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Babesia Infection in Dogs



**Babesia organism inside
a red blood cell**

Most people have never heard of *Babesia* organisms though they have caused red blood cell destruction in their canine hosts all over the world. *Babesia* organisms are spread by ticks and are of particular significance to racing greyhounds and pit bull terriers. Humans may also become infected.

There are over 100 species of *Babesia* but only a few are found in the U.S. and are transmissible to dogs. *Babesia canis*, the "large" species of *Babesia* is one; *Babesia gibsoni*, a smaller *Babesia* that affects pit bull terriers almost exclusively is another; and a second but unnamed small *Babesia* has been identified in California. *Babesia* species continue to be classified and sub-classified worldwide.

How Infection Happens and what Happens Next

Infection occurs when a *Babesia*-infected tick bites a dog and releases *Babesia* sporozoites into the dog's bloodstream. A tick must feed for two to three days to infect a dog with *Babesia*. The young *Babesia* organisms attach to red blood cells, eventually penetrating and making a new home within the cells for themselves. Inside the red blood cell, the *Babesia* organism divests its outer coating and begins to divide, becoming a new form called a merozoite that a new tick may ingest during a blood meal. Infected pregnant dogs can spread *Babesia* to their unborn puppies, and dogs can transmit the organism by biting another dog as well. (In fact, for *Babesia gibsoni*, which is primarily a pit bull terrier infection, ticks are a minor cause of infection and maternal transmission and bite wounds are the chief routes of transmission.)

Having a parasite in your red blood cells does not go undetected by your immune system. Infected red blood cells are identified and destroyed, which kills the *Babesia* organism, but unfortunately if many red blood cells are infected this leaves the host with anemia, a lack of red blood cells. Often the host's immune system will begin destroying the uninfected red cells as well, a condition called **immune mediated hemolytic anemia (IMHA)**. Symptoms include weakness, jaundice, fever, red or orange colored urine. At least 50% of patients will require blood transfusions.

Making matters worse is the fact that animals seem to get sicker than the degree of anemia would suggest so that there is more to this infection than the destruction of red blood cells. The severe inflammation that is associated with this parasitism can be overwhelming and completely separate from the anemia. Platelet counts can drop, impairing normal blood clotting (especially a problem with *Babesia gibsoni*). An assortment of neurologic signs can occur with *Babesia* infection when parasites sequester inside the central nervous system and generate a more localized focus of inflammation. In severe cases there is a lung injury similar to what people with late stage malaria can experience. The new California *Babesia* species seem predisposed to creating liver disease.

If the acute symptoms are relatively mild or at least non-lethal, a chronic infection can develop. This is usually without symptoms but the dog may continue to be a source of infection to feeding ticks. Relapses can also occur with stress.

Because babesiosis is a tick-borne infection, it is not unusual for infected dogs to have other tick-borne infections such as **Ehrlichiosis**, Rocky Mountain Spotted Fever, and others. These infections may interact to make each other more severe.

Young dogs tend to be most severely infected, especially pit bull terriers.

Diagnosis of Babesiosis

With luck, the *Babesia* organisms can be seen on a blood smear. *Babesia canis* organisms are tear-shaped and occur in pairs. Other *Babesia* species have several forms in which they appear. Odds of finding the organism are improved by checking freshly drawn blood taken from a capillary source (a small cut to an ear, for example) rather than from a blood vessel. If *Babesia* organisms are found, the patient is definitely infected but in most cases an alternative method of diagnosis is needed.

Antibody testing has been problematic as infected animals may have circulating antibodies long after the organism is gone or may have no antibodies circulating while the few organisms remain hidden inside red blood cells.

The current method of diagnosis involves PCR testing. This is extremely sensitive testing and can distinguish four different species of *Babesia*. While only certain laboratories run this type of testing, this is really the best method of answering the *Babesia* infection question.

Babesia Treatment

Therapy for *Babesia* is not a benign undertaking. In fact, if a dog is asymptomatic with *Babesia*, treatment is not worth the side effects. Furthermore, even with treatment *Babesia gibsoni*, and probably the other small *Babesia* species, cannot be fully cleared by any of the drugs listed. Female dogs testing positive for *Babesia* should not be bred.

Diminazene Aceturate

This drug is not available in the U.S. but in other countries it is the most commonly used treatment. A single injection is needed and is best used on *Babesia canis*. Side effects include: nausea, blood pressure drop, painful injection, seizures, and some fatal reactions.

Imidocarb Dipropionate

This is the only drug approved for babesiosis in the U.S. A single dose is usually effective for *Babesia canis* but two doses given two weeks apart are needed for *Babesia gibsoni* and the other smaller *Babesias*. The injection is painful, plus it causes muscle tremors, drooling, elevated heart rate, shivering, fever, facial swelling, tearing of the eyes, and restlessness. Pre-treatment with an injection of atropine helps lessen these side effects.

Trypan Blue

This medication serves to block the parasite from entering red blood cells and may help minimize the symptoms of the infection. Side effects are minimal and it is given as an IV drip.

Phenamidine Isethionate

This drug is not available in the U.S. but a similar drug, Pentamidine isethionate, is. It is more effective on *Babesia canis*.

Quinuronium Sulfate

This drug is not available in the U.S. It is similar to malarial treatment. It is given as a series of two injections two days apart, and generally marked improvement is seen in the patient by the second injection.

A combination therapy of quinine, **azithromycin**, atovaquone, and/or **clindamycin** are promising and may become prominent in the future. Clindamycin, the treatment of choice for *Babesia microti*, the chief *Babesia* species that infects humans, can be used against *Babesia* in dogs. Since this is a readily available antibiotic and the drugs specific for *Babesia* (listed above) are difficult to obtain, clindamycin represents an excellent starting point for therapy.

A vaccine is available against *Babesia* in France but only seems effective against certain strains. Vaccination is 89% effective in France. The best prevention is aimed at tick control.

Human Babesiosis

In the U.S., human cases chiefly occur on the East Coast and along the Great Lakes. *Babesia microti* is the species that infects humans and is associated with a 5% mortality rate. Treatment is similar to that for malaria: blood transfusion, quinine, and clindamycin. New species of *Babesia* have been diagnosed in humans in California, Washington State, and Missouri.

Read more detail on [human infection](#) from the Centers for Disease Control and Prevention.

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