Canine Ehrlichiosis
By Rebecca Stokes

What is Ehrlichia?
Ehrlichia is a bacterium that lives in the white blood cells of the host that it infects. Domesticated animals, such as the dog, as well as wild animals and even humans can be infected with this bacterium. Although there are many different strains of Ehrlichia, some are more specific to one particular host. For the dog, Ehrlichia canis is the strain that is most responsible for causing clinical disease from infection. We will focus on this strain throughout the rest of the discussion.

How could my dog get Ehrlichia?
Transmission of Ehrlichia canis requires a tick vector, specifically the Rhipicephalus sanguineus species also known as the “brown dog tick” (see image below). The tick acquires the bacteria by taking a blood meal from an acutely infected dog. The bacteria are then transferred to another dog as that same tick takes a blood meal in successive life stages. A dog can also become infected by receiving a blood transfusion from a donor dog that is Ehrlichia positive. However, this is rare as there is usually extensive screening done before a dog can be used as a donor.

Like most other tick born diseases, cases of Ehrlichiosis, or Ehrlichia infections, typically occur during the warmer seasons when the vector is at its peak. Infections can occur anywhere in the United States, as the “brown dog tick” is endemic throughout the country (see map below).

What are the signs of an Ehrlichia infection in my dog?
In general, there are three phases of disease: acute, subclinical, and chronic. Immune function, age, and breed can dictate the severity of clinical signs in the individual infected dog.

Acute phase: This phase is typically a milder phase occurring 1-3 weeks after the tick has infected the host. For this reason, it typically occurs within the warmer months when the vector is most active. During this phase Ehrlichia canis starts to attach to white blood cells (lymphocytes and monocytes in particular). Clinically, the dog will be showing non-specific signs such as fever, lethargy, and enlarged lymph nodes most commonly. The dog may go off feed and be less playful than its usual self. Increased stiffness
in their gate with reluctance to move, edema (increased fluid buildup) of the limbs or scrotum, as well as coughing or difficultly breathing may also be observed. During this phase, the dog can appear very sick but typically responds well to treatment and can go on to clear the organism. Some dogs can spontaneously clear the infection without treatment. However, if while in this phase the animal does not clear the organism, the infection will progress to the next phase.

**Subclinical:** The dog appears normal during this phase because the organism has sequestered (hidden) itself in the spleen. This phase can go on for months to years. Besides an increased globulin (category of blood proteins) on a blood test in conjunction with a slightly reduced platelet count, no signs of infection can be detected making diagnosis difficult.

**Chronic:** During this phase, the dog becomes sick again. This phase can be severe and life threatening and typically occurs in dogs that are immunocompromised. This can occur in any breed; however, German Shepard dogs seem to be more prone to developing chronic infections. Due to the latent nature of the subclinical phase, progression to the chronic phase is not observed at any particular time of year and could occur at any time. It is characterized by depression, fever, and weight loss most commonly. Most dogs will have bleeding tendencies due to decreased platelets; however, pale gums and mucous membranes due to anemia, painful abdomens with splenomegaly (increased size of the spleen), uveitis (inflammation of the eye), and neurologic signs can be observed as well. As the chronic stage progresses, irreversible destruction of the bone marrow occurs. Secondary infections are common and can further complicate this disease process. Death typically occurs secondary to these infections or from extensive hemorrhage and blood loss.

**How do you diagnose Ehrlichiosis?**
Diagnosis of Ehrlichiosis is complicated due to the complex nature of infection and no one test can do so. Therefore, diagnosis is based off consistent clinical signs (a dog with fever, large lymph nodes, possibly has bleeding disorders, or arthritis in multiple joints) in addition to blood work values (decreased platelets, increased globulins, and mildly decreased red blood cells (anemia)).

Furthermore, blood tests can be performed but can be difficult to interpret. This is typically an ELISA snap test called a 4DX snap test. It also includes a heartworm test and a test for Lyme disease and results can be achieved relatively quickly while at the clinic. This test detects antibodies to *Ehrlichia canis* found in the blood. A positive test only indicates that the dog has been exposed to *Ehrlichia canis* and does not always correlate with clinical disease. A negative test also does not rule out disease, as animals that are too sick may not be able to produce enough antibodies to be detected by the test. Also, if tested too early during infection, the dog may not be producing antibodies quite yet.
PCR (polymerase chain reaction) blood tests are also available now and detect the presence of *Ehrlichia canis* itself. It dose not quantify the number of organisms present, and it also cannot differentiate between live and dead organisms which can be present several weeks after the infection has cleared. This makes it difficult to use this test as a means to confirm successful treatment and clearance of the organism. However, it can be used in conjunction with an antibody titer blood test in order to better diagnose and monitor treatment.

Since *Ehrlichia canis* attaches to white blood cells, a blood smear of the “buffy coat” layer can also be confirmatory for infection. White blood cells or platelets will contain intracytoplasmic inclusion bodies, “morulae”. However, these organisms exist in low numbers and are relatively difficult to find so a lack of morulae cannot rule out infection.

**I was told my dog tested positive for Ehrlichia on his yearly heartworm test. What now?**

If a dog tests positive on the 4DX snap test during its yearly heartworm test, it simply means that the animal has been exposed to the organism. If the dog is not showing clinical signs, a diagnostic work up and treatment is not necessary. The dog can be monitored at home for development of clinical signs. Treatment should be initiated once clinical signs occur. However, a large percentage of dogs will clear the infection on their own and do not become clinical.

**How do we treat it?**

Treatment of Ehrlichiosis can be managed with tetracycline antibiotics such as doxycycline or minocycline. The duration of treatment can be different between dogs and depends on the rate of clearance of the organism and resolution of clinical signs. With acute infections, you will typically see quicker response with a decrease in fever within one to two days. Chronic infections tend to require longer treatment and blood abnormalities can persist for 3-6 months; however, relief of clinical signs appear much sooner. Supportive care and platelet or whole blood transfusions may be necessary in more severe cases where organ dysfunction and excessive hemorrhage is present.

**How do I prevent an Ehrlichia infection in my dog?**

*Ehrlichia canis* is most commonly transmitted to your dog through a tick bite. Therefore, regular tick preventative are paramount in prevention of this disease. Take special care that the preventative that you are using is effective against the tick vector *R. sanguineous*. Chemicals such as propxur, anitraz, and flumethrin have been proven effective at killing this particular species of tick. As previously mentioned, this tick species can be found throughout the United States so, despite your location, tick prevention is of upmost importance. In particular, it tends to be found around homes and kennels so long-term tick control is needed for management. Monthly topicals or oral preventatives can be used as well as long acting collars which may be a more convenient and cost effective means of managing this.
Can I get Ehrlichiosis from my dog?
Both humans and animals can become infected with species of Ehrlichia; however, direct transmission under normal circumstances from infected dogs does not pose a risk. Within the medical literature, there has only been one case of a human infection with *Ehrlichia canis* reported and infection did not result in clinical signs.

**Conclusion**
Ehrlichiosis is an important disease that affects canines throughout the world. Although it can be quite common, especially in the southern regions of the United States where the weather is more favorable for the *R. sanguineous* vector, it is often difficult to diagnose as it has many different clinical manifestations. Luckily, with early and proper treatment dogs tend to recover from clinical disease relatively well. Furthermore, regular tick prevention is key in preventing and controlling this disease.

**References:**


