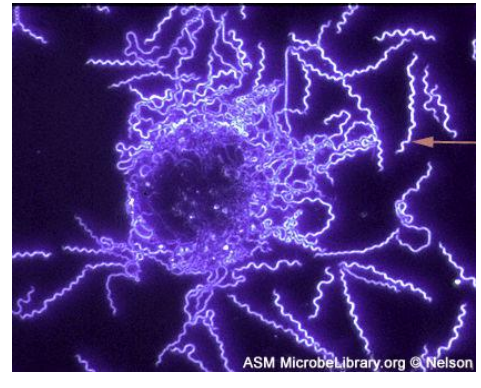




# Designing and Implementing a Novel CAM Protocol Using Laboratory Analysis and Supplementation to Reduce Morbidity Outcomes in the Treatment of Lyme Disease



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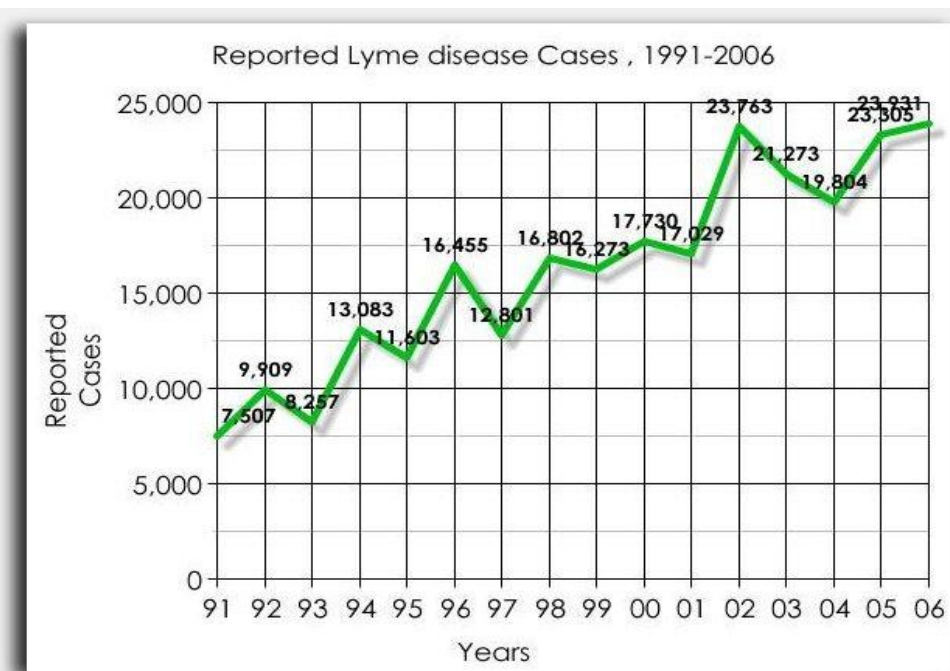
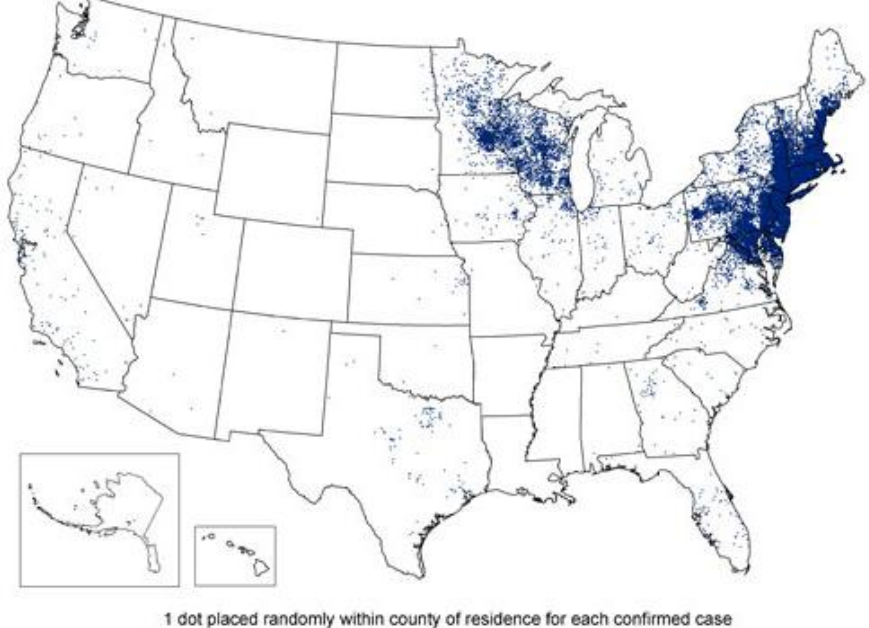


## Introduction/Justification:

Lyme Disease (LD) is currently the most common vector-borne disease in the United States<sup>1</sup>. This disease is complicated to diagnose and cure in its acute state and highly morbid in its chronic state. Given the complications derived from the presence of this pathogen, the varying antigenic response in its host and the difficulty to establish a timely diagnosis in at least half of the cases, we decided to focus our research on:

- Designing a new Diagnostic Protocol that will help with faster identification of the spirochete presence and associated co-infections, plus help us establish a baseline of autoimmune and degenerative diseases propensity in the affected individual.
- Compiling CAM (Complimentary and Alternative Medicine) treatments to compliment antibiotic therapies and prevent/treat co-morbidities associated with the chronic manifestation of Lyme.

Reported Cases of Lyme Disease -- United States, 2009



During a six year period cases of Lyme disease were reported to CDC by 49 states and DC, the number of cases is increasing rapidly<sup>2</sup>.

## Symptoms and Common Co-Infections:

Typical symptoms of Lyme Disease overlap with other diseases transmitted by deer ticks, including *Babesia microti*, *Anaplasma phagocytophilum* (formerly *Ehrlichia phagocytophila*), and *Bartonella henselae*<sup>3-5</sup>. viruses such as TBEV, WNV, Powassan encephalitis, and other bacteria such as Q fever (*Coxiella*), *Brucella*, *Tularemia*, and *Rickettsia* species<sup>10</sup>. Transmission of multiple pathogens by *Ixodes* ticks is common and can further complicate diagnosis, treatment and resolution of symptoms<sup>6</sup>. Mimickers of the disease in the chronic state are: Protozoan FL-1953, EBV, CMV, *Mycoplasma*, *Chlamydia*. See below for overlapping symptoms.

| Common Symptoms     | Lyme            | Babesia  | Anaplasma   | Bartonella |
|---------------------|-----------------|----------|-------------|------------|
| Fatigue             | X               | X        | X           | X          |
| Headache            | X               | X        | X           | X          |
| Swollen joints      | X               |          |             |            |
| Fever               | X               | X        | X           | X          |
| Chills              | X               | X        | X           | X          |
| Swollen lymph nodes | X               |          |             | X          |
| Encephalopathy      | X               | X        | X           |            |
| Malaise             | X               | X        | X           | X          |
| Skin complications  | Bull's eye rash |          | Rarely rash | Rash       |
| Nausea/Vomiting     |                 | X        | X           | X          |
| Flu-like symptoms   | X               | X        | X           | X          |
| Muscle/joint aches  | X               |          | X           |            |
| Confusion           | X               |          | X           |            |
| Incubation Period   | 3 days -6 mo.   | 1-52 wks | 1-30 days   | 3-50 days  |

## Justification for More Comprehensive Testing:

Concurrent tick-borne infections statistically decrease the likelihood of the characteristic bull's eye rash and impairs diagnosis through conventional laboratory testing<sup>6-8</sup>. Additionally, multiple tick-borne infections increase severity and duration of morbidity<sup>6-8</sup>. Lyme disease is also a great mimicker of many chronic diseases including autoimmune and degenerative diseases, justifying the need for establishing a patient health baseline<sup>9,11</sup>.



## Basic Laboratory Testing:

- Borrelia burgdorferi* Ab ELISA with reflex to IgG & IgM Western blot:** early disease to isolate antigenic response to Lyme 6 weeks post tick bite (its reliability is controversial<sup>11</sup>, false positive with other spirochetal disease, autoimmune disease, EBV, and periodontitis<sup>12</sup>).
- CBC with differential:** abnormal WBCs, chronic anemia, hemolytic anemia
- Comprehensive Metabolic Panel:** imbalanced electrolyte levels, metabolic acidosis, elevated liver enzymes, BUN, uric acid, and creatinine

## Step One Comprehensive /Baseline Testing and Possible Findings<sup>9,11,12</sup>:

- Autoimmune Panel:** increased morbidity if positive, easier follow up in chronic state
- HLADR2, HLADR4 genotypes:** increased morbidity if positive
- Borrelia burgdorferi* C6 Peptide Ab ELISA with reflex to IgG & IgM Western blot:** more specific assay
- Babesia microti*, *Anaplasma phagocytophilum*, and *Bartonella henselae* Ab IgG & IgM by IFA:** positive if co-infections are present
- Viral Panel:** to rule out other causes of symptoms
- 3-OH Vitamin D3:** low
- Thyroid Panel (TSH, TT4, FT4, Anti-TPO Ab, Anti-TG Ab):** elevated TSH, maybe low TT4 and FT4, positive for antibodies
- RBC Magnesium:** < 2.0
- CD-57 panel (Lab Corp):** Absolute CD8-/CD57+ lymphocytes are often low in Lyme Disease and Chlamydia. Ideal range is >200.

## Step Two Comprehensive /Baseline Testing and Possible Findings<sup>9,11,12</sup>:

- Fasting Glucose, Insulin, HbA1c:** altered glucose, elevated HbA1c, insulin resistance
- Urinary Organic Acids and Amino Acids:** elevated amino acids indicate a state of catabolic breakdown from disease, certain elevations in organic acids correlate with physiological malfunctions or infections
- Fibrinogen:** increased clotting factors
- Anti-cardiolipin Ab, Anti-phospholipid Ab:** positive if *Borrelia* burrows into the arterial lining
- C3a and C4a (Lab Corp):** elevated in Lyme and autoimmune disease

## Treatment therapies: (usually prescribed in this order)

- Oral:** amoxicillin, azithromycin, cefuroxime, clarithromycin, doxycycline and tetracycline
- IV:** ceftriaxone, cefotaxime, penicillin imipenem, azithromycin and doxycycline
- IM:** benzathine penicillin
- Combination:** Oral amoxicillin, cefuroxime or cefdinir combined with a macrolide (azithromycin or clarithromycin)
- NSAIDS:** for pain and inflammation

## CAM Treatments<sup>9,13</sup>:

- NK Cell and Phagocytic Immune Boosting to Reduce Microbial Load:** Antioxidants, Beta-glucans, *Astragalus*, Shiitake
- Inflammatory Cytokine Reduction:** Samento, Cat's Claw, Curcumin, *Boswellia*, Quercetin, Omega-3 Fatty Acids, Probiotics
- Anti-microbials:** Olive leaf, colloidal silver, EGCG, Samento and Banderol to decrease biofilm formation A-L Complex (for *Borrelia*), A-BAB (for *Babesia*), A-BART (for *Bartonella*)
- Anti-virals:** Lauricidin (monolauric acid) in coconut, L-lysine, *Melissa officinalis*, *Glycyrrhiza glabra*
- Maintenance of Tight Junctions to Decrease Mobility of Infection:** ALA, vitamin D, *Ginkgo biloba*, DHEA, Glutathione, NAC
- Dietary:** Avoid sugar, gluten and casein; add protein to stabilize blood sugar and adrenal function, high water (1/2 body wt in oz.), high fiber, and alkaline diet high in vegetables
- Adjunct treatments:** Hyperthermy –hot Epsom salt baths or IR sauna to trigger immune function, Hyperbaric Chamber: shown positive preliminary results
- Reduction of Increased Clotting:** Hydrolytic enzymes, Capsaicin, Vitamin E, CoQ10, EPA/DHA

**CONCLUSIONS:** After our thorough literary search we were able to design a protocol for comprehensive testing and consequent individualization of Lyme (and co-infection) treatments. Our preliminary data demonstrates that integrating antibiotic and CAM therapies help decrease the symptomatology and may prevent the chronic state of the disease by improving the immune system. We look forward to implementing our lab test protocol as a standard for our clinic patients. We predict a reduction in chronic Lyme morbidity and more clarification on what pathology might be present through better diagnostics and a combinatorial approach to treatment using CAM and antibiotics.

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