

Consideration of A Prospective Trial

Hyperbaric oxygen therapy/HBOT for Lyme anticipated protocols: An overview



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*[This protocol represents a review of the literature to support the potential therapeutic implications of hyperbaric oxygen treatment for the management of Lyme disease. **This is only a potential trial for which no active plans are in place.** Rather this is an attempt to better understand the field with the goal that someday the study will be performed].*

Please also be aware that the actual anticipated protocols will be individualized and likely be different than that described in this potential trial.

Lyme disease is the most commonly reported vector borne illness in the United States (1). Infection begins as a local process after *Borrelia burgdorferi* is inoculated into the skin by a feeding tick. In many patients, the initial sign of infection may be the development of erythema migrans, characterized by an annular erythematous skin lesion (2). However, Reik et al found that a large proportion of patients diagnosed with Lyme disease never develop this pathognomonic rash (3). This is coupled by the frequent lack of recognition by the infected individual, of the small nymph of *Ixodes scapularis*, a major vector associated with transmission of *B. burgdorferi* infection (1). Multiple authors describe the “diagnostic challenges of early Lyme disease,” such that even for community physicians practicing in high-risk geographic areas, the diagnosis of Lyme disease remains difficult (4-8). Further, that failure to recognize and treat early Lyme disease can lead to a greater risk for late manifestations. In essence, these untreated patients with Lyme disease can evolve into what otherwise could encompass many of the symptoms associated with chronic fatigue syndrome, including at times incapacitating fatigue, arthralgias, headaches and cognitive impairment among other features (7,8). Management of these patients can often be challenging for which new treatment paradigms must be constantly explored.

One such management strategy includes hyperbaric oxygen treatment [HBOT] [9-10]. This technology involves inhalation of up to 100% oxygen at greater than 1 atmosphere [ATA] in a pressurized chamber. What is then generated is a super saturation of the plasma by oxygen, with associated improved delivery of oxygen to the end organ. Potential side effects of HBOT are most commonly at ~2% relate to ear drum trauma, for which vigilant history should uncover symptoms to minimize this problem. Other less common side effects include a sensation of “sinus squeeze,” serious otitis, claustrophobia and reversible myopia. Otherwise felt to be safe [11-15]. Approved indications for HBOT include carbon monoxide poisoning, decompression sickness, poor wound healing, refractory osteomyelitis and others.

We propose that a directed treatment strategy for patients with Lyme disease may have ameliorating effects. Whether one believes that this condition may represent a persistent infectious process [16], or post antimicrobial multisystem dysfunction [17], HBOT has the potential to provide positive outcomes in either scenario. There is data to support that chronic fatigue syndrome and chronic Lyme disease share many features [18-19]. This includes the potential of mitochondrial dysfunction playing a central role in the perpetuation of this multisystem process [20-21]. HBOT has clear evidence of improving mitochondrial function [22-25]. In addition, there is evidence that an oxygen rich environment is toxic to *Borrelia burgdorferi* [26-27]. In addition, there is supportive evidence in the literature that HBOT has the potential to attenuate many symptoms associated with this condition including headaches [28-29] and cognitive impairment [30-33].

Design

We propose an open labeled, non placebo controlled prospective trial of patients diagnosed with Lyme disease using the present CDC surveillance diagnostic criteria, who have “plateaued” on their present management strategy of at least 3 months duration. Attempting to control for confounding variables, the following protocol will be provided to patients who otherwise fulfill entrance criteria:

- ONCE daily treatments for five-seven days/week for a total initially of 20 sessions at our facility at 1860 Town Center Drive G220 Reston Virginia
 - O₂ will be sustained at 100% for each of the 20 one hour treatments
- The initial pressures will be 1.5 ATA for the first treatment. Assuming tolerability, the next treatment will be at 2.0 ATA. Assuming tolerability, each subsequent one hour treatment will be 2.4 ATA, to complete a total of 20 treatments
- Quality of life measures will be obtained through SF36 and the validated Lyme symptom questionnaire[20] at time zero and at 6 weeks after initiation of the study
- Basic cbc and CMP will be obtained at baseline, at 3 and 6 weeks of the study

Patients will be identified through the practice of the PI and directed marketing to community physicians. Selection criteria:

- ≥ 21 years of age
- Not pregnant and consenting to use a means of birth control during the study
- Agreeing to maintain entrance pharmacologic intervention during the duration of the 6 week trial. This would include both prescribed and nonprescribed medications/supplements.
- Agreeing to the aforementioned protocol and appropriate follow up.

Data will be secured in digital form through an encrypted, password protected system. Paper files will be kept in a secure location in the office of the PI. Only staff associated with the study, or potentially involved in the ongoing care of the study patient, will have access to this information.

AIMS

It is thus the contention of the PI that hyperbaric oxygen treatment has a proven safety record, for which intervention in the management of ongoing symptoms related to Lyme disease has the potential to improve outcomes.

CRITIQUE

Although this is an open labeled study without placebo controls, we offer this as a pilot to determine if a larger multicenter, prospective randomized placebo controlled study should be coordinated.

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