

CRITICALLY APPRAISED TOPIC:

Role of Antibiotic Therapy in Canine Lyme Disease

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The long-term benefit of antibiotic therapy for Lyme-positive asymptomatic dogs is unknown.

CLINICAL QUESTION

In Lyme-positive asymptomatic dogs, does treatment with doxycycline or other antibiotics result in the emergence of fewer clinical signs at a later time compared to dogs that receive no therapy?

CLINICAL BOTTOM LINE

Use of doxycycline or other antibiotics, while possibly of benefit, has not been proven to eliminate the possibility of later emerging clinical signs of Lyme disease, especially in patients treated with corticosteroids.

EVIDENCE SUMMARY

Search string

VIN Search: canine Lyme disease treatment

PubMed: canine Lyme disease treatment

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Main results

- In dogs infected in an experimental setting with *Borrelia burgdorferi* and treated with doxycycline or other antibiotics for 30 days, *Borrelia* organisms were found to persist after treatment.¹⁻³ Antibody titers did rise six months post-treatment.¹
- Treatment with corticosteroids was associated with the emergence of clinical signs of Lyme disease in previously exposed dogs that had not received

antibiotics while dogs previously treated with antibiotics did not develop such signs.^{2,3}

- In antibody-positive asymptomatic dogs in a practice setting, titers declined by about twice as much in antibiotic-treated dogs compared to untreated dogs.⁴
- A professional consensus statement recognized that doxycycline and other antibiotics have a positive, though not fully defined, role.⁵
- In human medicine, prolonged antibiotic therapy “may be useful and justifiable” in Lyme disease patients with long-standing symptoms and coinfection with other tick-borne agents.⁶

STRENGTH OF EVIDENCE (FIGURE 1)

Comments

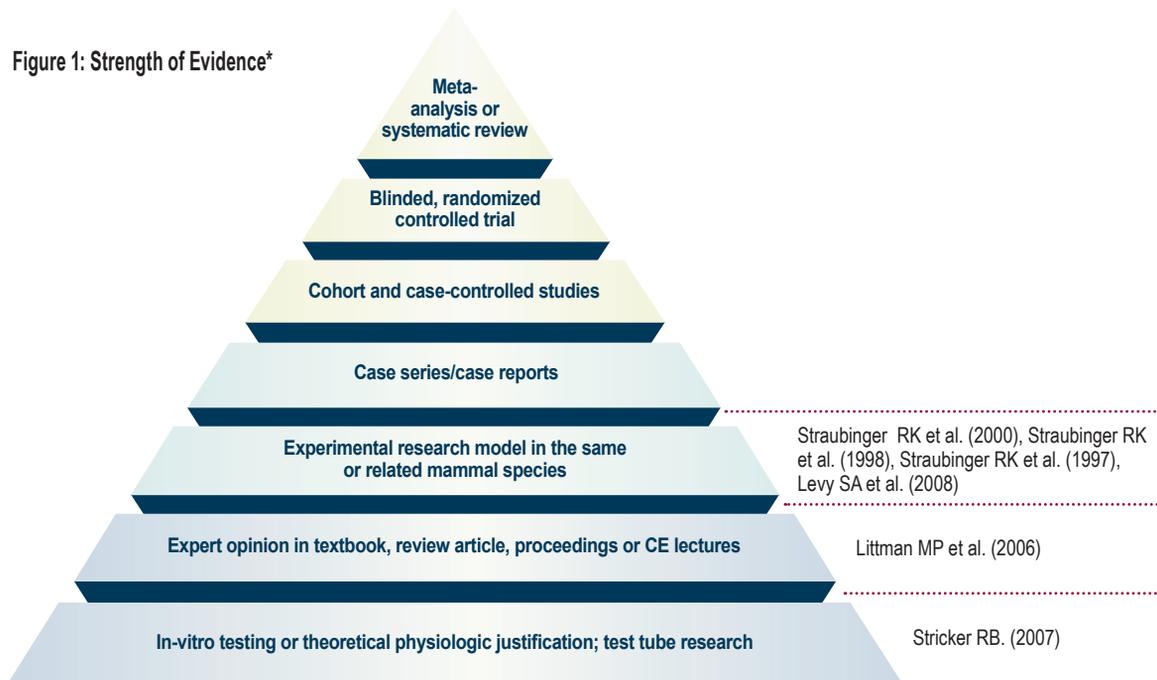
Studies of the highest quality (meta-analyses, clinical trials, etc.) that address impact of antibiotics on the Lyme disease progression have not been published. From what experimental laboratory and clinical evidence is available and the opinions of experienced clinicians, it would seem that at the very least, antibiotic therapy for a month is a reasonable course. However, the outcome is far less clear if the patient was treated with corticosteroids subsequent to infection. In published work, experimental corticosteroid administration has been at high doses following infection with *B burgdorferi* with or without

antibiotic therapy—steroid doses higher than used in most routine clinical situations.

The studies reviewed suggest but do not prove that antibiotic treatment of asymptomatic antibody-positive dogs offers certain protection against future clinical signs related to *B burgdorferi*. As is so often the case in veterinary medicine, the evidence is limited. It is important to consider not only what the available evidence tells us, but also what it does *not* tell us and address, in an evidence-based veterinary medicine (EBVM) framework, what we might do about that. Here, the evidence alone does not tell us exactly what to do.

The principles of EBVM, however, do not leave the practitioner entirely stranded. Remember that the best clinical evidence, as expressed in the published literature, is only one of the three principal components of EBVM practice. Clinical expertise developed over years of practice, observation and reflection and concern for the owner's values and situation are also critical components of EBVM philosophy and practice. Such is the current status in veterinary medicine, even for those who strive to include the best current evidence in their decisions.

Figure 1: Strength of Evidence*



*See corresponding Evidence Summary, Table 1, pages 5 and 6

REFERENCES

- 1) Straubinger RK, Summers BA, Chang YF, et al. Persistence of *Borrelia burgdorferi* in experimentally infected dogs after antibiotic treatment. *J Clin Microbiol.* 1997;35:111-116.
- 2) Straubinger RK, Straubinger AF, Summers BA, et al. Clinical manifestations, pathogenesis, and effect of antibiotic treatment on Lyme borreliosis in dogs. *Wien Klin Wochenschr.* 1998;110(24):873-881.
- 3) Straubinger RK, Straubinger AF, Summers BA, et al. Status of *Borrelia burgdorferi* infection after antibiotic treatment and the effects of corticosteroids: an experimental study. *J Infect Dis.* 2000;181:1069-1081.
- 4) Levy SA, O'Connor TP, Hanscom JL, et al. Quantitative measurement of C₆ antibody following antibiotic treatment of *Borrelia burgdorferi* antibody-positive nonclinical dogs. *Clin Vacc Immunol.* 2008: 115-119.
- 5) Littman MP, Goldstein RE, Labato MA, et al. ACVIM small animal consensus statement on Lyme disease in dogs: diagnosis, treatment, and prevention. *J Vet Int Med.* 2006;20:422-434.
- 6) Stricker RB. Counterpoint: long-term antibiotic therapy improves persistent symptoms associated with Lyme disease. *Clin Infect Dis.* 2007;45:149-157.

Table 1: Evidence Summary

Study	Methods	Key Findings
Study: Straubinger RK et al. (1997)	Experimental infection with <i>B. burgdorferi</i> followed in 120 days by 30 days treatment with doxycycline or ampicillin; exposed but untreated controls. Antibody levels monitored for an additional 6 months.	Joint disease prevented or cured in 5/6 dogs treated with doxycycline and 5/6 dogs treated with ampicillin; joint lesions were apparent in 4/6 control dogs. Antibody concentrations rose six months after antibiotic therapy.
Study: Straubinger RK et al. (1998)	Experimental infection with <i>B. Burgdorferi</i> followed in 120 days by 30 days treatment with amoxicillin, azithromycin, ceftriaxone or doxycycline; subsequent corticosteroid treatment in untreated controls.	Antibiotic therapy resulted in resolution of acute arthritis without elimination of organisms. Subsequent corticosteroid therapy in untreated infected dogs was followed by the development of arthritis.
Study: Straubinger RK et al. (2000)	Experimental infection with <i>B. Burgdorferi</i> followed in 120 days by 30 days treatment with azithromycin, ceftriaxone or doxycycline; subsequent corticosteroid treatment in treated dogs and untreated controls.	Signs noted following infection and before antibiotic therapy were minimal and resolved without treatment. Subsequent corticosteroid therapy in untreated infected dogs was followed by the development of arthritis in 2/4 of the untreated but in only 1/16 dogs previously treated with antibiotics.
Study: Levy SA (2008)	Serial evaluations of C ₆ antibody in naturally occurring nonclinical dogs, treated and untreated.	Dogs with low initial antibody concentrations had little change with antibiotic therapy; dogs with high initial antibody concentrations had decreases in antibody concentrations with antibiotic therapy that were greater than those in untreated dogs.
Study: Littman MP et al. (2006)	Consensus statement developed by a panel of experts to review the literature in order to advance the understanding of the issue	Although the signs of Lyme disease seem to respond promptly to a number of antibiotics, there is no known optimal therapy that addresses any or all the various clinical presentations.
Study: Stricker RB (2007)	Review of the peer-reviewed literature on standard treatment results and other issues in human beings.	Prolonged antibiotic therapy may be useful for those with persistent symptoms/coinfection.

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