

# Tick-borne infections

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Tick-borne infections are found worldwide. In the upper Midwest, this group of diseases consists primarily of tularemia, borreliosis (Lyme disease), ehrlichiosis and anaplasmosis. Tularemia (*Francisella tularensis*) and borreliosis (*Borrelia burgdorferi*) have been covered in prior publications; therefore, this discussion will focus on ehrlichiosis and anaplasmosis.

*Ehrlichia* and *Anaplasma* organisms are classified as bacteria. Several different species of each of these organisms causes disease in animals and people. Here are some of those species:

- *Ehrlichia canis* causes canine monocytic ehrlichiosis. Rare reports have been made of this organism causing disease in humans. *Rhipicephalus sanguineus*, the brown dog tick, is the main vector for this organism.



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- *Ehrlichia chaffeensis* causes human monocytic ehrlichiosis. This organism can cause disease in dogs as well. This organism is found in the southeastern, south-central and mid-Atlantic states. *Amblyoma americanum*, the Lone Star tick, is the main vector for this organism.



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- *Ehrlichia ewingii* causes canine granulocytic ehrlichiosis and human ewingii ehrlichiosis. *Amblyoma americanum*, the Lone Star tick, is the main vector for this organism.
- *Ehrlichia ruminantium* causes heartwater disease in cattle, a foreign animal disease that is not found in the U.S. This organism does not cause disease in humans.
- *Anaplasma phagocytophilum* causes human, canine and equine granulocytic anaplasmosis. This



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organism is found primarily in the Northeast, upper Midwest and western U.S. *Ixodes scapularis*, the black-legged tick, and *Ixodes pacificus*, the Western black-legged tick, are the main vectors of this organism.

- *Anaplasma platys* causes cyclic canine thrombocytopenia (low platelets). This organism does not cause disease in humans.
- *Anaplasma marginale* infects the red blood cells of domestic and wild ruminants. This organism does not cause disease in humans.

While this is not an inclusive list, it describes the major *Ehrlichia* and *Anaplasma* species important to animals and people in the upper Midwest. All of these organisms are transmitted from Ixodid ticks to wild and domesticated animal reservoir hosts. They can be transmitted in the tick life cycle through molts, but they do not appear to be transmitted reproductively (eggs of the female). Less common, but important, routes of transmission include blood transfusions, bone marrow transplants and solid organ transplants.

## The Disease in Humans

Although a variety of organisms have been presented, the clinical signs of disease are somewhat the same for all humans and range from asymptomatic to fatalities. Affected individuals will develop a fever; abnormalities in their white blood cell, red blood cell and platelet counts; and elevated liver enzymes. In severe cases, people can develop serious disease involving the kidneys, lungs and heart.

## The Disease in Animals

**Dogs** infected with *Ehrlichia* and *Anaplasma* organisms can be asymptomatic; demonstrate acute illness with signs of fever, lethargy, anorexia, vomiting, diarrhea, lameness/stiffness, coughing, swollen lymph nodes and weight loss; and, finally, show development of chronic disease characterized by fever, chronic weight loss, anorexia, weakness, lethargy, muscle pain and fluid accumulation in dependent areas. Bleeding disorders and ocular infections have been reported as well. Abnormalities in the numbers of red and white blood cells and platelets are common.

**Horses** infected with *Anaplasma phagocytophilum* (most of them older than 3 years of age) tend to show fever, anorexia, lethargy, yellowing of mucous membranes, decreased activity, ataxia and fluid accumulation in the lower legs.

*Ehrlichia* infections have been reported in **calves** as well. Clinical signs are similar to those described for dogs and horses.

## Diagnosis

Diagnosis of these infections is by demonstration of the organism or antibody to the organism in the blood of the affected animal or human. Response to treatment, clinical history and blood tests can help as well. In some cases, examination of a blood smear can provide valuable information. Molecular assays that detect nucleic acids from the organisms also are widely used.

## Treatment

Tetracycline antibiotics are the treatment of choice for these types of infections.

## Prevention

People are encouraged to take precautions to prevent them or their animals from being exposed to ticks. The following is list of suggested preventative practices:

- Wear light-colored clothing.
- Examine clothes and skin for ticks.
- If possible, use well-traveled trails.
- Use insect repellent.
- Wear long-sleeved shirts and pants.
- Place sock tops outside the pant leg and tuck in your shirt when walking in woods.
- Check yourself, your children and pets for ticks at the end of the day. If you find a tick on your body, follow the Centers for Disease Control and Prevention guidelines for removal ([www.cdc.gov/ticks/removing\\_a\\_tick.html](http://www.cdc.gov/ticks/removing_a_tick.html)).
- Keep your lawn mowed.
- Clear vegetation from around houses and gardens.
- Spray the yard with a residual insecticide.
- Talk to your veterinarian about using an appropriate tick repellent for pets.

**For more information on this and other topics, see [www.ag.ndsu.edu](http://www.ag.ndsu.edu)**

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