

Overview of Lyme Disease in Dogs

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Canine Lyme disease is most commonly diagnosed as a limb or joint abnormality (ie, Lyme arthritis), a less common but often fatal kidney failure syndrome, a rare cardiac form, or an also rare neurologic abnormality. The disease is caused by *Borrelia burgdorferi* and vectored by *Ixodes scapularis* in the eastern half of the United States and *I. pacificus* on the west coast.

Canine Lyme arthritis patients present with lameness, fever, swollen joints (often carpus or tarsus), a reluctance to move, and inappetence.¹

Lyme nephritis is a severe protein-losing nephropathy² characterized by hypoalbuminemia, proteinuria, and elevated blood urea nitrogen (BUN), creatinine, and phosphorus. Patients

have a history or risk of tick exposure and a positive point-of-care test. Aggressive therapy is directed toward resolving azotemia, renal hypertension, and other abnormalities but is usually unsuccessful, resulting in death or euthanasia within days of presentation.

Lyme carditis is rare, with only one peer-reviewed reported case.³ Al-

though humans with Lyme disease often exhibit neurologic abnormalities, reports of facial paralysis and seizures in dogs have not been convincingly linked to *B burgdorferi* infection.⁴

DIAGNOSIS & TREATMENT

Diagnosis of any form of canine Lyme disease is a clinical conclusion based on appropriate signs, epidemiologic risk, rule-out of an alternate diagnosis, demonstration of infection with the etiologic organism, and, in the case of Lyme arthritis, a response to appropriate therapy.¹ Diagnosis is typically made by determining that the patient is either from or has traveled to an active vector region, and by ruling out other causes (eg, trauma, immune-mediated arthropathy, degenerative joint disease).

Additionally, 2 point-of-care tests are available for determining *B burgdorferi* infection status which, when linked with the above diagnostic criteria and rapid improvement after initiation of appropriate antibiotic therapy, leads to a diagnosis of Lyme arthritis. Note that infected dogs may often have a positive test but are asymptomatic at the time of testing.⁵

Canine Lyme disease is most commonly diagnosed as a limb or joint abnormality.



Figure 1 Joints of dogs presenting with lameness, fever, anorexia, lymphadenomegaly, history of tick exposure, and positive Lyme serology; both dogs responded rapidly to antibiotic therapy.



Figure 2

Courtesy of the CDC

STEP 2 Treatment Plan ▶

Treatment & Prevention

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Many dogs that present for annual preventive testing (eg, for heartworm, Lyme, other tick-borne diseases) are Lyme-positive without apparent signs. Infected dogs are at a 5%⁵ to 10% risk of developing signs of Lyme disease and are unlikely to survive if they develop renal disease.

Vaccinating Lyme-positive dogs has been demonstrated to be safe.⁶ Treating asymptomatic positive dogs has been demonstrated to reduce antibody titers⁷; however, there is evidence that Lyme infections are persistent even after antibiotic therapy.⁸

When a patient is diagnosed with Lyme arthritis, antibiotic therapy is initiated with injectable penicillin, followed by 14 days of oral amoxicillin. For dogs presumed to have Lyme nephritis, discuss with the client further testing (eg, blood chemistry, complete blood count, urinalysis), in-patient care, intensive therapy, and a guarded prognosis.

PREVENTION

Vaccination of at-risk dogs before exposure to infected vector ticks is a part of disease prevention. Two types of vaccines with demonstrated safety and efficacy are available: a recombinant vaccine with a single protein from the causative organism, which immuno-



genicity studies have suggested may provide maximum protection with twice-yearly immunizations, and another vaccine that contains **multiple proteins of *B burgdorferi***, which immunogenicity studies have suggested will maintain effective immunity with annual boosters.⁹

Preventing Transmission

Successful transmission of the Lyme agent from a tick to a dog requires a minimum of 24 hours of tick attachment and feeding and is most efficient at 48 to 52 hours post-attachment.

- A rapidly acting **acaricide** will prevent tick feeding by either killing ticks or rendering them moribund before they attach.
- **Spot-on products** and some **collars** can achieve “clinical repellence,” essentially shielding dogs from ticks by rapid killing and attachment prevention.

- New **oral products** are highly effective at killing ticks but often allow some period of feeding, thus providing an opportunity for transmission of *B burgdorferi* or other tick-borne organisms.

References

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STEP 3
Team Roles ▶

Team Roles

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TECHNICIAN

Client educator, client & patient caregiver

- Obtain a thorough patient history, including exposure risk and vaccination status
- Perform a physical examination, noting signs of Lyme disease, fever, and considerations for rule-out diagnoses
- Explain the diagnostic process and rapid, point-of-care testing to the client
- For annual preventive testing visits:
 - Explain the practice's testing protocol
 - Discuss the value of vaccinations
 - Obtain a blood sample for point-of-care testing
 - Provide a review of the practice's preferred tick-bite prevention protocol and encourage the client to obtain preventives

VETERINARIAN

Medical expert, client and team educator

- Examine the patient and review the history
- Interpret test results and discuss diagnostic implications
- Formulate a treatment plan with appropriate antibiotics
- For annual preventive visits:
 - Discuss the significance of a positive Lyme test
- Review the practice's tick-prevention protocol with the client

RECEPTIONIST

Client communicator

- Introduce the facets of an annual visit including:
 - physical examination
 - testing for vector-borne diseases
 - immunizations recommended by the practice

PRACTICE MANAGER

Facilitator, supervisor

- Codify and communicate to all team members the practice protocols for Lyme disease testing, immunization, and treatment of Lyme disease and tick prevention as determined by veterinarian(s)
 - Stress the importance of the team presenting a unified approach to prevent client confusion and subsequent compliance reluctance

Editor's note: Dr. Steven A. Levy is a member of the Abaxis Advisory Board.

STEP 4
Team Training Plan ►

Team Training

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Many products now are available to prevent, control, and treat parasites internally and externally, and the veterinary team is the client's most valuable resource when choosing a product. Too many product options and too little team education can overwhelm clients and decrease compliance.

Basic team training should organize and focus the team so all members are on the same page. The practice manager, veterinarian, veterinary technician, and other team members should define their roles and prepare messages, handouts, websites, and processes to recognize patients at risk. A team approach is the best way to deliver accurate and timely information consistently to clients.

Training must be easy to understand and explain. Offer teaching aids nonmedical team members can refer to when talking with clients; these are referred to as “just-in-time learning and support” and can be handouts, websites, Youtube videos, or pamphlets created by the practice or a vendor (see **Useful Training Aids**). The training team must select, review, and utilize the selected

resources during training presentations.

Team training for Lyme disease should cover the following:

- Disease name
- Disease in dogs vs humans
- Risk in geographic and travel areas
- Cause of the disease and the organism of transmission
- Significance of patient travel history
- Clinical signs
- Diagnostic testing
- Treatment
- Immunization
- Follow-up and management.

Role-play is vital to the success of any program. Team members should take turns acting out each role (eg, veterinarian, veterinary technician, receptionist, client). Use scripts and simplified messages to make role-play engaging and less threatening.



Useful Training Aids

- Centers for Disease Control: Tickborne Diseases App; cdc.gov/mobile/applications/mobileframework/tickborne-diseases.html
- Companion Animal Parasite Council: App; CAPCVet.org
- **Youtube:** Search for high quality, reliable tick removal videos

STEP 5
Communication Keys ►

Client Communication

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To decrease confusion and keep clients active in their pet's health, the veterinary team must communicate a consistent message. A recent study by the Companion Animal Parasite Council (CAPC) showed that 74% of pet owners want their veterinarian to provide more information about parasite testing, and 90% want to be notified if there is a high incidence of parasites in their county; also, 89% are likely to make an appointment to get their pet tested based on this risk.¹

The "Rule of 3" provides clear, concise, comprehensive talking points:

1. The risk of the disease in the area
2. The patient's risk for an uncomfortable disease
3. Easy and cost-effective solutions.

The following is an example for a Brunswick, Georgia, patient:

- The incidence of Lyme disease is moderate, according to the CAPC app. In Georgia, one out of every 203 dogs is positive for the disease.
- The carrier tick (ie, *Ixodes scapularis*) is seasonally active in the spring and feeds intensely in the fall.



Please see handouts at
veterinaryteambrief.com.

- The patient can be tested during the examination with an in-house blood test. Then, with the client's input, the best prevention steps can be determined.

Clients need to connect with the recommendation by seeing or experiencing how their pet could be at risk.

Questions to review the risk include:

- How and where does your pet exercise?

Companion Animal Parasite Council study¹

74% Pet owners who want more details about parasite testing

90% Pet owners who want information about local parasite incidence

89% Pet owners likely to get their pet tested based on risk.



- How does your pet interact with other animals?
- How is your home protected from parasites or unwanted bugs?
- What concerns do you have about parasites inside your home?
- Describe your backyard.

Educate clients with simple steps on tick exposure and prevention at home and while traveling. Also, consider showing a computer presentation or video or providing handouts to address all client concerns.

Reference

1. Connecting with Today's Clients (a study conducted by the Companion Animal Parasite Council in collaboration with Bayer Healthcare Animal Health). 2014. <http://photos.pnewswire.com/prmfull/20150116/169679-info>. Accessed Jun 2015.

Editor's note: Dr. Mary Ann Vande Linde is a member of the Companion Animal Parasite Council Board of Directors.