



## Canine Tick-Borne Diseases Are Becoming More Prevalent

**T**ick-borne diseases are spreading yet much about them remains unknown. The best defense is to check dogs after they've been outside, no matter where you live. Some veterinarians recommend testing for the most common diseases as part of annual veterinary exams.

"The distribution and biology of ticks have changed dramatically in the last several decades," says Richard Goldstein, D.V.M., DACVIM, associate professor of small animal medicine at Cornell University College of Veterinary Medicine.

Tick-borne diseases are reported worldwide. Researchers are identifying more disease organisms and tick species that carry them. Ticks often transmit multiple diseases simultaneously. Many infections are treatable but not with the same drugs, so dogs that are co-infected can become sicker longer with more severe clinical signs and longer treatment regimen required.

"We have diagnosed dogs with Rocky Mountain spotted fever, Lyme disease, and *Ehrlichia canis*, *Babesia canis* and *Babesia gibsoni* infections at the same time," says Arthur Angulo, D.V.M., Ph.D., DACVIM, veterinary immunologist at the Texas Veterinary Medical Diagnostic Laboratory at Texas A&M University.

"Many ticks carry more than one

disease within them," agrees Goldstein. "Most common in the Northeast is Lyme disease."

### Testing for Tick Diseases

More cases also are being diagnosed due to increased testing. A veterinary screening test, developed by IDEXX Laboratories Inc., based in Westbrook, Maine, is helping to identify dogs that have been exposed to pathogens so treatment can begin before a dog becomes sick. Introduced in 2006, the 4Dx rapid screening test allows a veterinarian to analyze a dog's serum in 10 minutes.

The test detects heartworm, Lyme disease, ehrlichiosis and anaplasmosis, an emerging disease that had been considered a subset of ehrlichiosis. A positive test means the dog has developed antibodies and could develop the disease unless treated. A veterinarian performs additional testing to determine if an animal is infected based on alterations in his platelet count.

"We chose these diseases because all can have subclinical or hidden stages," says Leif Lorentzen, D.V.M., medical affairs manager at IDEXX. "Testing can indicate whether dogs have been exposed to these agents and allows the veterinarian to determine if treatment or other intervention is necessary."

Fifty percent or more of dogs living in certain Lyme-endemic regions have positive titers, Goldstein says. "A lot of those dogs appear to be normal, but they all have developed antibodies by the time we do blood serum tests. What to do about dogs that are infected but don't have clinical signs is a difficult question."

Antibodies do not appear until 14 days — and often longer — after a tick bite. Earlier treatment, if necessary, is usually based on case history and signs. Other testing is available, including PCR (polymerase chain reaction) technology to amplify a pathogen's DNA.

Research of tick-borne diseases focuses largely on tick prevention, tick biology to understand how and what organisms ticks carry, and understanding how tick-borne diseases spread. Although few genetic studies have been done, some breeds seem susceptible to worse cases of tick-borne illnesses. This includes Labrador Retrievers that contract Lyme disease and German Shepherd Dogs infected with ehrlichiosis or Rocky Mountain spotted fever. Greyhounds may be prone to babesiosis.

The most prevalent tick-borne diseases in dogs are Lyme, anaplasmosis, ehrlichiosis and Rocky Mountain spotted fever (RMSF). Babesiosis, which is often transmitted with bartonellosis and ehrlichiosis, may be underdiagnosed.

Dogs also can get infected tick bites, inflammatory skin reactions, and become allergic to bites. Tick paralysis from toxins in the saliva of American dog ticks can paralyze dogs and cause respiratory failure if ticks are not removed.

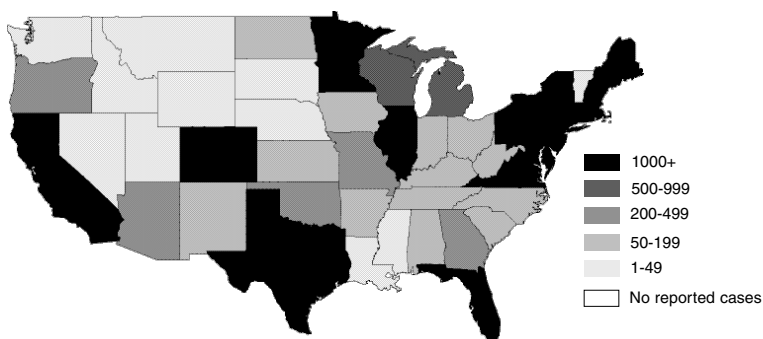
### A Look at Lyme Disease

Possibly the most common tick-borne illness in the nation, Lyme disease afflicts dogs and humans — and it's spreading. Caused by the spirochete *Borrelia burgdorferi*, Lyme is carried by the hard-shell deer tick (*Ixodes scapularis*) endemic in the Northeast and upper Midwest.

An infected tick presumably does

### Where Lyme Disease Is Found

The following map highlights the number of detected canine Lyme disease cases found in the United States. Because many dogs go untested for tick-borne diseases, the actual number of infected dogs is likely many times higher than what is depicted on the map.



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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](mailto: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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