

Physicians Take Heed, Lyme Neuroborreliosis Mimicry is Afoot

Robert-A. Ollar, PhD^{1,2}

Clinical Assistant Professor of Neurology, Department of Neurology, New York Medical College, Valhalla, New York¹

Consulting Microbiologist and Member of the Pike County Tick Borne Disease Task Force Committee, Milford, Pennsylvania²

It has been stated, “Like its close spirochetal cousin *Treponema pallidum* (the bacterium that causes syphilis), *B. burgdorferi* (one of the Borrelia Genus organisms known to cause Lyme disease) can cause disabling neurologic manifestations and present a puzzling diagnostic challenge” (1)

Coyle noted that in Lyme disease (LD), “neurological involvement occurs in up to 40% of symptomatic infections and includes both Central Nervous System (CNS) and Peripheral Nervous System (PNS) involvement” (2).

The literature further states that, “Many healthcare practitioners mistakenly believe LD is not endemic to their state, causing them to omit the diagnosis from their differential or discount the patient’s concerns in this regard. Unfortunately, doctors may not realize that LD has been found in every state. In states where *B. burgdorferi*-carrying ticks are not highly prevalent, the ticks may be carried in the bodies of birds, pets, wild animals, or people. Physicians often do not obtain a thorough patient travel history that might raise suspicion to test for LD” (1, 2, 3).

Recently, a member of the Dental Profession, related to me the case of a patient who had traveled overseas, and had acquired a borrelia infection caused by species of that genus that did not occur in these United States.

Information about foreign travel is extremely importance because testing that uniquely focused upon *Borrelia burgdorferi*, the primary agent of Lyme disease in the USA, would have failed to reveal the presence a foreign species of Borrelia. This oversight would therefore delay the timely application of urgently needed antibiotic therapy.

The literature also points out that, “Some Lyme Disease (LD) patients are misdiagnosed with serious, untreatable chronic conditions (ie Lou Gehrig’s Disease also known ALS, Multiple Sclerosis (MS), Early Onset Alzheimer’s Disease, Epilepsy, Parkinson Disease) with no hope for recovery. When patients are assumed to have an autoimmune disease, they are even put on corticosteroids to suppress their immune system, an unfortunate outcome for a patient with a chronic infection”(1, 2).

The emotional trauma to patients and their loved ones that result when Lyme Neuroborreliosis has been misdiagnosed with an untreatable neurological disease is devastating!!

The noted country & western music star Kris Kristofferson has become a Poster Child for Lyme Neuroborreliosis which had misdiagnosed as Alzheimer's Disease (CBSNews July 2, 2016: Kris Kristofferson's Lyme disease misdiagnosed as Alzheimer's).

In Virginia Savely's monograph on the diagnostic dilemma posed by Lyme Disease, the author states that "patients are often labeled "atypical" in their disease presentation, meaning that their disease process greatly resembles the given diagnosis but is missing some of the diagnostic features. Anyone with an atypical presentation of any of the diseases discussed below should be thoroughly evaluated to rule out the possibility of disseminated LD"(1). Therefore, it is important to always be cognizant of the fact that neurological manifestations, could be the result of Neuroborrelial mimicry (1-4).

The Department of Health of the Commonwealth of Pennsylvania created a special Task Force Committee on Tick and Lyme Disease in August of 2014 (Pa Task Force group worked from Sept 2014 to Sept 2015). This task force created guidelines and recommendations on how the Pa Dept of Health should deal with the ramifications associated with Lyme disease and related tick borne infections. The topic of misdiagnosis was discussed and recommendations were put forward in order to promote a of general awareness for both the public and healthcare professionals on the long-term effects of misdiagnosis of Lyme disease and its many serious ramifications.

Mekhani et al have stated that "There is no "gold standard" diagnostic test for Lyme Neuroborreliosis. Direct culture of *Borrelia* species and Polymerase Chain Reaction (PCR) are of low sensitivity; therefore, laboratory diagnosis instead relies on the detection of anti-*Borrelia* antibodies. In North America, testing follows a two-step algorithm. Serum samples are screened for antibodies with an ELISA Assay, which is a relatively sensitive, but not specific test. Confirmatory testing is performed using Western blotting, which is specific, but not sensitive assay. The sensitivity of the two-step approach increased in later stages of the disease for both European and North American acquired Borreliosis. While sensitivity may be less than 40% in cases of acute stage 1 Lyme disease, both retrospective and prospective studies from New England have found the sensitivity of the two-step approach to be 85% to 100% in cases of stage 2 acute neuroborreliosis" (6).

Dersche et al stated that, "Patients with LNB and neurosyphilis showed significantly higher CXCL13 levels in their CSF compared to Multiple Sclerosis (MS) patients ($p < 0.05$, $p < 0.001$, respectively). CXCL13 levels in the CSF declined during treatment"(6).

It is of the utmost importance to develop new lab based assays for improved early and accurate detection of Neuroborrelial infections and other tick borne infections. It would be extremely useful for a clinician to have assays which monitored the efficacy of therapy as a function of changes in the pathogen load and eventual clearance of the pathogen from the patient.

We monitor the effectiveness of therapy in our Tuberculosis Patients by determining that they are free of pathogens via classical TB sputum testing (a patient with three successive

negative sputum tests is declared free of TB bacilli). We are also able to utilize an advanced genetic based assay which uses genetic amplification testing also known as Polymerase Chain Reaction or PCR(this genetic test notes an absence of a genetic element called an Insertion Sequence (IS) known as IS6110 which is associated with the Genome of Tuberculosis and Tuberculosis Complex Organisms).

Thus, when both classical and advanced genetic assays fail to indicate the presence of TB bacilli in a patient we then stop treatment and declare that the patient is cured. We currently do not have this sort of assay system that would enable to state that borrelia pathogens have been totally cleared from a patient's anatomy and therefore we can cease antibiotic therapy.

Borrelial pathogens like their cousin *Treponema pallidum* can mimic a variety of illnesses and can invade the CNS (3). It is therefore incumbent upon all Physicians, to be ready to think "**out of the box**" when it comes to considering the possibility of a potential microbial agent as the "**raison d'être**" of patient neuropathology!!

Lyme Neuroborreliosis which is commonly associated with tick bites, however, Lyme Neuroborreliosis can be also transmitted by other non-tick related vectors!!

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