

Lyme Borreliosis

Extended Version

Classic case: Puppy w/ anorexia & arthritis - quickly resolves on its own

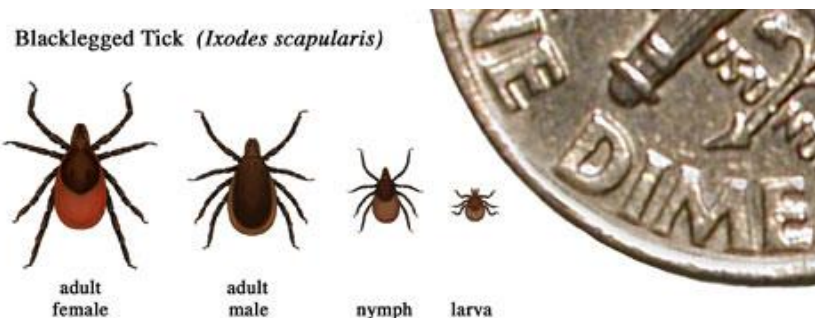
Presentation:

- Dogs
 - 95% of seropositive dogs – asymptomatic
 - 5% of seropositive dogs – usually younger dogs
 - Warm, swollen, painful joints, fever, lymphadenopathy
 - Lyme nephropathy (less common) – dehydration, ascites, edema, aortic thromboembolism, dyspnea, retinal hemorrhage/detachment
 - Hypertension
 - Vasculitis
 - Protein-losing nephropathy
 - Labs, golden retrievers, Shetland sheepdogs, Bernese mountain dogs may be predisposed
 - Cardiac form – conduction abnormalities and bradycardia
 - Neurologic form – facial paralysis, seizures, aggression
- Cats – asymptomatic
- Horses
 - Most cases subclinical
 - Low-grade fever, arthritis, shifting lameness, swollen joints, myalgia, chronic weight loss
 - Neurologic signs, skin lesions, uveitis, cardiac disease, hepatitis, laminitis, abortion also reported
- Cattle
 - Fever, lameness, stiffness, possible joint swelling
 - Decreased milk production
 - Erythema, warmth, swelling, and hypersensitivity of udder
 - Laminitis, chronic weight loss, uveitis, abortions
 - Occurs most often in first calving heifers
- Rabbits (experimentally infected) – skin lesions, polyarthritis, carditis
- Humans
 - Erythema migrans
 - Macule with distinctive, intense borders, but not raised
 - Widens and develops into bluish-red rash that expands over days or weeks
 - Flu-like symptoms (malaise, fatigue, fever, stiff neck)
 - Arthritis – intermittent pain of one or a few joints (usually large weight-bearing joints)
 - Meningoradiculitis.



Ixodes scapularis, the blacklegged or deer tick, is the primary vector in the Eastern US.

Image courtesy, Scott Bauer and USDA.



Ixodes scapularis ticks are.... tiny.

Adult ticks are approximately the size of a **sesame seed**.

Nymphal ticks are approximately the size of a **poppy seed**.

*Image courtesy,
US Centers for Disease Control & Prevention (CDC).*

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DDX: Other causes for lameness, nephropathy, meningitis, heart disease

Test(s) of choice: Difficult to definitively diagnose

- Antibodies to **C6 peptide** are specific to natural *exposure* (but do NOT occur after vaccination)
- IFA no longer recommended because of low specificity
- ELISA antibody detection
- *New **Lyme multiplex assay** – distinguishes between acute and chronic infection and antibodies from vaccination.
- **Urinalysis** for proteinuria, microalbuminuria or protein/creatinine ratio (always check in sero-pos dogs)
- Radiographs of affected joint – non-erosive arthritis
- Arthrocentesis – nonseptic suppurative inflammation
- **Diagnosis is presumptive in most cases**, based on:
 - Positive for natural exposure antibodies (C6 peptide)
 - Consistent clinical signs
 - Ruling out other differentials
 - Response to treatment (however, Lyme nephropathy generally does not respond well)

Rx of choice:

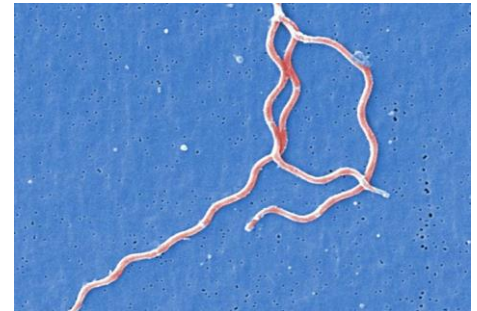
- **Doxycycline** or **amoxicillin**
 - LONG Rx- four weeks
 - Only use if patient is symptomatic or has proteinuria
- For nephropathy
 - Angiotensin-converting enzyme (ACE) inhibitor
 - Low-dose aspirin
 - Omega-3 fatty acids
 - Supportive care

Prognosis:

- Arthritis – good, immediate response to treatment
- Nephropathy – guarded to poor, usually fatal

Prevention:

- Tick control and prevention
- Vaccination is **controversial**
 - Because most serious form of disease has an immune-mediated process
 - Recombinant outer surface protein A (rOspA) vaccine is licensed for dogs
 - Prevents spirochete transmission from ticks, however, it has been shown that the organisms stop producing OspA when tick attaches to animal
 - Young dogs should be vaccinated **before** natural exposure occurs
 - Why? postinfection vaccination has little-to-no beneficial effect on established infections.



Scanning electron micrograph of *Borrelia burgdorferi*, a gram negative, microaerophilic bacteria.

Image courtesy, Claudia Molins and CDC.



White-footed mouse, one of several reservoir hosts for *Borrelia burgdorferi*



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Pearls:

- CONFUSING and difficult to definitively diagnose
- If dog does NOT respond to Rx, likely a misdiagnosis (though Lyme nephropathy may not respond well)
- If dog **DOES** respond to treatment is not an indication of diagnosis
 - Rickettsial and other diseases with similar symptoms may respond to doxycycline.
 - Doxycycline has anti-inflammatory properties
- Lyme nephropathy is probably due to immune-mediated complexes in glomeruli
- Persistent carriers may or may not be clinically ill
- Tickborne co-infections are common (e.g., anaplasmosis)
- Caused by gram negative, anaerobic spirochete *Borrelia burgdorferi*
- Incubation period
 - Humans – 10-14 days (up to 36 days)
 - Dogs – 2-5 months LONG
- Reservoir hosts: **White-footed mouse**, short-tailed shrews, eastern chipmunks, brush mouse, western gray squirrel. Rarely birds and lizards
- Vectors: *Ixodes scapularis* in Midwest and northeast; *Ixodes pacificus* on Pacific coast
- Lyme disease may be *overdiagnosed* in small animals
- **Zoonosis:** but pets are **NOT** source of infection to people
 - Although dogs and cats can get Lyme disease,
 - There is no evidence that they spread Lyme disease directly to their owners.
 - However, pets can bring infected ticks into your home or yard

Refs: Côté, Clinical Veterinary Advisor, 2nd ed, pp 146-147; The Center for Food Security and Public Health, Iowa State University: Lyme Disease; Merck Manual, 10th ed (online): Lyme Borreliosis

My Notes: