

Letters to JAHVMA

A PILOT STUDY: AN INTEGRATIVE APPROACH TO THE TREATMENT OF CANINE LYME DISEASE

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ABBREVIATIONS

BBB – Blood brain barrier

LD – Lyme Disease

Abstract

Lyme disease, or Lyme borreliosis, is an inflammatory disease caused by the bacterial spirochete *Borrelia burgdorferi*. It is seen in humans, dogs, horses and other species. This study presents 4 canine cases of Lyme disease that converted to negative on an ELISA test with a combination of doxycycline and an herbal combination of Teasel (*Dipsacus sylvestris*), Japanese Knotweed (*Fallopia japonica*), and Sweet Annie (*Artemisia annua*). When dogs were treated with doxycycline and no concurrent herbal therapy, the ELISA tests did not return to negative for Lyme disease on retest (6 months or more later).

Introduction

In medicine, we are faced with community health predicaments and seek solutions to prevent or remedy these challenges. Complementary and alternative therapies consist of proven and unproven theories and therapies that can be adopted and used in our attempts to address medical care. As they are used, clinical experience and personal opinions accumulate which can be shared and experienced by others. First, pioneers enter the field. Then, after longer periods of time, students of these pioneers or other interested parties begin the process of

more thorough scientific inquiry. As these studies progress more rigorous information accumulates allowing more evidence based approaches in evaluation of the data. Once evidence accumulates the therapy becomes an integrative medical modality. Finally, as more data and support develops, a theory or modality may gain acceptance into so-called "conventional medicine." This paper examines the experiences of the author using an integration of Western herbal medicine and antibiotic drug therapy in supporting canine patients with Lyme disease (LD).

LD, or Lyme borreliosis, is an inflammatory disease caused by the bacterial spirochete *Borrelia burgdorferi*. LD (named for the town in Connecticut where it was first diagnosed), is a rapidly growing epidemic (1–3). It has been endemic in the Northeast for years. It is seen primarily in people, dogs, and horses. There is much debate in both the holistic and the allopathic communities over the diagnosis and treatment of this disease (1, 4–6). This author has pooled information from both communities to develop a diagnostic and treatment protocol that shows promise in the management of Lyme disease.

LD is spread primarily by ticks of the genus *Ixodes* (2, 5). Ticks carrying *Borrelia burgdorferi* attach to the host animal and regurgitate the spirochete into the mammalian host. Originally, it was assumed that the spirochete traveled through the bloodstream. However it now appears that it travels through the skin and spreads locally through inflamed tissue to other parts of the body (2, 7). This method of travel enables the organism to establish in joints and other hard to reach spaces in the body. According to Littman, et al., the Lyme spirochete is primarily found in the dermis, connective tissue, and synovia, but not in the blood, urine, joint fluid, or CSF (5). The persistent infection is maintained especially in the collagen-rich tissues (7).

Signs of LD vary, but the most common signs in dogs are lameness, fever, and lethargy. The lameness in dogs usually manifests as joint and limb inflammation, with possible lymphadenopathy of regional lymph nodes (such as inguinal or prescapular) (2, 8). Due to the manner in which the spirochete spreads, the limb closest to the tick bite is usually the one affected (7). Horses and cows seem

to have the same signs (7). Untreated, LD in dogs can progress to cause protein-losing nephropathy, known as “Lyme nephropathy” (5). Humans develop fever and joint issues as well, but they also more commonly get a bulls-eye lesion at the site of the tick bite. This bulls-eye lesion is proposed to be due to the spread of the spirochete through the skin (7). Dogs and horses may develop such a lesion, but it often goes unnoticed as they are covered in fur. Humans also can get cardiac sequela that are not generally seen in other species.

Diagnosis of LD is as debated as every other facet of the disease. According to Skotaczak, diagnosis of Lyme disease diagnosis is based on the 5 criteria:

- 1: the presence or absence of common clinical signs
- 2: differential diagnosis
- 3: specific response to diagnosis of Lyme disease
- 4: known tick bite or living in an endemic area
- 5: antibodies in the blood (2).

Littman, et al., have similar criteria for diagnosis, and also include “response to treatment” (5). Although it is



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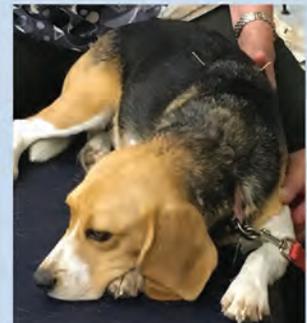


Table 1. Results for Dogs Treated with Antibiotics and Herbs

Dog	Breed	Gender	Age	Weight (kg)	Test Results (H/L/E/A)**	Original Test Date	Doxycycline Dose	Tincture Dose	Retest Date	Retest Results (H/L/E/A)
1	German Shepherd	FS	6 yo	32.5	(-/+/+/-)	07/26/2012	150 mg BID x 4 weeks	2.5 mL BID x 4 weeks	07/11/2013	(-/-/-/-)
2	German Shepherd	FS	5 yo	38.8	(-/+/+/-)	03/13/2013	200 mg BID x 6 weeks	3.0 mL BID x 8 weeks	Unknown date*	(-/-/-/-)
3	Pit Bull	FS	3 yo	18.6	(-/+/+/-)	04/10/2013	100 mg BID x 6 weeks	1.5 mL BID x 8 weeks	04/16/2016	(-/-/-/-)
4	Sheltie cross	FS	10 yo	19.2	(-/+/+/-)	05/09/2013	100 mg BID x 4 weeks	1.5 mL BID x 4 weeks	09/08/2016	(-/-/-/-)

*personal communication from owner

** H=Heartworm disease, L=Lyme disease, E=Ehrlichiosis, A=Anaplasmosis

controversial, this author treats every dog that is ELISA positive (a) for LD or any other tick-borne disease, regardless of obvious clinical signs. This author does not treat as a diagnostic tool, a method which runs contrary to holistic principles especially since treatment includes the use of antibiotics. Client feedback has reinforced this protocol; even in the patients that were not obviously symptomatic, the clients would say that after 48 hours of treatment, they had not realized how lethargic their dog had become and how active the pet was again once the LD was treated. This author personally believes there is significant sub-clinical disease being left untreated.

LD is hard to treat for a myriad of reasons. First, it hides in the body. Second, it mutates rapidly which also makes it hard to diagnose. The spirochete regulates its expression of antigens during its different life cycles so that it can more easily spread throughout the host body and survive indefinitely (6). Third, it can live in 3 forms: the spirochete itself, an encysted form (also called a spheroblast), and within a biofilm (9). These factors also explain why the host's immune system does such a poor job of fighting off the spirochete and why it persists despite treatment. According to Vojdani, et al., first the spirochete "borrows a practical coat from the saliva of its vector, the *Ixodes* tick" where it also undergoes a surface phenotypic change from its phenotype in the stomach of the tick (6). This new phenotype (Salp15) inhibits "IgG antibody response to foreign antigens by halting CD4+ T-cell activation, and inducing immune suppression.... This Salp15-mediated immunosuppressive mechanism, along with the activation of the fibrinolytic system and proinflammatory cytokine

production, allows for facilitated invasion of the host's immune [system] and CNS" (6). This is also why a simple course of antibiotics is ineffective in treating LD (8).

Materials and methods

Eleven dogs were tested by an in-house ELISA test (a). They were then prescribed doxycycline (5mg/kg BID PO) and an herbal tincture (b) of 1:1:1 dry volume Teasel (*Dipsacus sylvestris*), Japanese Knotweed (*Fallopia japonica*), and Sweet Annie (*Artemisia annua*) in 40% ethanol with 60% water (0.2 mL/2.27 kg BID for 4–8 weeks). Retesting by the same method was performed at least 6 months later.

Results

From January 2012 – June 2013, the author's practice treated 11 dogs with the combination of doxycycline and the herbal tincture. Seven were lost to follow-up, 4 retested. Some of the dogs had concurrent *Ehrlichia canis* infections, which required a higher doxycycline dosage.

As Table 1 shows, the 4 dogs that were positive for Lyme alone or with a co-infection all converted to negative on the ELISA test once treated with the combination of Doxycycline and herbs.

Discussion

In the author's practice, every dog is ELISA tested as a diagnostic indicator. According to the manufacturer, the test sensitivity is 94.1% and the specificity is 96.2%. Littman, et al., concur that the commercial Lyme ELISA (a) test indicates natural exposure to the disease and shows good correlation with other tests. Additionally, the intensity

of the blue in the response is a good indicator of antibody level but not of antigen level (6).

The author's original treatment protocol was simply 4–6 weeks of doxycycline at 5 mg/kg BID PO. However, while remission of signs occurred in the dogs, the ELISA test remained positive the following year. This persistence of positive tests was also mentioned in the literature (5). When the Lyme Tincture was added, the tests started coming back negative the following year. According to Vojdani, et al., integrative treatment of LD includes antibiotics, herbs, and nutritional supplements. The addition of CAM demonstrates that certain herbs and nutritional supplements prevent the tick from adhering to the skin, decrease the pathogen number by increasing phagocytosis and NK cell activity, down-regulate proinflammatory cytokines, impede the fibrinolytic cascade, and repair the blood brain barrier (6). It should also be pointed out that a negative ELISA does not necessarily mean that the spirochete has been eradicated from the body, only that there is not a detectable antibody level. Doxycycline is the

first choice of antibiotic for LD, both in allopathic and complementary medicine (1, 5, 6). The current treatment recommendation for dogs is 10 mg/kg QD for at least 4 weeks (5, 10). Doxycycline is not only a tetracycline antibiotic, but it also has anti-inflammatory and anti-arthritic properties (5). Doxycycline is well distributed in the body, including into spaces such as joints. Additionally, it is better distributed than other tetracyclines due to the fact that it is more lipid-soluble (10). Since renal disease is a concern, doxycycline is also a good choice because it is safe for use with renal insufficiency (10). Side effects include gastrointestinal distress and esophageal erosions, making it best to split the dose to 5 mg/kg BID and administer during or after meals. The food helps protect the GI mucosa from antibiotic irritation and damage.

Teasel (*Dipsacus sylvestris*) is a member of the Dipsacaceae family. The first-year unpeeled root (before it flowers) is used medicinally (3, 4). Most commonly, teasel is used in tincture form. Many historical and traditional philosophical modalities explain the use of teasel against LD. As a

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doctrine of signatures, teasel has 3 justifications. First, the plant has a purplish-red flower that blossoms by expanding in a ring around the flower head, similar to the bulls-eye ring caused by borreliosis at the site of the tick bite. Second, the term “*Dipsacus*” comes from the Greek “*dipsan*” which means “thirsty” because birds will drink from the leaf basins. Historically, this water was considered “Venus water” which was cleansing to “Venus organs,” such as the kidneys, hence its applicability in Lyme nephropathy. Third, there are anecdotal reports of people with LD who took Teasel and felt “as if sharp barbs of energy were shooting from the inside of the body out toward the periphery...It is as though one can feel the energetic configuration, which gives the plant its barbs and pricks” (3). It eradicates the spirochete from the internal organs out to the skin (3). Historically, Teasel was believed to drive poisons from the body. In TCM, teasel has the following attributes which correlate with LD: it prevents and treats osteoporosis and wounded bones, it treats joints and muscles, improves the immune system, blocks bacteria, treats Kidney jing, and strengthens yang (3, 11). Wood adds that teasel treats intermittent fevers, which are a symptom of LD (11). Overall, Teasel clears the spirochete itself out of the host body (11).

Japanese Knotweed (*Fallopia japonica* or *Polygonum cuspidatum*) is a member of the Polygonaceae family. Its roots are also used medicinally, and it is effective in any form (tincture, tea, powder, etcetera) (1). Japanese Knotweed is an Asian native that has become naturalized and is highly invasive in the USA. As a doctrine of signatures, Japanese Knotweed and LD are spreading at the same rate in the same areas (3). The primary chemical constituent in Japanese Knotweed is resveratrol, contained in a higher concentration than in any other known plant (1, 12). (As an aside, grapes are the go-to source of resveratrol, but they do not contain a high enough concentration to combat LD and can cause acute renal failure in some dogs (1).) Both the plant and the constituent have been found to be anti-inflammatory, antibacterial, immunomodulatory, immunostimulatory, capillary-stimulating, and antioxidant, among other actions (3, 12, 13). Japanese Knotweed uses capillary stimulation to both increase blood flow in hard to reach areas (such as skin and joints) and to carry other medicines to these areas (13). It is both an allopathic drug and an herbal medicine synergist (3). The plant also kills

the spirochete outright (12). The root strongly obstructs the cytokine cascade caused by the Lyme spirochete. For example, the spirochete fuels the release of matrix metalloproteinases (MMPs) through a variety of cellular pathways, and Japanese Knotweed is the only herb known that blocks MMP-1 and MMP-3 stimulation through 3 of these pathways (14). *Borrelia burgdorferi* also causes endothelial damage, which is prevented and repaired by Japanese knotweed (3, 14). In addition to all these defenses against LD, Japanese Knotweed also has been proven to both gently break up the biofilm form of the spirochete and to prevent its formation (1). Buhner sums this all up best when he describes Japanese Knotweed’s actions specific to LD:

1. It increases microcirculation to carry chemical constituents (the medically active chemicals in the herb) to locations such as eyes, knees, heart, brain, and skin in order to decrease the number of spirochetes in these locations.
2. It decreases tissue inflammation, which in turn decreases clinical signs, such as arthritis.
3. It protects and improves heart function, especially in cases of Lyme carditis.
4. It decreases the autoimmune sequela of LD.
5. It increases broad-spectrum antibiotic and antiviral activity, and this includes antibiotic action against spirochetes.
6. It restores and increases healthy immune system functioning.
7. It is synergistic with other herbs and allopathic drugs for the treatment of LD.
8. It protects the endothelium from *Borrelia burgdorferi* and other spirochetes and common coinfections.
9. It has anti-biofilm activity.
10. It reduces brain and CNS inflammation, which leads to improved functioning in cases of Lyme neuroborreliosis (1).

Sweet Annie (*Artemisia annua*) is a member of the Asteraceae family, which has many medicinal plants. Even the genus *Artemisia* has a plethora of medicinal species besides Sweet Annie, such as Wormwood (*Artemisia absinthium*), from which absinthe is made. Unlike the previous 2 herbs, Sweet Annie’s pre-blooming leaves are used (15). Sweet Annie is most famous as both a preventive and treatment for

malaria, another insect (mosquito) borne disease (15, 16). This herb also treats the spirochete that causes leptospirosis (16). Sweet Annie bonds with parasitic proteins, thus rendering the parasite inert. Sweet Annie is a febrifuge (fever reducer) antimicrobial, immunomodulatory, and is synergistic to other compounds that fight Lyme spirochetes (1, 16). The main constituent is artemisinin, but the whole plant has internal synergy, thus rendering its effectiveness greater than the sum of its parts (17). Lastly, it crosses the BBB to attack any spirochetes there (16).

One other benefit of this herbal combination is that in a review of the literature, no safety concerns were found. These 3 herbs are safe to use individually, in combination, and with allopathic medications such as doxycycline.

Conclusion

LD is a rapidly spreading, seriously debilitating disease requiring knowledge on the part of holistic practitioners in the areas of prevention (not discussed in the scope of this article) and treatment, especially since no preventives are 100% effective against tick bites. This author has had preliminary success with this integrative approach of doxycycline and herbs. This author believes that doxycycline is an essential part of LD treatment, consistent with both herbal and mainstream literature. However, the combination of Teasel, Japanese Knotweed, and Sweet Annie seem to rid the body of *Borrelia burgdorferi* in ways that antibiotics alone cannot (1, 16). The preliminary success of the author's experience with this herbal mixture indicates that further clinical trials are indicated. 🌿

Endnote

- a. IDEXX Laboratories, Inc. SNAP 4Dx Plus Test: Test Accuracy. IDEXX Laboratories, Inc., 2016.
- b. Lyme Tincture, Purple Moon Herbs and Studies, LLC, Hartly, Delaware 19953

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