

Canine Lyme Disease Review

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Lyme disease is a growing problem in Iowa. An analysis by the U.S Centers for Disease Control and Prevention revealed that that the Lyme disease rate in Iowa tripled between 1992 and 2006 (1). According to the Iowa Lyme Disease Association, Lyme disease is the second fastest growing infectious disease in the U.S. and is the number one vector-borne disease in the U.S. (2).

IDEXX publishes veterinary statistics on Ehrlichiosis, Lyme Disease, Heartworm Disease and Anaplasmosis at www.dogsandticks.com. Data was collected between 2001 and 2009, and during this time frame, 897 cases of Lyme disease were reported in Iowa, which interestingly, is about 3 times higher than the reported number of heartworm positive dogs during this same time frame. Actual numbers are probably much higher, as many dogs are untested for tick-borne diseases, and many positive Lyme tests remain unreported (3).

Disease Description:

Lyme disease in the U.S. is caused by spirochete bacteria, *Borrelia burgdorferi*. Lyme disease is transmitted by both nymphs and adults belonging to the *Ixodes* genus (commonly referred to as the deer tick or black-legged tick); although spirochetes have been identified in other species of ticks as well and also fleas, mosquitos and flies (4). Black-legged ticks are much smaller than most pet owners realize; **the black-legged nymph is only the size of a poppy seed and a black-legged adult tick is about the size of a sesame seed.** A host is infected after the tick is partially engorged, which is typically about 24-48 hours after attachment (3).



Borrelia burgdorferi



Black-legged adult, nymph and larva ticks

Clinical Signs:

The most common symptom of canine Lyme disease is no symptoms at all (5). In fact, 95% of dogs that test positive for Lyme disease are asymptomatic. Other symptoms of Lyme disease are variable and include fever, anorexia, lameness, joint swelling, cardiac disease, neurologic disease and glomerulonephritis (4).

Diagnosis:

There are a variety of tests available to screen for *Bb* exposure; however in private-practice, the IDEXX C6 antibody-based tests are most commonly used. Research has demonstrated that the C6 antibody is detected early in infection and will NOT cross-react with vaccination or other tick-borne disease. Also, C6 antibody levels decline rapidly and significantly after treatment (7).

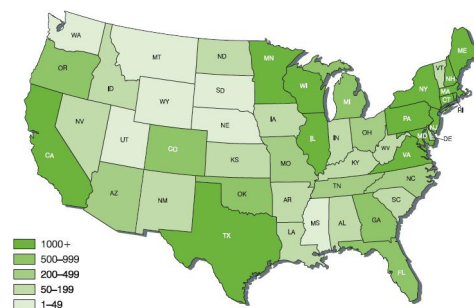
IDEXX has a qualitative in-house 4DX snap test that screens for heartworm disease, Ehrlichiosis, Anaplasmosis and Lyme Disease. This test has been shown to have a sensitivity of 96.2% and a specificity of 100% (7). IDEXX also has a quantitative "Lyme Quant C6 test" that is available through the reference laboratory. These tests can be used in conjunction with one another to help determine if treatment for Lyme disease is warranted and/or has been sufficient. For example, a Lyme Quant C6 test could be submitted on patients who test positive on an in-house 4DX test. Treatment may be indicated for patients with C6 antibody levels greater than 30 U/mL. IDEXX also recommends submitting a Lyme Quant C6 test after treatment to determine if antibody levels have dropped to below 30 U/mL (7). Quantitative antibody levels are very helpful because many dogs that have been treated for Lyme disease will remain positive on a 4DX test for months, and in some cases years.

One important consideration is that because canine Lyme disease is asymptomatic in the majority of cases, sick dogs who test positive for Lyme disease may be coincidentally seropositive. A thorough orthopedic examination, a CBC, complete serum chemistry and a urinalysis are warranted for patients who test positive for *Bb* exposure.

Treatment:

The 2006 ACVIM Lyme disease consensus statement reports that most authors and participating ACVIM diplomats recommend treatment with doxycycline at 10 mg/kg PO q24h for at least 30 days (6). Other treatment options include amoxicillin at 20 mg/kg PO q12h for two weeks, Ampicillin at 22 mg/kg PO, SC, IM, IV q8h for 2 weeks, or tetracycline at 22 mg/kg PO q8h for 30 days (4). There are published reports that support the possibility of persistent Lyme disease infection despite treatment (6).

U.S. CANINE POSITIVE LYME RESULTS³



Controversy exists over the need to treat clinically normal dogs who test positive for Lyme disease, primarily because it appears that the majority of dogs who are seropositive for *Bb* will not ever develop clinical Lyme disease, and also because of concerns related to antibiotic resistance. Proponents of the treatment of clinically normal seropositive animals will argue that one cannot predict which dogs will eventually develop clinical Lyme disease, and many practitioners report that treatment of “happy, healthy” sero-positive dogs results in “happier, healthier” dogs.

Prevention:

There are two types of Lyme vaccines available: a whole-cell, killed bacterin or a recombinant vaccine that produces antibodies against *Bb* outer surface protein A (OspA). Both types of vaccines (recombinant and killed) induce an immune response to OspA (4, 6). Relatively recently, a bi-valent, killed Lyme vaccine (Intervet-Schering Plough) was licensed and claims borreliacidal activity against both OspA (expressed inside the tick) and OspC (expressed in the dog). Multiple studies have been done that demonstrate variable, but generally high efficacy of both types of Lyme disease vaccines (ranging from 78-100%) (6, 8, 9, 10).

Controversy also exists over the need to vaccinate dogs against Lyme disease. Proponents of vaccination say that because some dogs, albeit a small percentage, develop serious illness as a result of *Bb* infection, vaccination of all at-risk dogs is important. Those who do not recommend vaccination argue that the vaccine is unnecessary because morbidity is probably less than 10% and that most dogs with clinical Lyme disease respond to antibiotic therapy (6).

It is generally agreed that vaccination of untreated sero-positive animals as part of a treatment regimen is NOT a good idea, and may exacerbate disease in some cases (4, 6). The Lyme disease vaccine does NOT replace the need for tick control.

Additional Resources:

Lyme disease is a growing problem and more research is needed to enhance our understanding of this disease in the canine population. For more information about Lyme disease, a thorough review can be found in the ACVIM Small Animal Consensus Statement on Lyme Disease in Dogs: Diagnosis, Treatment and Prevention. *J Vet Intern Med* 2006; 20:422-434.

References: (1) Beeman, Perry. “Prevalence of Lyme Disease in Iowa Appears to be Growing.” *The Des Moines Register*, 7 July 2007; (2) Iowa Lyme Disease Association education home page [online], Available: <http://www.iowalymedisease.com>; (3) IDEXX Dog Ticks & Diseases Information page [online], Available: http://www.dogsandticks.com/dog_tick_diseases/index.html; (4) Shell, Linda. Lyme Disease (Zoonotic). VIN Associate Database (2004) [online], Available: http://www.vin.com/Members/Associate/Associate.plx?Disease_ID=1169; (5) CDC Lyme Disease Fact Sheet [online], Available <http://www.cdc.gov/lyme/healthcare/veterinarians.html>; (6) Littman, Meryl P., Goldstein, Richard E., Labato, Mary A., Lappin, Michael R., and Moore, George E., “ACVIM Small Animal Consensus Statement on Lyme Disease in Dogs: Diagnosis, Treatment, and Prevention,” *J Vet Intern Med* 20 (2006): 422-434; (7) “Assessing Response to Antibiotic Treatment: Quantitative Measurement of C6 Antibody in Dogs,” *Supplement to Compendium: IDEXX Continuing Education for Veterinarians* 31, no. 4C (2009); (8) Levy, S.A., Lissman, B.A., and Ficke, C.M., “Performance of *Borrelia burgdorferi* bacterin in borreliosis-endemic areas,” *J Am Vet Med Assoc* 202, no 11 (1993): 1834-8; (9) Conion, J.A., Mather, T.N., Tanner, P., Gallo, G., and Jacobson, R.H., “Efficacy of a nonadjuvanted, outer surface protein A, recombinant vaccine in dogs after challenge by ticks naturally infected with *Borrelia burgdorferi*,” *Vet Ther* 1, no 2 (2000): 96-107; (10) LaFleur, R.L., Dant, J.C., Wasmoen, T.L., Callister, S.M., Jobe, D.A., Lovrich, S.D., Warner, T.F., Abdelmagid, O., and Schell, R.F., “Bacterin that induces anti-OspA and anti-OspC borreliacidal antibodies provides a high level of protection against canine Lyme disease,” *Clin Vaccine Immunol* 16, no 2 (2009): 253-9.

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1. Any age
2. Signs of arthritis in the rear legs (hips and/or knees)
3. Currently on any medications or supplements for the relief of arthritic pain. (Do not add or subtract anything they are currently on.)

Refer these patients for a Courtesy Laser Study consultation. We will discuss with these clients the labwork and radiographs that will need to be done to further qualify their pet for the laser study (and the cost of these prerequisites), the time commitment for laser treatments, and a \$200 Visa gift card they will receive after completing the study as a thank-you.

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