Considerations in the Clinical Treatment of Lyme Coinfections by Stephen Harrod Buhner

Although prominent physicians in the mid to late twentieth century announced with great fanfare that the type of infectious disease for all time such as malaria, smallpox, cholera, or typhoid fever, was about to disappear, they were wrong. Infectious diseases continue to challenge the medical community today. In this article we shall explore not only Lyme disease, but coinfections by such organisms as Bartonella, Ehrlichia, Anaplasma, Mycoplasma, Coxiella, and Rickettsia organisms.

Clinicians specializing in Lyme disease treatment and research are in an unique position to be aware of the complex problems attendant with treating something as amenable as a bacterial infection. Though slow on the uptake, as usual, this awareness is now becoming more common among researchers. In consequence, some good information is beginning to become known about the outer membrane proteins of Bartonella, the outer membrane proteins of Ehrlichia, and Anaplasma, or the expression pattern in a variety of bioinformatics, species, disease, or pathogen interactions have a great deal of impact on patient outcomes.

One of the first things to understand is the tremendous genetic flexibility of coinfectious organisms. Genetic Flexibility and Evolution Among Bartonella

Bartonella organisms, like many related members of the proteobacteria (among them are coinfectious agents such as Ehrlichia and Anaplasma), are undergoing rapid genetic alterations in response to environmental factors such as environmental change, habitat damage, and human population increase. As in Chomet et al, note in their paper, "Ecological fitness and strategies of adaptation of Bartonella species to their hosts and vectors:"

Massive natural or man-made changes to historically stable ecosystems that result in alterations in vector biology and reservoir host density, increased movement of a wide range of reservoir hosts across continents, rural to urban behavioral and societal changes that bring animals into increasingly close human contact, as well as medical interventions, HIV infection and coinfections, have resulted in considerable human population contribution to ongoing and dynamic interactions among Bartonella species and their hosts and vectors." (Chomet, et al, 2009)

Studies have found that Bartonella exists within infected hosts as a mosaic of different strains. This kind of variation is not found during in vitro studies, because the bacteria are all the same. In response to the immune system of the host Bartonella, species including their outer membrane proteins, generate a number of genetic variants in order to maximize their survival in the host. The various variants are able to live within different niches of the host more easily than others, e.g. the bone marrow or the lymph system, in order to maximize survival over time. It is not uncommon that several variants can be found within those niches, the several strains existing genetic material in order to stay ahead of the immune response. The outer membrane proteins of the bacterial or of the cellular wall are often altered (as are many of the adhesion proteins such as BaxA) which makes the variants harder to recognize by the immune system. Simple rearrangements of certain portions of the genome can create as many as 42,000 variants of a species of bacteria in a short period of time. As Chomet, et al, observe, "When the host produces antibodies targeted against the invading microorganisms, the infection is usually killed. However, if the pathogen alters the protein expressed (antigenic variation), or no longer expresses the protein on its surface (phase variation), the microorganism can survive and multiply in the host." (Chomet, 2009) In those with persistent or chronic infection, both phase variation and antigenic variation appear to be the norm, with the immune system unable to keep up. Study has found that the immune system is compromised in cases, at least minimally.

All Bartonella species contain a very similar, fairly small, core genome and multiple accessory genetic structures that they can weave into the core genome to produce diversity. Most of the accessory genomes exist as genomic islands and were formed through horizontal gene transfer from other bacteria. Some of these genomic islands are host specific, such as in the Lyme spirochetes. Upon entry into a new host, the necessary genomic island can be incorporated into the core genome to facilitate host infection. As Chomet, et al, note, "the horizontal gene transfer of so many genomic islands has "facilitated microbial evolution by the establishment of new pathways through horizontal gene transfer from other bacteria." And the infection is persistent. Many of the arthropod vectors of Bartonella (ticks, fleas, and so on) contain multiple species of the bacteria, all of whom exchange DNA segments in order to facilitate their adaptation to new hosts. Variants disseminated in infected hosts such as humans, vectors take a blood meal, ingesting the new variants. The new variants, taken as blood meals from multiple species, interact in the gut of the vector, alter their genome structures, and are then injected into new hosts. There is a continual and very elegant genetic recombination occurring.

Research in 2007 found that "isolates responsible for human disease are not drawn randomly from the feline reservoir. " (Arvand, 2007) In other words, there are specific human-infected Bartonella held in the cat that are generated inside the cat to infect the human hosts that own the cats. (In fact, B. quintana, which is considered to be human specific, is an evolved offshoot of B. henselae - a generally cat-specific species - that adapted itself to specialize in infecting humans. Research has found that B. henselae has newly evolved in the feline reservoir and is able to shift its outer membrane proteins to allow it to infect human red blood cells.) Lindroos, et al, note, "the variable gene pool in the B. henselae population plays an important role in the evolution of new strains of long term persistent infection in the natural host by promoting antigenic variation and escape from immune response..." (Lindroos, 2006) In spite of numerous comments to the contrary, Bartonella infection of human beings is not a random or accidental event; we are not inadvertent hosts. All animals are potential hosts for all Bartonella species and B. henselae (along with other infections that infect companion animals) is not transmitted to infectious humans. And the infection is widespread, much more so than is commonly recognized among physicians or the CDC. As Metz, et al note, in their research among Germans: "The prevalence of bartonellae among humans in Germany appears to be high and severe clinical cases have been described." (Metz, 2011)

There is tremendous genetic shifting occurring in response to multiple environmental factors. Coinfectious organisms that congregate inside ticks or other arthropod vectors are exchanging information with each other, including how to alter DNA in order to avoid both antibiotics and host immune responses. It should be noted that in a chronic case of Lyme or Lyme coinfections is encountered and the patient exists variant existing and being..." Coinfections..."
regularly generated within the infected person. This is because the immune system is more complex than the exception. Treatment must become more sophisticated in order to be successful. Looking at cytokine profiles is one of the ways to get to a more sophisticated, approach.

Coinfections and Cytokine Cascades

One of the better articles on cytokine cascades is Andreadis et al, 2008. The transmission consequences of coinfection: cytokines write large. This article appears in Trends in Parasitology, volume 23, number 6, in 2007. The article is a more unique approach to understanding the dynamics of coinfection. Instead of focusing on the organisms themselves, they suggest focusing on the cytokine cascades that the organisms produce in the body. They concentrate on coinfections of parasites, and taxonomic identities of par- asites are replaced with their cytokine profiles. For example, it becomes possible to predict within-host cytokine dynamics for the microorganism responsible for the disease. This is called a particular kind of cytokine signature, for example, "Cytokine in- fects and its coinfectious agents forms of inflammation and abnormalities in the nervous system that are complications for both the host and its coinfectious partners."

When treating a coinfection, it is important to take into account the cytokine cascade that occurs from each organism. The article outlines some of the most effective approaches to treat the condition. For example, if the infectious bacteria, say Bartonella for example, stimulate, stimulate high levels of proinflammatory cytokines in the body, then reducing interleukin-8 levels through the use of anti-inflammatory drugs may have that particular action with minimal effect on the other symptoms associated with Bartonella.

It is not completely easy to explore the cytokine cas- cade that one organism initi- ates, especially if there are two or more bacteria involved in an infection, each causing unique cytokine responses. The dynamic becomes a great deal more complex. Most researchers have not been able to learn to work synergisti- cally with each other. This makes it difficult to know if cytokines are not just additive; the bacteria work together actually, and just as with people working together, produce a much more powerful outcome if merely one bacterial species is involved. As well, most researchers have become familiar with cytokine and its coinfectious agents such as Bartonella. Most of the time, the magnitude and type of cytokine responses influence the outcome, a property of the cytokines. Susceptibility to a given parasite will be affect- ed by cytokine responses that are ongoing at the time of exposure, including respons- es to other microorganisms. In other words, if you are already suffering some inflammatory impacts, however mild, the bacteria will use it to facilitate their own replication. Furthermore, the pathogenic process of more than one microorganism is involved such spreading is considered reversible. As Graham et al, put it, coin- fection increases the repro- duction potential for the incoming parasite species and facilitates their transmis- sion to the next host or location. While the immune system is often compromised by the cytokine dynamics initi- ated by one type of bacte- ria, multiple, simultaneously existing and interacting genotypes are more potent in their impacts. It is possible some may get assaults on multiple body systems.

B Bartonella is a coinfection with Lyme, for exam- ple, what you then get is a cascade of processes with the body in a state of overdrive. The initial stages, however, are thought to sequester themselves in the capillary networks of the skin and other peripheral tissues. Bartonella species apparently usually reside in blood cells along with continuous infection by out- er membrane proteins. These impacts are thought to be already suffering with a preexisting inflamm- ation. The joint action on the host, the process is even easier for the bacteria. If you have add other coinfectious bacteria to the mix, the picture is even more complicated. For example, if Babesia are present, then the red blood cells are going to have to deal with the coinfectious phenomena (Bartonella, Babesia), thus increasing the number of impacts on red blood cells. This is, as Graham, et al, comment, more common in those with "cats." "Hosts that are coinfectious by multiple parasite species seem to be the rule rather than the exception in natural infections and some studies have found that most devastating human dis- ease is due to coinfectious pathogens that challenge immune response efficacy," as they go on to state.

The immune status of some individuals must be addressed as part of any treatment protocol. Due to the potential of coinfections there is an unanswerable question: the weak- ness of the immune system, the more likely someone is to become infected, they may have a debilitat- ing course of illness. Another very fine paper on the dynamics of coinfection is the one by Telfer, et al, 2008. "Parasite interactions in natural populations: insights for disease control" (Parasitology, volume 135, number 7, 2008). They echo the Graham, et al, which put it, "convinc- ing evidence suggests that coinfection with multiple parasite species or genotype are common. Consequently, particular interactions between differ- ent parasite genotypes or species frequently occur.  These interactions tend to be synergistic or antagonistic with potential fitness implications for both the host (morbidity and/or mortality) and parasite (transmission potential)."

Consequently, note, “in natural populations: insights for disease control” (Parasitology, volume 135, number 7, 2008). They echo the Graham, et al, comment, “Attempts by the immune system to simulta- neously deal with one or more genotypes or environmental conditions may prove costly, because the immune system is a limited resource. In particular, the immune system may have to adapt to a new genotype during coinfection with multiple parasite species involved in a co-infection to lead to immune paralysis and pathology that are more than the simple additive effects of the different parasite species.” For example, infection with the bacteria, say Bartonella are synergistically impalpable on red blood cells because the immune system response into the host, a parasite will experience an “immunoenvi- ronmental potential” that is compound from both previous and current infections, as well as genotypic factors such as age, nutrition status and genotype. The immediate effect of coinfection, however, is to comprise the innate immune response, and thus the effi- cacy of the adaptive responses of this arm of the immune system at reducing and clearing infection will be decreased because of determining susceptibility.

In other words, attention to the health of the immune system is essential for successful treatment of infections. Resto-Rui, et al, emphasize this as well, do not understate the impact of red blood cells. This is, as Graham, et al, comment, more common in those with "cats." "Hosts that are coinfectious by multiple parasite species..."
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Telfer, et al’s, research also found that infection with Anaplasma for example, made subsequent infection by Babesia much more certain, in fact, it made it twice as likely to occur. Reversing the order of infection found the same rate of increase. As well, animals infected with one Bartonella species who were also infected by other Bartonella species were much more likely to have long term infections. Coinfection with Babesia and Ehrlichia (or Babesia and Ehrlichia), for example, are often more severe in the disease progression in that both white blood cells and red blood cells are infected. Specifically, Anaplasma and Ehrlichia infect neutrophils, the most abundant form of white blood cell in the body and an essential part of the innate immune system. Thus, the immune system is fighting not only bacteria in the red blood cells and vascular tissues but bacteria inside itself.

In my experience, the technological medical community tends to downplay both the impact and occurrence of coinfections in the people they see while the alternative community tends to exaggerate it. Oddly, in spite of their training, most physicians don’t really understand bacterial organisms very well, nor how to treat them. They usually tend to look for a pharmaceutical that is active for the bacteria in question and apply it, a fairly superficial approach that is increasingly failing in practice. If they have not definitively identified the cause of the condition they will generally prescribe a broad-spectrum antibiotic that will, as often as not, do more harm than good. The alternative community often fails at rigor of analysis and the focus, and courage, needed to confront deadly or life-debilitating infections. Both make too much money off people’s suffering though, in fairness, most (not all) of the alternative community tends to make much less - I just don’t see that many herbalists with their own private airplanes.

In treating coinfections, the approach should be depth based with rigor of analysis. The bacterial infections need to be identified (and so, muscle testing is not reliable enough, but then, neither is Elisa - neither should be relied upon as definitively diagnostic) and then a treatment protocol initiated. In some cases antibiotics are very effective and with diseases as debilitat ing as Lyme and its coinfections they should be considered. However, if that kind of superficial approach fails, then a depth understanding of the cytokine cascades and the likely interactions between the coinfections should be undertaken and a treatment protocol initiated that addresses it in depth. The most important thing in treating coinfections is to reduce the inflammato ry processes the bacteria initiate and reduce the cytokine cascades that occur. That stops the majority of symptoms right there especially if treatment protocols are initiated that are designed to protect the areas of the body that are affected. As Telfer et al, observe, “An immune response that effectively cleared the infection from endothelial cells would therefore ultimately control an infection [by Bartonella].” This applies as well to any intervention that will protect endothelial tissue from the bacteria. The bacteriae can’t survive if they are not able to initiate their particular form of inflammation in the body, it is how they make habit and scavenger food. Enhancing immune function then allows the body to deal with the infection on its own. The addition of protocols to reduce the specific symptoms that are occurring (e.g. arthritis) and help restore quality of life are also important. Antibacterials can help but comprehensive treatment protocols that address these initial three conditions are essential:

1) reducing the cytokine cascade
2) enhancing the exact immune function that is depressed
3) addressing symptom picture

Relying on a “kill the invaders” approach is going to become increasingly ineffective as time goes on. In fact, it is already failing. The bacteria are evolving. We should, too.

References
7. About the Author
Stephen Harrod Buhner (http://www.gaiastudies.org) is the author of 18 books of nonfiction and one of poetry. For the past 30 years he has taught throughout the U.S., Canada, and the Western European Isles (UK/EU) on herbal medicine and Earth relationship. Among other contributions, Stephen is one of the early pioneers in understanding the non-linear source of indigenous plant knowledge; has been instrumental in bringing to prominence unhopped, herbal beers and ancient gruit; developed the first deep understanding of systems herbal anthelminthics and plant synergists; created the first comprehensive exploration of the use of Lyme spirochetes in the human body; developed the first understandings necessary for the herbal treat ment of cytokine cascades in disease complexes; generated the first comprehensive exploration of the use of plant human/plant relationships; created the first deep analysis and exploration of herbal antivirals; and is one of the foremost writers on the nature of emerging infections and ecosystem disruption. There is a reason that Rosemary Gladstar calls him one of the “plant geniuses of our time.”

In December 2010, a 29 year old female (Miss S.) began a series of EESystem sessions at my wellness center to counter the effects of Lyme disease and associated symptoms that had increasingly deteriorated her quality of life since she was 10 years old. Here is her story, as told to me over a 12 week period during her EESystem sessions.

By the age of 10, Miss S. was a trained semi-professional athlete preparing for the Olympics, regularly performing for audiences of up to 30,000 people. She developed fatigue, depression and body aches. Lyme was only diagnosed when she was 19 years old.

Periodically, for various reasons, she wasn’t able to receive her antibiotics. Her symptoms rapidly progressed to the degree of disability. She forced herself constantly to manage work and life, feeling sick and tired every day. She told me once that she had to physically push herself twice as much as anyone else to meet her responsibilities at work and in life. In addition to the symptoms of Lyme, she experienced deep sleep deprivation, frustration and nightmares. She alienated herself from friends and activities. Her diet changed from vegetables, fish and poultry to one of predominantly sugar.

When Miss S. arrived for her first EESystem session in December 2010, her symptoms were inclusive of Effexor, Ambien and bi-monthly acupuncture sessions. She was in constant pain due to state disability and struggled with minimal medication and no antibiotics for 2 years. Effexor was the only medication she received. Lyme symptoms returned full force. She moved in with family because her condition prevented her from maintaining employment and self-care. Nightmares returned and were partially subdued with sleeping pills. She preferred to stay in bed more so due to the depression rather than the body aches and pains. Social interaction was challenging, so thus avoided. Cognitive function and memory were impaired.

Miss S. found the acupuncture treatments twice a week provided partial relief, however, the acupuncturist found the liver meridians hardening and more difficult to access. Miss S. sensed the heavy regime of antibiotics had interfered with healthy liver function so she stopped taking antibiotics. She also received tremendous benefits from meditation and positive thought in the past, but discarded alternative practices due to increasing difficulty with focus and lack of motivation.

When Miss S. arrived for her first EESystem session in December 2010, the dark circles under her eyes were no longer painful. The liver points also softened and were no longer painful. The liver points also softened and were no longer painful. The liver points also softened and were no longer painful. The liver points also softened and were no longer painful. The liver points also softened and were no longer painful.

Her energy level increased and stabilized for longer periods of time. She found herself laughing and happy, more social. After the 3rd week, her acupuncturist was able to insert the needles in the liver points. Gall bladder points also softened and were no longer painful. The acupuncturist noticed an overall better response to treatment.

Miss S. shared with me, that for as long as she remembered, she never was happy, never had fantasy dreams as most people do - she had only nightmares. The nightmares ceased at the 2nd week of EESystem sessions. She experienced dreams that felt ‘good’. She began to consider the possibility of returning to work and related education. Her appetite increased as well as her desire for healthy food. She effortlessly drove 25 miles to her office for her EESystem session without fatigue, and met friends and socialized after the session. She said “I’ve been running with energy like I haven’t experienced for years!”

Miss S. voluntarily discontinued Acupuncture after the 3rd week of EESystem sessions. She experienced only slight anxiety and was able to sleep without nightmares. She traveled to the local beach and took the challenge to take on Disney World in Florida - something she thought she’d never be able to do again. She arranged all her travel plans without difficulty. She tired the same as her friends but felt ‘normal’ tired rather than exhaust-ed. She started the project of sorting through papers and notes to reorganize the last 10 years of her life. She traveled to California, reconnect-ed with old friends and made plans for her educational pursuits.

Her energy increased greatly the next week. Having learned how to look forward to the future and maintain an overall good feeling. Her energy level surprised her, mainly because it lasted through-out the day. She pursued activities such as walking to burn calories.

“Case Study”...cont’d pg 6

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Beyond Lyme Disease
Laura Wild Interviews Connie Strasheim

by Laura Wild

1W: What is Beyond Lyme Disease about?

CS: Beyond Lyme Disease is about discovering and healing the underlying causes of chronic illness in people with Borrelia and co-infections. Through my eight years of researching Lyme disease and many other causes of chronic illness today, I have learned that many people, perhaps a majority of those who have chronic disease, just aren't suffering from symptoms of tick-borne infections, or are just as important in the overall symphony of the infections.

Many people with chronic Lyme disease feel like Lyme causes a multitude of problems in the body, endocrine, gastroin-testinal, neurological, cardiac and autonomic nervous systems. Indeed, Lyme disease, for example, as well as damage to organs and tissues. Yet we have observed a tendency for doctors and patients to attribute most of this dys-function to Borrelia, beyond Borrelia and other infec-tions. Beyond Lyme, immune factors are causing disease. These factors may have pre-cedent, because anything that may have been what enabled the infections to gain a foothold in the body, or they may be conditions that emerged because of Lyme disease, in addition to underlying or major cause of illness, and not "ancillary" or "adjunct" conditions. Beyond Lyme, I do believe that the distinction is important because if these factors are considered and dealt with, such as being the result of Lyme, or it is assumed that they all are, then the infections are taken care of, then less attention may be given to treating them, or mitigating their influence upon the body. Consider this: many Lyme-literate doctors believe that a signifi-cant percentage of the popula-tion carries Lyme or other common tick-borne infections, but not everyone has Lyme disease, because some people's immune sys-tems are able to hold the infections under control. People with chronic Lyme disease are often sick because factors-stress, toxins and other disease processes-predisposed them to chronic illness.

1W: What are the topics in this book, and can you describe each one?

CS: This book covers some of the major causes of chronic illness in people with Lyme disease, although it is not inclusive of every cause, since people are unique and things can cause illness. Among the topics described in the book are:

1) Adrenal fatigue and hypothyroidism. Many people with long-standing Lyme disease fatigue, a complex topic, but I have chosen to focus upon hypothyroidism, specifically, because they cause major problems in people with Lyme, and often precede Lyme. Many people in our society today suffer from adrenal fatigue, which weak-en immune function and create susceptibility to infection and toxin reten-tion. While many doctors treat Lyme disease patients' adrenal fatigue, healing from the condition, if it is actually present, is even harder in Lyme, requires much more than just a course of antibiotics plus a tapering drug formula or some vitamin C, for example. Beyond Lyme Disease explains the causes of adrenal fatigue and the hypothyroidism, and describes the result from that, and what's required to heal it.

2) Deficiencies and Toxic Food. Toxic food that is genetically modified, and contains antibi-otics, hormones, pesticides and/or harmful sub-stances, is making many people sick today. It isn't just that these foods are bad for the body; they may cause "special diets"; conventionally processed food may be a major cause of illness. Unfortunately, it can be difficult to know how to eat well, since food labels are confusing, and opinions con-flict about the best diet for people with Lyme. Beyond Lyme Disease describes how to identify foods which are healthy for most people with chronic illness, along with how to remedy some of the many deficiencies caused by chronic illness, and why it is impor-tant to take the time and effort seriously in order to fully heal.

3) Electromagnetic Pollution. Every year, the amount of electromagnetic radiation in the environment doubles. Over two thousand studies have proven electro-magnetic fields (EMFs) to negatively alter cellular behavior and harm the body's beneficial bacteria. Dr. Thomas Rau of the Paracelsus clinic in Switzerland stated in an on-line article that EMFs can cause “reversal of the healthy gut flora to susceptible to symptoms from Lyme disease infect-ions. They determine beneficial bacteria in the gut that are meant to defend against ingesting toxins. Beyond Lyme Disease describes sources of danger-ous EMFs, how to identify them and mitigate their impact. On-line article on Lyme disease and working environment.

4) Mold. Over fifty percent of homes in the USA have mold, according to some estimates. Fully one-third of people with Lyme disease cannot eliminate mold toxins from their bod-ies, which means that mold toxicity can be a major cause of chronic illness in people with Lyme. As other condi-tions in this books, symptoms of mold toxicity mimic those of Lyme disease, making it difficult to identify the pri-mary cause of illness. Removing mold and the inflammatory responses that it causes is essential for heal-ing from chronic illness involving Lyme disease, which is described in Beyond Lyme Disease, as what describes to do's for Lyme disease.

5) Pyrouria/Heavy Metal Toxicity. By some estimates, 50-80 percent of Lyme disease suffers from a condition known as pyrouria, in which the body does not properly synthesize hemoglobin (used to make hemoglobin) and instead creates a mauve-like substance that binds with essential minerals and car-ries the blood from the body. Pyrouria creates severe nutrient deficiencies and, as a byproduct, heavy metal toxicity; both of which weak-en immune function and predispose the body to infec-tions. Beyond Lyme describes why treating pyrouria is essential for recovery, and provides gen-eral guidelines for how to address heavy metal toxicity.

6) Parasites. The role of parasites in Lyme disease is understated, but concurrent gastrointestinal infections, as well as by Steatobacillus, Bartonella, and other co-infections, parasitisms are intelli-gent and tenacious, and eradicating them often involves more than just take-a few weeks of worm-wood. Beyond Lyme Disease describes how to treat them and pre-vent their return to the body.

7) Emotional Trauma. Thousands of studies have revealed emo-tional trauma to be a major predisposing factor to chronic illness. Trauma thrusts the body into a state of "fight or flight", and when this state is prolonged, it weakens immune function. Unfortunately, trauma is often treated as a secondary condition to Lyme, or as the result of Lyme, although Lyme disease may be a major cause of illness. Healing from trauma often requires more than just opening the line to a day in meditation, or seeing a counselor once a week. This is because trauma is stored in all of the organs and tissues of the body, and root causes are beliefs, thoughts and behav-ioural patterns. Beyond Lyme Disease details the role of parasites in chronic Lyme, as well as how to treat them and prevent their return to the body.

Beyond Lyme Disease contains a bonus Appendix of updated Lyme disease treatment guidelines, based on my notes from recent Lyme disease confer-ences. The guidelines offer basic diagnostic and treat-ment information for healing from Lyme disease and other common co-infections.

1W: Do you have any specific dietary recommen-dations that Lyme patients should follow to help in recovery?

CS: Any allergic food will cause inflammation, so it's important to avoid all foods that cause inflammation in your body. If you are tired, for example, change your diet. If you are affected by mold, according to some estimates, as much as 50 percent of homes in the USA have mold, according to some estimates. Fully one-third of people with Lyme disease cannot eliminate mold toxins from their bodies, which means that mold toxicity can be a major cause of chronic illness in people with Lyme. As other conditions in this book, symptoms of mold toxicity mimic those of Lyme disease, making it difficult to identify the primary cause of illness. Removing mold and the inflammatory responses that it causes is essential for healing from chronic illness involving Lyme disease, which is described in Beyond Lyme Disease, as what describes to do's for Lyme disease.

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chronic illness tend to have allergic reactions to gluten, dairy, sugar, and refined and processed foods, so these should all be avoided if possible. High fructose corn syrup and pesticides is good, as are non-starchy vegetables, soups, legumes, rich in fruits and occasionally, lean meats and fish. Vegetarian diets are difficult, since many chronically ill people cannot eat any type, which then severely restricts the foods options and can be overwhelming. Limiting dairy with dairy, wheat, eggs, corn and soy allergies should consider non-GMO, natural, unprocessed organic food, since conventional and processed foods can contain always some corn and/or soy. Free-range, and hormone-free organic animal protein, including turkey, chicken, beef, buffalo and venison are the best choices for such people, as are non-starchy vegetables, low glycemic fruits (except for peanuts) and coconut and olive oil. While this diet may be difficult, but it is essential until the body, particularly the gut, has reached an acid-base balance of healing. The Paleo diet is often a good one to follow.

LV: You mention many different supplements in Beyond Lyme Disease, if you had to pick 5 of them that you could not live without, what would they be? CS: I could not live without my omega-3 essential fatty acids, Vitamin D, quercetin, trace minerals, and pantethic acid. Each of these nutrients is somewhat different; however, I believe that most people need these nutrients. The challenges need all of the above, in addition to other nutrients such as probiotics, digestive enzymes and Vitamin D.

LV: What advice would you give people so that their symptoms aren’t entirely due to tick borne illness do you rely on Zyto technology? CS: Besides reading this book, I would suggest consulting with a holistic doctor who is familiar with advanced testing techniques, such as a Zyto machine, along with lab tests and a clinical diagnosis to determine the cause of symptoms. Traditional lab tests should be performed for this purpose. I would also advise receiving treatment from an LDN doctor who thoroughly understands the issues in this book, as well as other factors that cause chronic ill- ness, since their symptoms are becoming ill as a result of the factors described in this book, because we live in a very toxic world where increasing levels of pathogens, environmental toxins and bad lifestyles are compromising the health of our bodies. Therefore, it’s important to consider multiple causes of illness when treating chronic illness involving Lyme disease.

LV: Yeast overgrowth is a common issue impacting Lyme patients. Can you explain how they can identify if they have yeast overgrowth? CS: Determining the difference between Lyme disease symptoms and yeast overgrowth symptoms may be difficult, since they often overlap with one another. In particular, people with Lyme, especially those on antibiotics, have yeast overgrowth, so it’s often important to treat both Lyme infections and the yeast. Lab tests are inadequate for determining both fungal and Lyme infections; doing a bioenergetic scan of the body using the Zyto machine or Applied Kinesiology can detect both types of infections, allowing the practitioner to determine which infections are more significant in each person’s picture, and how to treat them. Doing an empirical trial of treatment, either yeast or Lyme infections can also be useful.

LV: If a Lyme disease patient’s #1 symptom is chronic fatigue, which is waking up unrested from sleep, how can you identify what you do them both treatment wise and supplement wise? CS: This is difficult to answer, since chronic fatigue can be caused by many factors, including adrenal fatigue and hypothyroidism (which are commonly caused by infections and/or toxins), deficiencies in digestive enzymes and/or other abnormalities caused by toxins/infections, lack of rest, and an inflammatory function and insomnia. I have done a lot of research on adrenal fatigue and I personally believe that this is the number one cause or most common cause of day time fatigue for many people, especially if the fatigue is weight related. Therefore, I would generally recommend support the adrenal glands with nutrients, rest and lifestyle modifications (which are explained in Beyond Lyme Disease), as well as supporting the thyroid with thyroid gland supplements, supplemental thyroid hormones, or thyroid hormone precursors such as tyrosine. Taking nutrients to sleep is important for energy for people. I have found 5-HTP, melatonin, and proges- tern to be beneficial in this regard. I do-biode and COQo can help with cellular energy when the source of the fatigue is mitochondrial dysfunction.

LV: What do you think of the recent surge in the use of LDN (low dose norepinephrine) for Lyme disease patients? CS: I think that pharmacological remedies, when used appropriately, can be beneficial for short periods of time, when a person is in a crisis situation or the early stages of an illness, when strong and the person needs a lot of emergency support just to be able to function through the day. However, I believe in many pharmaceutical remedies, over the long term, can compromise the body’s natural healing and metabolic processes, and so should only be used for a short period of time, until the body has reached a stage whereby it can heal without medications. Therefore, I think LDN may be helpful, and even necessary for some people, until their immune systems are balanced enough to properly regulate inflammation without the use of medication.

LW: What do you think of the number one cause-or number two cause of so many cases of Lyme disease being infectious? CS: Yes, I believe that resolving emotional trauma is the number one cause of these cases, and all must heal the original trauma that caused the patient’s immune system to weaken in the first place. Do you think that is the most important factor in whether a patient can recover? Many people want to know if a traumatic emotional event can trigger Lyme, or cause a relapse.

LW: What do you think about Lyme and depression? The important point you have made is about emotional trauma and emotional stress. People that have a history of severe trauma and/or an immune system that was already prior to being infected by Lyme and other toxins. Emotional trauma that causes the body immune system to fight or flight, which, when prolonged, weakens immune function and causes the body to become susceptible to infections and toxins. The health of the body’s terrain is everything; when it is weakened by stress; infections can take root and grow like a foothold and cause symptoms. When the immune system is weak, and the inner terrain of the body is healthy, the body can more easily withstand environmental assaults.

The body’s pH is also strongly influenced by the immune system; it becomes acidic under conditions of stress, and microbes have been shown to be sus- ceptible to both inflammation, as well as stress. Therefore, I think it’s important to both reduce stress on the body and support the immune system to weaken in the first place. Do you think that is the most important factor in whether a patient can recover? Many people want to know if a traumatic emotional event can trigger Lyme, or cause a relapse.

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