



Scientific Guide in Natural Approach to Lyme disease Information for Health Practitioners

Presented by Dr. Rath Research Institute

Current Lyme disease treatments aiming at killing *Borrelia sp.* infection using various medications (e.g., synthetic compounds, antibiotics, etc.) have been rarely successful. Therefore, many health practitioners combine traditional antibiotics with naturopathic supportive care. Also, some patients who do not tolerate the antibiotics, or those who are opposed to using them, are seeking natural approaches in order to enhance healthy body functions. Many health practitioners use naturopathic support to offset negative side effects associated with conventional therapies and to improve the patient's tolerance to the treatment.

Major goals of nutritional support in Lyme disease are:

1. Eradication of pathogens
2. Boosting immunity and fighting inflammation
3. Metabolic support for affected organs
4. Symptoms relief

New science based approach to natural control of the pathogens associated with Lyme disease

The main pathogen causing Lyme disease in the USA is *Borrelia burgdorferi* sensu stricto while *Borrelia garinii* is a pathogen causing Lyme disease in Europe. Study conducted at the Dr. Rath Research Institute tested 45 plant-derived compounds (i.e., phytochemicals and vitamins) against these two species of *Borrelia* including their all morphological forms: spirochetes, latent rounded forms and biofilm.

The following results were obtained:

- *Spirochetes*: All 45 tested compounds inhibited spirochetes growth by 35% to 65% in both *Borrelia sp.*

- *Rounded forms*: Death of latent rounded forms ranging from 30% to 50% was observed in the presence of cis-2-decenoic acid, rosmarinic acid, baicalein, monolaurin, luteolin, kelp (iodine), grape seed extract, grapefruit extract, and black walnut green hull extract.
- *Biofilm*: The most effective compounds in reducing biofilm formed by *Borrelia burgdorferi* (20%-40% reduction) were baicalein, luteolin, monolaurin, cis-2-decenoic acid, kelp (iodine), and 10-undecenoic acid (aka undecylenic acid). Biofilm formation by *Borrelia garinii* was reduced by 40%-50% in the presence of baicalein, monolaurin, and 10-undecenoic acid.

Based on these results we selected the most effective and non-toxic compounds for their further testing for synergy effects against *Borrelia sp.* We compared the efficacy of different mixtures containing these micronutrients to the antibiotic doxycycline (the most frequently prescribed antibiotic for Lyme patients).

Among several combinations, we selected the one which was the most effective against all morphological forms of *Borrelia sp.* This combination has demonstrated a comparable efficacy to doxycycline in the elimination of the spirochete form of *Borrelia sp.* and showed superior efficacy against the rounded forms and a biofilm.

To learn more about this selection process as well as *in vitro* and *in vivo* experimental results, please visit our website at www.drrathreaserch.com.

Practical implications of our research

Our research results in addition to studies conducted by others, and the clinical expertise from health professionals, suggest that several key aspects should be considered in effective control of *Borrelia* infection:

1. Micronutrient supplementation for at least 8-12 weeks or longer depending on the condition of the patient.
2. Immune system support, lowering inflammation
3. Detoxification of the body
4. Proper diet

1 – Natural components with scientifically documented efficacy against *Borrelia sp.* in form of spirochetes, rounded forms and biofilm

VITAMINS

1. Vitamin D3 – 400–10000 IU/day. Vitamin D3 is an immunomodulator. It has been shown to enhance the innate immune system and moderately lessen the adaptive immune system and as well as it can modulate autoimmune responses. **Note:** Lyme

patients have often a low level of Vitamin D3 which should be taken into consideration by a health practitioner.

2. Vitamin C – 1000–5000 mg/day. Vitamin C is an immunomodulator. It can enhance the function of the immune system by controlling the activities of phagocytes. It has anti-oxidative properties and supports strong connective tissue which forms a natural barrier against penetration and migration of bacteria and other microorganisms in the tissue.
3. Vitamin B-complex:
 - B1 known as thiamine (including benfotiamine) – 50-150 mg/day. Vitamin B1 is needed for an effective immune response improving the body's ability to withstand stressful conditions.
 - B2 known as riboflavin – 50-100 mg/day. Vitamin B2 strengthens the immune system by “alerting” the antibodies in the body important in effective protection against infections.
 - B3 known as niacin (including niacinamide) – 100-1500 mg/day. Vitamin B3 supports the anti-microbial efficacy of our immune system by affecting the “production” of neutrophils at the genetic level.
 - B5 known as pantothenic acid – 50-100 mg/day. Vitamin B5 is required to synthesize an important compound in the bio-energy cycle - coenzyme-A (CoA). It has been shown that it helps to fight fatigue and sleep disturbances often associated with Lyme disease.
 - B6 known as pyridoxine, pyridoxal, pyridoxamine – 50-100 mg/day. Vitamin B6 helps in strengthening the immune system.
 - Biotin also known as vitamin B7 – 100-300 mcg/day. Biotin is a co-factor of enzymes involved in amino acid, glucose, and lipid metabolism thereby optimizing cellular functions.
 - B12 – >100 mcg/day. Vitamin B12 is an immunomodulator essential for optimum function of the immune system. It is needed to support white blood cells multiplication and their maturation (growth); is especially affects CD8+ cells and NK cell. **Note:** In many Lyme patients there is a significant decrease in Vitamin B12 and CD57 (marker of NK cells) blood levels, which should be taken into consideration by a health practitioner.
 - Folic acid – >400 mcg/day. Folic acid is an immunomodulator essential for the immune system and white blood cells function. It is especially important for controlling inflammation, autoimmune responses and increasing resistance to infections. **Note:** The blood levels of Folic acid can be significantly decreased in Lyme patients - this should be taken into consideration by a health practitioner.

MINERALS

Minerals and trace elements: selenium, magnesium, manganese, molybdenum are important to maintain proper homeostasis of the body by supporting metabolic anti-bacterial processes. **Note:** Magnesium level is often significantly decreased in Lyme patients.

PHYTOBIOLOGICS

1. Iodine (Kelp form or Iodoral form) – 300-1000 mcg/day in Kelp form; 12 mg/day in Iodoral form. Iodine is one of the strongest anti-microbial compounds against vegetative (spirochetes) and latent rounded forms of *Borrelia sp.* Iodine is needed for supporting tissue regeneration and healing. It can attract granulocytes into the sites of inflammation improving their phagocytic properties (killing bacteria). Iodine is well known as essential for the thyroid function (pituitary and other endocrine abnormalities are common in LD).

Since iodine is needed for optimum body metabolism and its deficiency is quite pronounced in different populations, running an “iodine overtaking test” should be considered prior taking iodine supplements.

Note: The RDA for Iodine is 150 mcg a day, although some studies (Japanese diet studies) suggest that the daily iodine requirement should be about 12 mg. Most ingested iodine is taken up by the thyroid cells and its excess is excreted in the urine. Urinary iodine concentration of 100 µg/L corresponds to its dietary intake of about 150 µg/day in an adult. Median urinary iodine concentrations below 100 µg/L are associated with increases in median thyroid size and TSH and thyroglobulin values in the serum. Correction of iodine deficiency results in adjusting T3 and T4, and other parameters back into the normal range.

2. Fucoidan – 300-1000 µ/day. In addition to being considered an anti-microbial agent, fucoidan helps in body detoxification and acts as an immunomodulator by strengthening the immune system, especially in the production and function of NK cells.
3. Grape seed/skin extract – doses according to manufacturer’s recommendation. Grape seed/skin extract has been shown to have anti-microbial properties against spirochetes and latent rounded forms of *Borrelia sp.*
4. Grapefruit extract – doses according to manufacturer’s recommendation. Grapefruit extract has been shown to have anti-microbial properties against spirochetes and

latent rounded forms of *Borrelia sp.* **Note:** Some patients cannot take this compound due to its interference with some of the conventional medicines.

5. Black walnut green hull extract – 400-800 mg/day of an extract. The active constituent in the unripe (green) hulls of Black Walnut (*Juglans nigra*) is a naphthoquinone (aka juglone) that displays anti-fungal, anti-helminthic (anti-parasitic), anti-viral and anti-bacterial effects. The extract also contains tannins and natural iodine and is an excellent agent against parasite-type (worms) organisms. It has shown positive health effects in fighting stress, supporting healthy digestion, balancing blood sugar, and is a powerful detoxifier. In addition, our data have shown that it is effective against spirochetes and latent rounded forms of *Borrelia sp.* **Note:** Black walnut green hull tincture can either be prepared at home (the exact protocol can be found in the Internet) or it can be purchased.
6. Apricot kernels – >3 apricot kernels/day or 25-30 µg/day of amygdalin (98%), or the equivalent amount of grounded kernels (powder). **Note:** The apricot's kernels contain amygdalin which is also present in plum and peach pits, bitter almonds, wild cherry bark, and apple seeds. Amygdalin is toxic in high amounts. It is effective in killing the spirochetes in the non-division stage, since they have no defense against its cyanate residue (-CN). All human cells can convert it into harmless thiocyanate (-SCN) by an enzyme called rhodanase (a mitochondrial enzyme). SCN in turn is a substrate for lactoperoxidase that converts thiocyanate into hypothiocyanite (-OSCN) that is considered as a safe product: it is not mutagenic and has antibacterial activity. Hypothiocyanite has been researched extensively for its capabilities as an alternative to antibiotics as it is harmless to human body cells while being cytotoxic to bacteria. The antibacterial activity of lactoperoxidase is important in white blood cells to fight pathogens. Amygdalin showed anti-borreliase effects by killing mature cysts as well as the “persisters” in cerebrospinal fluid, the brain, and the disseminated remnants not killed by antibiotics or non-synthetic (natural) compounds in the organism. **Note:** Do not substitute with Laetrile, which is the patented drug made from the natural compound amygdalin. Laetrile is also known as Amigdaline B-17 or vitamin B17.
7. Anise seeds – >500 mg/day of powdered seeds, typical use is between 0.5 to 3 g of seeds of *Pimpinella anisum* (in literature anise can be also referred to as *A. vulgare* or *A. officinarum*). The whole anise seed is harvested from the fruit of an annual herb, while anise extract is usually obtained from both the leaves and the seeds of the spice known as star anise (do not confuse it with the “Chinese star anise” (*Illicium verum*, Magnoliaceae).

Anise has a strong, slightly sweet flavor due to the presence of aromatic compound known as anethole, which has also been found in fennel, tarragon and licorice and

which inhibits growth of *Aspergillus sp.* known for its production of mycotoxin. Other components of the whole seed include coumarins (such as umbelliferone, umbelliprenine, bergapten, and scopoletin), lipids (such as fatty acids, beta-amyrin, stigmasterol), and flavonoids (such as rutin, isoorientin, and isovitexin). Anise has been evaluated for its anti-microbial effects against gram-negative and gram-positive bacteria. In addition it has been used for constipation, distressed stomach, to increase urine flow, in the treatment of seizures, nicotine dependence, sleeplessness (insomnia), and asthma. **Note:** Anise is not recommended for use during pregnancy. In addition, research showed that anise is very effective against resistance to other compounds, fungi and yeasts. Anise seeds can be substituted with anise extract (1.5 teaspoon of ground anise seed for every 1 teaspoon of anise extract).

PLANT SYNERGY COMPONENTS

1. Baicalein – 200-400 mg/day of pure ingredient, 600-800 mg of Skullcap extract. Baicalein is an anti-inflammatory and anti-microbial compound. Our study demonstrated its efficacy against *Borrelia's* biofilm, as well as in eliminating spirochetes and latent rounded forms of *Borrelia sp.* Baicalein is an active compound that can be found in *Scutellaria sp.*, e.g., *Scutellaria baicalensis* (Chinese Skullcap) and *Scutellaria lateriflora* (American Skullcap).

2. Luteolin – 75-150 mg/day of pure ingredient. Luteolin is an antioxidant (free radical scavenger) and cell protectant. Luteolin is an active compound that can be found in *Sophora japonica*, *Terminalia chebula*, and *Lippia graveolens* (mexican oregano).

3. Rosmarinic acid – 200-300 mg/day of pure ingredient, 400-800 mg of rosemary extract. Rosmarinic acid is an antioxidant and anti-inflammatory agent which acts by quenching allergic types of immune responses by killing activated T cells and neutrophils during allergic reactions without affecting the T cells or neutrophils in their resting state. It also has potent properties in eliminating latent rounded forms of *Borrelia sp.* Rosmarinic acid is an active compound that can be found in *Rosmarinus officinalis* (rosemary) and *Perilla frutescens* (Perilla Oil, a nutty oil derived from the seeds of *Perilla frutescens*, and rich in Omega-3 fatty acid).

4. Monolaurin – 400-600 mg/day of pure ingredient. Monolaurin (aka Glyceryl laurate, glycerol monolaurate) is a component of coconut oil shown to be effective against *Borrelia's* biofilm as well as in enhancing general immunity.

5. 10-hydroxy-2-decenoic acid (aka HAD, cis-2-decenoic acid) – 200-400 mg/day of pure ingredient. Cis-2-decenoic acid is an active component of Royal jelly with potent anti-microbial properties, particularly anti-biofilm.

6. 10-Undecenoic acid (aka Undecylenic acid) – >250 mg/day of pure ingredient. 10-Undecenoic acid is a synthetic unsaturated fatty acid prepared from the natural product Ricinoleic acid (aka 12-hydroxy-9-cis-octadecenoic acid), which is an unsaturated omega-9 fatty acid that exerts analgesic and anti-inflammatory effects. Ricinoleic acid is a major component of the oil obtained from mature Castor plant (*Ricinus communis*, Euphorbiaceae) seeds or from sclerotium of ergot (*Claviceps purpurea*, Clavicipitaceae). **Note:** Do not confuse Ricinoleic acid with a Ricin, which is a toxic protein in the castor seeds, acting as a blood coagulant. 10-Undecenoic acid showed strong anti-microbial, in particular an anti-biofilm, effects, and as well is known for anti-inflammatory properties. **Note:** Do not take 10-Undecenoic acid if you are allergic to fish.

Phybiologicals basic formula has showed synergistic or additive anti-borreliaea effects with described above phyto-compounds at dosages of one capsule/day.

2 - Immune system modulation (together with supplementation, detoxification, and diet)

Boosting the immune system function is essential in fighting any infection. It is important to use a properly selected micronutrient program to support healthy immune system function in Lyme disease as well.

It has been shown that micronutrient deficiencies and imbalances are frequent in *Borrelia* infection which further impairs immunity. In particular, the supplementation should include vitamin C, B-vitamins, and other micronutrients identified based on nutrient deficiency tests. It is important to pay attention to the deficiency of Intrinsic factor (IF, GIF), especially in older individuals. Intrinsic factor (is crucial for vitamin B12 absorption. In individuals deficient in this factor supplementation with B12 does no bring expected results, since this micronutrient is not effectively absorbed.

Other phybiologicals that have shown modulating effects on the immune system include:

1. *Andrographis paniculata* – the active constituents are andrographolides with their immune-modulating properties.
2. *Eleutherococcus senticosus* (aka Siberian Ginseng) – the active constituents are eleutherosides; They show to be protective against the effects of physical, mental, external (e.g., environmental) and internal (e.g., a disease) stresses, help in normalizing high or low blood pressure, stimulating immune system function, increasing body energy levels, protecting against toxins, and benefit in atherosclerosis.

3. AHCC (Active Hexose Correlated Compound) – an alpha-glucan rich nutritional supplement produced from the mycelia of shiitake (*Lentinula edodes*). It is known to have immune stimulating effects, it enhances natural killer (NK) cell activity, has beneficial effects on liver function and is an alternative for those not tolerating beta-glucans.

4. *Boswellia serrata* – the active constituents are boswellic acids. This herb has been used in arthritis and in maintaining joint health as it possesses analgesic and anti-inflammatory effects important in reducing joint pain and inflammation. For those suffering from Lyme arthritis, essential oil from *Boswellia serrata* applied together with coconut oil as a carrier on joints and other affected body parts, can be helpful in minimalizing pain and symptoms of LD.

5. *Astragalus membranaceus* – the active constituents are astragalosides I-IV and trigonosides I-III. Astragalus displayed cardio-protective, anti-diabetic, anti-microbial, anti-inflammatory, and longevity effects.

6. *Larch laricina/Larch occidentalis* – the active constituents are arabinogalactans, known to stimulate the immune system. Larch has anti-inflammatory and antiseptic properties beneficial for the digestive tract function. It may also improve the efficacy of some drugs when it is used together with them.

8. *Rumex acetosella* (aka Sheep sorrel) – the active constituents are tannins and anthraquinones, which work together with vitamin C in controlling digestive problems. It is used in anti-cancer therapy, as an anti-inflammatory, diuretic, antibacterial and antioxidant agent and the immune system booster.

9. *Polygonatum multiflorum* (aka Solomon's Seal) – the active constituents are steroidal saponins, alkaloids, anthraquinones, flavonoids, asparagine, allantoin, convallarin. It helps in providing relief and supporting the healing bruises or mending acute injuries to tendons, joints, ligaments, bones, connective tissue, cartilage, and in osteoarthritis. It can soothe gastrointestinal inflammation and help repairing its injuries, it can alleviate menstrual cramps, PMS, decrease bleeding, help in lowering blood pressure, but also help in increasing concentration and mental clarity.

Many health practitioners develop and follow their individual protocols which often include other immune modulating herbs such as elderberry and olive leaf, as well as powdered colostrum. Mushroom extracts such as reishi, shiitake, and maitake have shown to be beneficial, but may not be tolerated by people with severe candida problems and they should not be used continuously over a long time (presence of beta-glucans).

#3 - Detoxification (together with micronutrient supplementation, immune system modulation, and diet)

Many practitioners consider a detoxification program in their Lyme disease protocols. They usually cover three main areas: general liver detox support, neutralization of toxins released during treatment as bacteria die off, and heavy metal detox. However, many patients are intolerant of commonly used detox regimens therefore, such programs need to be individually adjusted and start with using milder approaches.

The following steps may be considered:

1. General detoxification with a slight alkalization of the body: One cup of warm or room temperature water (reliable purified water source, e.g., ROS [Reverse Osmosis] water) combined with the juice of one freshly squeezed lemon in the morning (lemon juice can be replaced with raw and organic apple vinegar).
2. Liver and kidney herbs as metabolic support in alleviating medication-associated toxic stress (St. John's Wort, Dandelion, etc.).
3. Heavy metal chelators such as vitamins C and B12, N-acetylcysteine (NAC is a source of Glutathione), also cilantro leaves, broken cell wall chlorella have shown beneficial effects. Chlorella can bind heavy metals and its assistance is needed for effective removal of toxic metals. **Note:** It is critical to use broken cell wall organic and laboratory grown chlorella. It is important to use reliable, organic sources of these compounds and gradually increase the doses. The program can start from supplementing with chlorella tablets (1 tablet = 200 mg, starting with 1 tablet 3 x per day up to 5 tablets 3 x per day during the detoxifying process). After 2-3 weeks adding a mix of cilantro with chlorella: cilantro leaves (1/4 cup organic fresh or frozen) and 5 chlorella tablets (very good organic quality) in 1 cup of pure water or liquid fulvic acid (fulvic acid is better choice) mixed in a blender. This mix can be consumed with at least a 4-hour break from taking the supplements. If used, it should be done daily every second week. Concurrently/concomitantly, apple and citrus pectin supplementation can be administered every day (follow manufacturer's recommendation regarding dosage; usually doses between 5-15 g/day are recommended). **Note:** Use a combination of apple and citrus pectin, not just apple or just citrus pectin. Because this methods chelates also necessary for our body minerals (e.g. magnesium, etc.), their supplementations has to be carry on, to avoid their depravation and eventually deficiencies.
4. For faster toxin removal the nutritional mix containing chitosan (binding of fat soluble toxins) and fibers containing supplements to support healthy bowel movement and

absorb toxins may be considered as a natural alternative. Bentonite clay and activated charcoal can be used; however, their excess can lead to constipation. Colostrum should be taken into consideration as an important addition to Lyme treatment that is also helpful for those with “leaky gut” problem.

5. In addition, an infrared sauna, Epsom salts baths, colon hydrotherapy, and lymphatic drainage may benefit many patients.

#4 - Diet (together with supplementation, immune system modulation, and detoxification)

Nutritional and lifestyle factors are important.

1. Most patients benefit from gluten and dairy free diets since these types of food can fuel inflammation which is already a major issue. Eggs and butter are accepted. Lean organic proteins, fruits, vegetables and healthy fats such as fish oil, flax, olives, avocados, and nuts and seeds will provide adequate nutrition without fuelling inflammation.

2. Since digestive function is often compromised, a low allergen diet is important. Avoiding sugar can help in preventing antibiotic-associated yeast overgrowth, and will assist in healthy immune response. Yeast overgrowth may develop especially with antibiotic treatments. Therefore, high potency probiotics should be part of every Lyme patient’s protocol and also used prophylactically.

3. It is important to consume at least two liters of clean, filtered water daily to help flush waste materials. About 1 L (~ 1 qtr.) for every 25 kg (~ 50 lb.) of weight. In order to balance some mineral deprivation 1/4-1/2 teaspoon of sea salt can be added. For the same reasons, adequate fiber is necessary to flush the colon of waste, in particular neurotoxins that can be released when bacteria are killed off.

4. Sleep is important, as Lyme has been often accompanied by insomnia due to pain and neurotransmitter imbalance. Melatonin, 5-HTP, and herbs such as valerian and passionflower can be helpful.

In general, the diet should be free of:

- Artificial/processed sugar/sweeteners and trans-fats (such as margarine)
- Yeast-based food
- Soy and its derivatives, peanuts and their derivatives, corn
- Sodas and other artificial/processed drinks
- Artificial colors, flavoring, preservatives, MSG, BHA, BHT, GMO

NOTE: It is important to pay attention to the quality of water used for drinking and cleaning and processing food. It is also important to avoid artificial/toxic ingredients (such as aluminum, etc.) in products such as soap, tooth paste, deodorant, shampoo, perfume, cleansing products, etc. This is in order to eliminate as many environmental toxins/threats as possible.

#5 - Additional health measures (together with supplementation, immune system modulation, detoxification, and diet)

1. Infrared sauna: 10-15 minutes every day or every other day for 8-12 weeks or longer (up to the required needs).
2. Moderate exercise: gym, walking, biking, hiking, dancing, etc., according to ability and preferences.

DO NOT SKIP ANY OF THE STEPS.

Step 1 and 2: Supplements - will help you to fight the pathogen and balance your immune system.

Step 3 and 4: Proper diet and detox - will help you to deal with the toxins, heal the gut, and calm auto-immune and inflammatory reactions.

Step 5: Additional health measures - will support supplementation, detox, and diet to avoid/minimalize Jarisch-Herxheimer reaction.

REMEMBER: Treating Lyme disease is a marathon not a sprint!

We hope that this is helpful. If you have any questions please contact us at: www.drrathresearch.org

Wishing you all Health!

The Dr. Rath Research Team

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