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The Effectiveness of Antibiotic Treatment in Lyme Neuroborreliosis

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Abstract

- Lyme disease is caused by human infection with *Borrelia burgdorferi*, a spirochete transmitted by the Ixodes tick which is indigenous primarily to an increasingly large area of the Northeast and Midwest United States.
- Manifestations of Lyme disease vary greatly, and can result in significant neurologic symptoms associated with complications of neuroborreliosis or neurologic Lyme disease.
- Diagnosis and treatment of Lyme disease and its complications has been a source of debate and confusion for providers and patients alike.
- The purpose of this study was to investigate the effectiveness and efficacy of antibiotic therapy in patients with symptoms of neurologic Lyme disease.
- Through a review of literature related to the treatment and outcomes of neurologic Lyme disease, it is determined that current evidence based guidelines for pharmacological treatment of neurologic Lyme disease are appropriate when administered correctly. It is also concluded that long term antibiotic therapy is not appropriate for patients with symptoms of chronic Lyme disease due to inadequate evidence to support improved outcomes after antibiotic treatments.

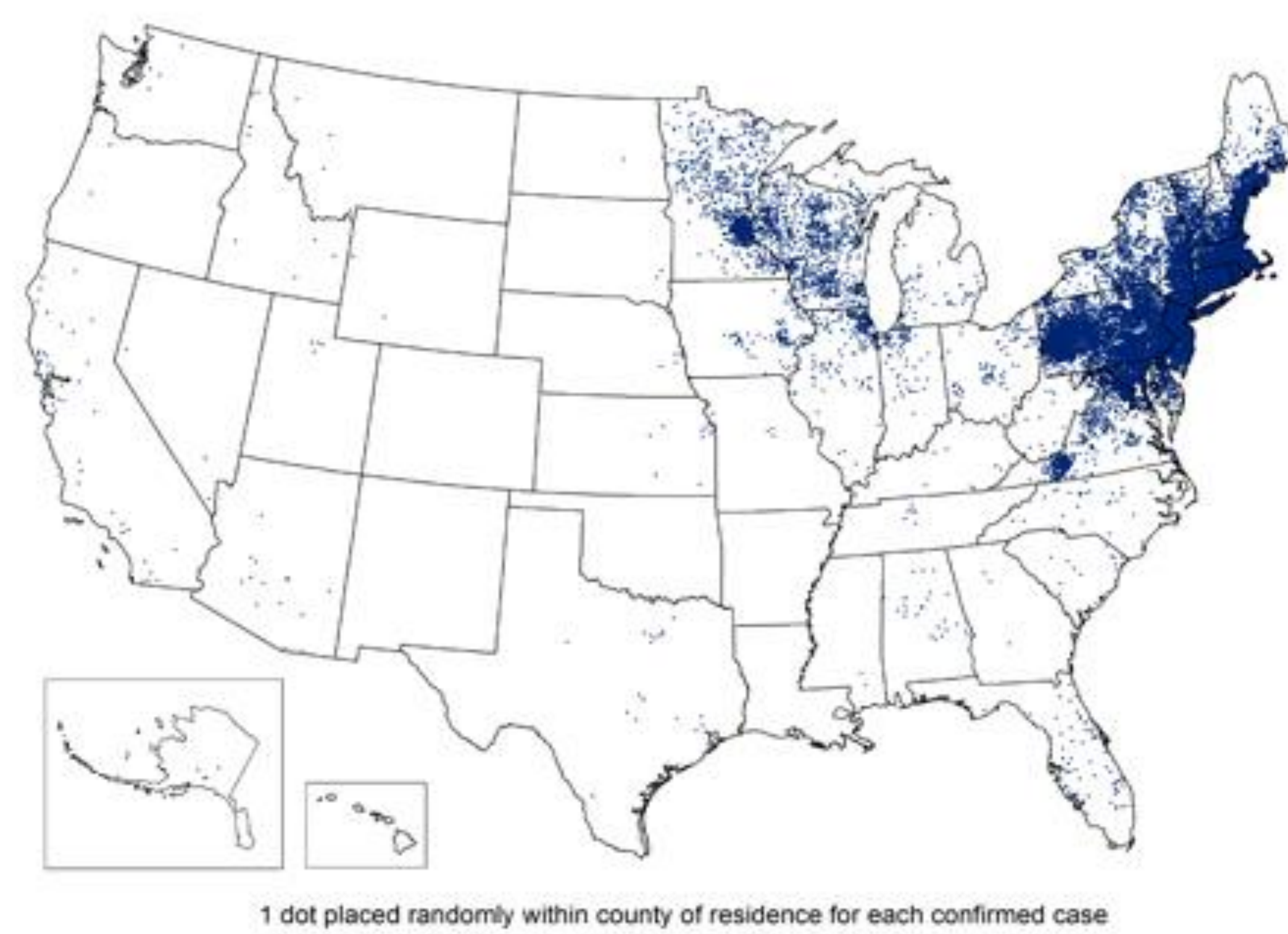
Introduction

- Although the disease process is relatively well understood, suspicion of chronic or re-infection in Lyme disease persists.
- Diagnosis and treatment of Lyme disease and its complications has been a source of debate and confusion for providers and patients alike. The purpose of this study is to investigate the effectiveness and efficacy of antibiotic therapy in neurologic Lyme disease treatment to define best practice guidelines in treating such patients.

Statement of the Problem

The best methods of diagnosis and treatment of neurologic symptoms in Lyme disease remain poorly understood, and therefore differing schools of thought exist regarding the efficacy, timing, and benefit of antibiotic therapy in patients with symptoms of neurologic Lyme disease.

Reported Cases of Lyme Disease -- United States, 2014



Research Questions

- In patients with neurologic Lyme disease, does the benefit of treating with antibiotics outweigh the potential for adverse reactions and resistance to antibiotics?
- Which antibiotics are most effective in treating neurologic Lyme disease?

Literature Review

Pathophysiology

- It has been recognized that *B. burgdorferi* causes chronic infection as the bacteria has been isolated in skin, CSF, synovial tissue, blood, synovial tissue, eye tissue and myocardium. (Kaiser 1998)
- A classic triad of conditions in neurologic Lyme manifestations is said to exist including meningitis, cranial neuropathy, and radicular neuropathy although the conditions do not always occur together. (Wright, Riedel, Talwani, & Gilliam, 2012)
- There is little evidence to support the role of *Borrelia burgdorferi* morphologic variants in the pathogenesis of Lyme disease, and no evidence that they influence treatment outcomes. (Lantos, Auwaerter, & Wormser, 2014)
- Cognitive impairment without direct CNS infection may result from Lyme encephalopathy, an immune modulated disorder that clears after antimicrobial therapy and is often confused with posttreatment or chronic Lyme disease for which treatment is rarely indicated. (Halperin 2014)

Antibiotic Therapy

- The recommendations for treatment of neurologic Lyme disease are dependent on the duration of symptoms and physical exam with IV ceftriaxone 2g or cefotaxime 2 g daily for 10-28 days or penicillin G 18-24 mega U per day for 10-28 days. (Wormser et al., 2006).
- Recommended prophylactic treatment of Lyme disease consists of a single 200 mg oral dose of doxycycline when appropriate criteria have been met. (Wormser et al., 2006)
- Antibiotic therapy has not proven to be useful and is not recommended for patients with chronic (>6 months) subjective symptoms after recommended treatment regimens for Lyme disease” (Lantos et al. 2010).
- Klempner et al. (2001) concluded that there was no significant symptomatic improvement over placebo after 30 days of treatment with ceftriaxone followed by 60 days of doxycycline 100 mg twice daily in patients with symptoms of disseminated Lyme disease.
- Sopi et al. (2011), concluded that antibiotics have varying effects on different forms of *Borrelia burgdorferi*, but there is little evidence of morphologic variants persisting in vivo, thus altering antimicrobial treatments to cover for such pathogens is not supported.
- Conventional and commonly used monotherapy with doxycycline and ceftriaxone demonstrated to be the most effective against the most predominant spirochete form. (Feng et al. 2015)
- Kaplan et al. (2003), found no significant differences (z scores of <-1) for any neuropsychological tests between treatment and placebo groups.

Discussion

- Much of the controversy surrounding Lyme disease is centered on the efficacy of treatment, specifically antibiotic therapy for confirmed cases of disseminated Lyme disease.
- It must be questioned whether the inherent risk of adverse effects with lengthy courses of IV antibiotics outweigh the possible benefit if the improvement in symptoms is not statistically significant
- There is concern of adverse effects and increasing cost of treatment with doxycycline as prophylaxis of disease when clinical presentation suggests infection is unlikely.
- Disseminated symptoms are not effectively treated with extended antibiotic treatment.
- No studies have confirmed the existence of morphologic variants of *B. burgdorferi* contributing to disease processes in human subjects.
- There is no evidence based argument to be made for long term antibiotic treatment of chronic symptoms attributed to infection with *Borrelia burgdorferi*.

Applicability to Clinical Practice

- Providing proper patient education on the topic may contribute to avoidance of confusion and reduce anxiety
- Erythema migrans rash is helpful in suspicion of Lyme disease, but other symptoms such as neuralgias, myalgias and other disseminated symptoms are easily overlooked or misdiagnosed.
- As healthcare providers it is our obligation to effectively assess, diagnose and treat our patients in a manner that will best serve the patient without the risk of contributing any undue harm.

References

- Cameron, D. J., Johnson, L. B., & Maloney, E. L. (2014). Evidence assessments and guideline recommendations in Lyme disease: The clinical management of known tick bites, erythema migrans rashes and persistent disease. *Expert Review of Anti-Infective Therapy*, 12(9), 1103-1135.
- Feng, J., Auwaerter, P. G., & Zhang, Y. (2015). Drug combinations against borrelia burgdorferi persists in vitro: Eradication achieved by using daptomycin, cefoperazone and doxycycline. *PLoS One*, 10(3).
- Halperin, J. J. (2014). Lyme disease: Neurology, neurobiology, and behavior. *Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America*, 58(9), 1267-1272.
- Kaiser, R. (1998). Neuroborreliosis. *Journal of Neurology*, 245(5), 247-255.
- Kaplan, R. F., Trevino, R. P., Johnson, G. M., Levy, L., Dornbush, R., Hu, L. T., Klempner, M. S. (2003). Cognitive function in post-treatment Lyme disease: Do additional antibiotics help? *Neurology*, 60(12), 1916-1922.
- Klempner, M. S., Hu, L. T., Evans, J., Schmid, C. H., Johnson, G. M., Trevino, R. P., McCall, J. (2001). Two controlled trials of antibiotic treatment in patients with persistent symptoms and a history of Lyme disease. *N Engl J Med*, 345(2), 85
- Lantos, P. M., Auwaerter, P. G., & Wormser, G. P. (2014). A systematic review of borrelia burgdorferi morphologic variants does not support a role in chronic Lyme disease. *Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America*, 58(5), 663-671.
- Sapi, E., Kaur, N., Anyanwu, S., Luecke, D. F., Datar, A., Patel, S., Stricker, R. B. (2011). Evaluation of in-vitro antibiotic susceptibility of different morphological forms of borrelia burgdorferi. *Infection and Drug Resistance*, 4, 97-113.
- Wormser, G. P., Dattwyler, R. J., Shapiro, E. D., Halperin, J. J., Steere, A. C., Klempner, M. S., ... Nadelman, R. B. (2006). The clinical assessment, treatment, and prevention of Lyme disease, human granulocytic anaplasmosis, and babesiosis: Clinical practice guidelines by the infectious diseases society of America. *Clinical Infectious Diseases: An Official Publication of the Infectious Diseases Society of America*, 43(9), 1089-1134.
- Wright, W. F., Riedel, D. J., Talwani, R., & Gilliam, B. L. (2012). Diagnosis and management of Lyme disease. *American Family Physician*, 85(11), 1086.

