

Canine Tick-Borne Diseases

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not transmit the disease until about 36 to 48 hours after attachment, so prompt removal can help prevent illness. A Lyme vaccine also is available for dogs.

Lyme is often mistaken for other illnesses. Clinical signs in dogs include sudden or intermittent lameness, hot or swollen joints, fever and lack of appetite. Only 10 percent to 20 percent of infected dogs show signs, Goldstein says.

"The most common clinical manifestation is actually no sign," he says. "Most dogs don't get the human-type rash possibly because the initial skin lesion may not be noticed due to the color of the skin and hair coat. Thus, it's hard to know when they're sick or even when they're bitten. It typically takes two to five months for a dog to show clinical signs, though we may just be missing the initial flu-like symptoms."

Treatment with penicillin or tetracycline-related antibiotics usually cures the signs, but signs can recur because often the organisms are not totally eliminated by the treatment regimen. While some cases may resolve without treatment, Lyme disease left untreated can cause polyarthritis as well as heart, neurological or kidney damage.

Labrador Retrievers and Golden Retrievers seem more susceptible to one deadly manifestation — Lyme nephritis. Antibodies combine with the antigen, causing circulating complexes that lodge in the kidneys. Clinical signs include vomiting, lethargy, weight loss, elevated kidney enzymes, and large amounts of protein in urine.

"Typically, most dogs die within weeks of showing severe clinical signs if it's not caught early," says Goldstein, who currently is conducting four canine Lyme disease studies including one of Labradors and Golden Retrievers that have been diagnosed with Lyme. Owners interested in participating in the studies may e-mail Goldstein at rg225@cornell.edu for information.

Difficult to Diagnose Diseases

Like Lyme, the bacteria causing canine anaplasmosis is transmitted to dogs by the deer tick. Two species of Ehrlichia — *E. equi* and *E. platys* — were renamed to the Anaplasma species *A. phagocytophilia* and *A. platys*, respectively.

Anaplasmosis can cause a profound reduction in platelet numbers and red blood cells. Signs including fever, lethargy and muscle pain generally appear within a week of a tick bite, and hemorrhaging occurs in later stages.

It's uncertain how long it takes an infected tick to transmit anaplasma pathogens, but early treatment with tetracycline-type antibiotics is effective.

Several species of *Ehrlichia* infect

dogs. An infection could cause anemia, thrombocytopenia, or a condition resulting in low blood platelets, and retinal and neurological problems. Depending on the bacteria and the individual dog, an infected animal may develop chronic illness. Ehrlichiosis is treatable with tetracycline-family antibiotics.

Canine ehrlichiosis can be hard to diagnose. Signs include fever, swollen lymph nodes, lack of appetite and exercise intolerance, yet some dogs are asymptomatic. Nosebleeds are a classic sign that occurs later, Angulo notes.

E. canis affects dogs in nearly all states. One known carrier, the brown dog tick, can transmit pathogens for five months past engorgement, enabling year-round infection.

Canine Rocky Mountain spotted fever is caused by *Rickettsia rickettsi* and carried by the American dog, brown dog and wood ticks. RMSF is now reported in most states, especially on the East and West coasts and in the South Central states. Ticks must be attached at least five hours to transmit the microorganism.

Fever, swollen lymph nodes and joints, vomiting and fatigue are signs. In later stages, dogs can develop skin lesions, vision problems, nosebleeds, anemia, and neurological signs including behavioral changes, head tremors, and difficulty standing or walking. RMSF is treated with tetracycline-type antibiotics but potentially fatal if untreated.

Babesia are microscopic blood protozoa that cause anemia. Dogs are infected by two species — *B. gibsoni* and *B. canis*, the latter having three subspecies — that are carried by Ixodid, brown dog and American dog ticks. Ticks feed 24 to 36 hours before transmitting the organisms.

Babesia also is transmitted by blood transfusions and possibly by infected dog bites. Kennels with tick problems are at high risk. Racing Greyhounds seem prone to *Babesiosis canis* although they may be asymptomatic.

Signs include pale gums, weakness, anorexia, vomiting and thrombocytopenia. Infected dogs can die, but most recover with treatment of anti-protozoal drugs and supportive therapy. A vaccine for *B. canis* is available in Europe but not in the United States.

B. gibsoni may cause more severe illness and be difficult to treat, Angulo says.

More Common Than Realized

Canine bartonellosis may be more common than previously believed in dogs infected with *E. canis* and *B. canis*. The brown dog tick is a known vector, especially in infested kennels.

At least 16 species of *Bartonella* bacteria are known, including *Bartonella vinsonii* subspecies *berkhoffii* in dogs and coyotes. Indications are intermittent fever and lameness. Bartonellosis may cause heart or liver disease. Infections are treated

with antibiotics.

Hepatozoonosis is caused by *Hepatozoon canis*, a parasite presumably carried by the brown dog and Gulf Coast ticks. Dogs are infected when they eat infected ticks. The ingested organism affects the liver, spleen, muscles, bone marrow and lungs. This parasite is limited in distribution along the Gulf Coast but appears to be on the move, Angulo says.

Signs include inflammation, back pain, fever, ocular and nasal discharges, bloody diarrhea, and muscle pain and atrophy. Healthy dogs may stay asymptomatic. Antibiotics and nonsteroidal anti-inflammatories usually are given.

Haemobartonellosis is a potentially fatal tick- and flea-transmitted disease caused by a blood parasite. In dogs the microorganism is *Mycoplasma haemocanis*, formerly called *Haemobartonella canis*. It also can be passed by blood transfusions and probably from mothers to newborns.

Dogs may not appear sick unless they are immune-compromised or co-infected with ehrlichiosis/babesiosis. Acute signs include loss of appetite and weight, fever and anemia. Treatment includes tetracycline-type antibiotics and blood transfusions.

Commonly called "Q fever," coxiellosis is a highly infectious zoonosis causing liver, kidney, cardiovascular and respiratory illness. Dogs can get *Coxiella burnetii* bacteria from tick bites — including from the brown dog tick — but more often from inhaling the organism, eating infected animals' meat or milk, or handling infected birthing tissue, urine or feces.

Diagnosed cases are rare, but farm dogs exposed to sheep, goats or cattle (known disease reservoirs) are at higher risk. Tetracycline antibiotics are possible treatments.

Because dogs often go outdoors and are low to the ground, they are considered 50 to 100 times more likely than people to be bitten by ticks.

"If you take your dogs outside, even to the park or onto your lawn, they're at risk," Angulo cautions. "We're also transporting dogs more from one place to another. The only way to control tick-borne diseases is to control ticks."

"Almost everywhere in the United States, dogs should be on preventive tick products," Goldstein advises. ■

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