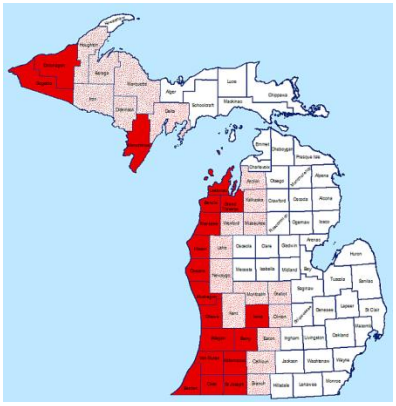
Healthcare provider information: Ehrlichiosis and Anaplasmosis

What is Ehrlichiosis/Anaplasmosis?

Ehrlichiosis/Anaplasmosis are tick-borne zoonoses caused by intracellular gram-negative bacteria. Only one species of *Anaplasma* is known to cause disease (*Anaplasma phagocytophillum*). Anaplasmosis was previously known as human granulocytic ehrlichiosis (HGE) due to the organism's proclivity for infecting granulocytes. *Ehrlichia chaffeensis* and *Ehrlichia ewingii* were previously the only two species of *Ehrlichia* thought to cause human illness in the United States. Illness associated with *E. chaffeensis* and *E. ewingii* was previously called human monocytic ehrlichiosis (HME) due to these organism's proclivity for infecting monocytes.

E. chaffeensis and *E. ewingii* are transmitted by the Lone star tick (*Amblyomma americanum*) which is uncommon in Michigan. There have previously been no confirmed, reported cases of Ehrlichiosis in Michigan that are thought to have been acquired in the state.

Ehrlichia muris-like, however, is suspected to be transmitted by the blacklegged tick. The blacklegged tick, which is common in the western Upper Peninsula and emerging in the western Lower Peninsula, may also transmit Lyme disease and Anaplasmosis (see map at right). Co-infections including both Lyme and Anaplasmosis have been reported and confirmed in Michigan as well as other endemic areas in the United States.



Areas of Michigan where *Ixodes scapularis,* the vector of anaplasmosis and EML, is present (red); and areas considered "at-risk" due to proximity to known populations of ticks (pink).

Image: MI Dept. Community Health

Who is susceptible to Ehrlichiosis/Anaplasmosis?

Everyone is susceptible to Ehrlichiosis, but people who spend time outdoors in tick-infested environments are at increased risk of exposure. In Michigan, reports of tick-borne disease are usually seen from spring through autumn when most ticks are active. Like Lyme disease, EML is most likely to be at increased risk during the summer months when blacklegged tick nymphs are active.

Because *Ehrlichia* organisms infect the white blood cells and circulate in the blood stream, these pathogens may pose a risk to be transmitted through blood transfusions. Ehrlichiosis and Anaplasmosis may be a risk during organ transplantation. Immune-compromised individuals may have more severe illness.

What are the symptoms of Ehrlichiosis/Anaplasmosis?

Symptoms may occur from one to three weeks after tick bite. Some individuals may experience only mild symptoms, or remain asymptomatic. Most patients, however, will experience fever, headache, chills, malaise, and muscle pain. Less frequent symptoms may include nausea/vomiting/diarrhea, confusion, conjunctival injection, rash (in up to 60% of children, less than 30% of adults), joint pain, or rigors.

Reported clinical laboratory findings in patients have included leukopenia, thrombocytopenia, and elevated hepatic aminotransferase levels.

If not treated, anaplasmosis and ehrlichiosis can result in serious illness, and can occasionally be fatal. Signs of severe illness may include difficulty breathing, hemorrhage, renal failure, or neurologic manifestations. Ehrlichiosis tends to be more severe than anaplasmosis.

How is Ehrlichiosis Diagnosed?

The diagnosis of ehrlichiosis or anaplasmosis should be made based on clinical signs and symptoms, and can later be confirmed using specialized laboratory tests. Treatment should never be delayed pending the receipt of laboratory test results, or be withheld on the basis of an initial negative laboratory result.

There are several aspects of ehrlichiosis and anaplasmosis that make it to diagnose and treat. The symptoms vary from patient to patient and can be difficult to distinguish from other diseases. Treatment is more likely to be effective if started early in the course of disease. Diagnostic tests based on the detection of antibodies will frequently be negative in the first 7-10 days of illness. Healthcare providers may find important information in the patient's history and physical examination that may aid clinical suspicion. Information such as recent tick bites, exposure to areas where ticks are likely to be found, or history of recent travel to areas where ehrlichiosis is endemic can be helpful in making the diagnosis. The healthcare provider should also look at routine blood tests, such as a complete blood cell count or a chemistry panel. Clues such as thrombocytopenia, leukopenia, or elevated liver enzyme levels are helpful predictors of ehrlichiosis, but may not be present in all patients depending on the course of the disease. After a suspect diagnosis is made on clinical suspicion and treatment has begun, specialized laboratory testing should be used to confirm the diagnosis of ehrlichiosis.

Laboratory Detection

During the first week of illness, a microscopic examination of blood smears may reveal morulae in the cytoplasm of white blood cells in up to 20% of patients. A sample of whole blood can also be tested for the presence of *Ehrlichia* or *Anaplasma* by polymerase chain reaction (PCR). This method is most sensitive during the first week of illness, and decreases in sensitivity following antibiotic treatment. While a positive PCR may be confirmatory, a negative result may not completely rule out the diagnosis. PCR testing of human patients is currently available through Mayo Laboratories.

Antibody tests may also be performed. It is important to note, however, that antibodies are not detectable in the first week of illness in 85% of patients, and a negative test during this time does not rule out ehrlichiosis or anaplasmosis as a cause of illness. The gold standard serologic test for diagnosis of ehrlichiosis/anaplasmosis is an indirect immunofluorescence assay (IFA) performed on paired serum samples to demonstrate a significant (four-fold) rise in antibody titers. The first sample should be taken as early in the disease as possible, preferably in the first week of symptoms, and the second sample should be taken 2 to 4 weeks later. Because of the similarity of the bacterial agents that cause anaplasmosis and ehrlichiosis, cross-reactivity may occur. It is therefore recommended, if conducting antibody testing, to order an ehrlichial/anaplama antibody panel.

What is the Treatment for Ehrlichiosis/Anaplasmosis?

The antibiotic Doxycycline is the first line treatment for adults and children of all ages. Doxycycline is most effective at preventing serious complications from developing if it is started early in the course of disease. If treatment is started within 5 days of illness onset, fever generally subsides within 24-72 hours.

Recommended Dosage:

- Adults: 100 mg every 12 hours
- Children under 45 kg (100 lbs): 2.2 mg/kg body weight given twice a day

Standard duration of treatment is 10 to 14 days.

How Can Ehrlichia/Anaplasma be Prevented?

The most effective way to prevent illness is to avoid tick bites. When in areas that may be tick-infested, the following personal protective measures can reduce the risk of getting anaplasmosis/ehrlichiosis:

- Use insect repellent that contains 20 - 30% DEET.
- Wear clothing that has been treated with permethrin.
- Take a shower as soon as you can after coming indoors.
- Look for ticks on your body. See the image to the right for areas that ticks tend to bite.
- Put your clothes in the dryer on high heat for 60 minutes to kill any remaining ticks.

Feel for bumps and look for tiny brown spots, especially in these areas:

1. Scalp
2. Ears
3. Underarms
4. Belly Button
5. Waist & Back
6. Behind Knees
7. Pelvic Area
8. In Between Legs

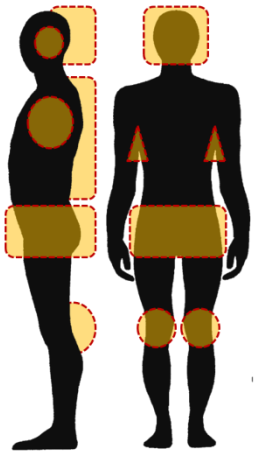


Image: MI Dept. Community Health

How Should an Attached Tick be Removed?

1. If a tick is attached, use fine-tipped tweezers to grasp the tick at the surface of the skin.
2. Pull the tick straight up and out. Don't twist or jerk the tick—this can cause the mouth parts to break off and stay in the skin. If this happens, remove the mouth parts with tweezers if possible. If not, leave them alone and let the skin heal.
3. Clean the bite and hands with rubbing alcohol, an iodine scrub, or soap and water.
4. A small bump or redness may be present, but will likely go away in 1-2 days, like a mosquito bite. This is not a sign of disease.

Note: *Do not put hot matches, nail polish, or petroleum jelly on the tick to try to make it pull away from your skin.*

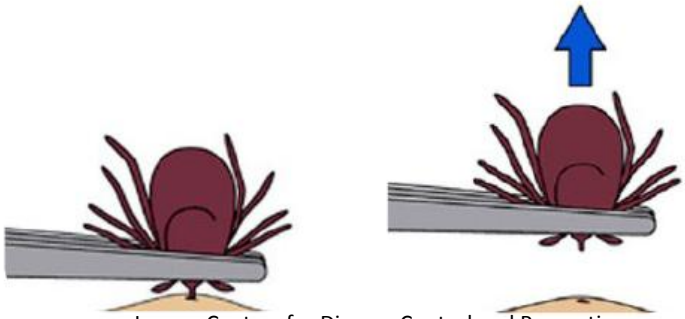


Image: Centers for Disease Control and Prevention

References

Pritt, B *et al.* (2011). Emergence of a New Pathogenic Ehrlichia Species, Wisconsin and Minnesota, 2009. N Eng J Med 365(5): 422-29. (http://www.nejm.org/doi/full/10.1056/NEJMoa1010493)

Centers for Disease Control and Prevention (www.cdc.gov/ehrlichiosis)

Centers for Disease Control and Prevention (www.cdc.gov/anaplasmosis)

Wisconsin Division of Public Health. Anaplasmosis/Ehrlichiosis Disease Fact Sheet. Bureau of Communicable Disease Epidemiology Section P-42045 (Rev. 01/2012).

Wormser, GP *et al*. (2006). The clinical assessment, treatment, and prevention of Lyme disease, Human Granulocytic Anaplasmosis, and Babesiosis: Clinical practice guidelines by the Infectious Diseases Society of America. Clin Infect Dis. 43:1089–1134.

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