia species*, which are obligate intracellular, gram-negative rickettsial organisms that infect human leukocytes.

Human Granulocytic Anaplasmosis (HGA), caused by the tick-borne rickettsia, *Anaplasma phagocytophilum*, is transmitted by contact with the *Ixodes* ticks. The white-footed mouse is the animal reservoir, and the epidemiology of this infection is very much like that of Lyme disease (caused by *Borrelia burgdorferi*) and Babesiosis (caused by *Babesia microti*), which all have the same tick vector. HGA is most prevalent in the upper Midwest and in other areas of the United States that are endemic for Lyme disease.

Human Monocytic Ehrlichiosis (HME) is caused by *Ehrlichia chaffeensis*, which is transmitted by the Lone Star tick, *Amblyomma americanum*. The white tail deer is believed to be the animal reservoir, and most cases of HME have been reported from the southeastern and south-central regions of the U.S.

Ehrlichia ewingii, the known cause of canine granulocytic ehrlichiosis, can occasionally case an HME-like illness in humans. Clinical features and laboratory abnormalities are similar to those of *E.chaffeensis* infection, and antibodies to *E. ewingii* cross-react with current serologic assays for detection of antibodies to *E. chaffeensis*.

Infective forms of the rickettsial organisms are injected during tick bites and the organisms enter the vascular system where they infect leukocytes. They are sequestered in host cell membrane limited parasitophorous vacuoles known as morulae. These morulae can be readily observed on Giemsa or Wright's-stained smears of peripheral blood from infected person. Macrophages in organs of the reticuloendotheleal system also are infected. Asexual reproduction occurs in leukocytes where daughter cells are formed and liberated upon rupture of the leukocytes.

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Most cases of Ehrlichiosis are probably subclinical or mild, but the infection can be severe and life-threatening with a 2% to 3% mortality rate. Fever, fatigue, malaise, headache, and other "flu-like" symptoms, including myalgias, artralgias, and nausea occur most commonly.

Diagnosis of Ehrlichiosis may be difficult since the patient's clinical course is often mild and nonspecific. The symptom complex is easily confused with other illnesses such as influenza, or other tick-borne zoonoses such as Lyme disease, Babesiosis, and Rocky Mountain spotted fever. Clues to the diagnosis of Ehrlichiosis in an acutely febrile patient after tick exposure include laboratory findings of leukopenia, thrombocytopenia and elevated transaminases. However, while these abnormal findings are frequently seen, they are not specific. Intragranulocytic or monocytic morulae may be observed in a peripheral blood smear, but this is not a reliable means of ruling out Human Ehrlichiosis/Anaplasmosis because of poor sensitivity in the range of 65% in our laboratory.

It is important to note that concurrent infection with *A. phagocytophilum*, *Borrelia burgdorferi*, and *Babesia microti* is not uncommon as these organisms share the same Ixodes tick vector, and additional testing for these pathogens may be indicated.

Experienced clinicians (including infectious disease specialists) frequently treat empirically based on signs and symptoms with knowledge of the blood CBC (neutropenia/thrombocytopenia) results. Patient response to Doxycycline therapy is reasonable confirmation of the diagnosis. If definitive laboratory testing is desired in the setting of acute illness, PCR testing on whole blood allows direct detection of DNA from *A. phagocytophilum* (our most common organism), *E. chaffeensis*, *E. ewingii* and *E-muris*-like agent. Please note that the DNA of *E. ewingii* is indistinguishable from that of *E. canis* by this rapid PCR assay and therefore, a positive result for *E. ewingii/E.canis* indicates the presence of DNA from either of those 2 organisms.

Serologic testing may be performed for confirmatory purposes, by demonstrating a 4-fold rise or fall in specific antibody titers to *Ehrlichia* or *Anaplasma* species antigens, but serologic testing is usually not indicated. Serologic testing can't distinguish *E. ewingii from E. chaffeensis,* and also *E. muris* since the antibodies cross react in the assay.

If you have questions, please contact S.J. Eastep, MD (218)249-3092, SLH Laboratory Medical Director, K. Warren, M.D. (218)249-6914, Microbiology Medical Director or Deborah Fischer , MT(ASCP) (218) 249-2479, Microbiology Technical Specialist.