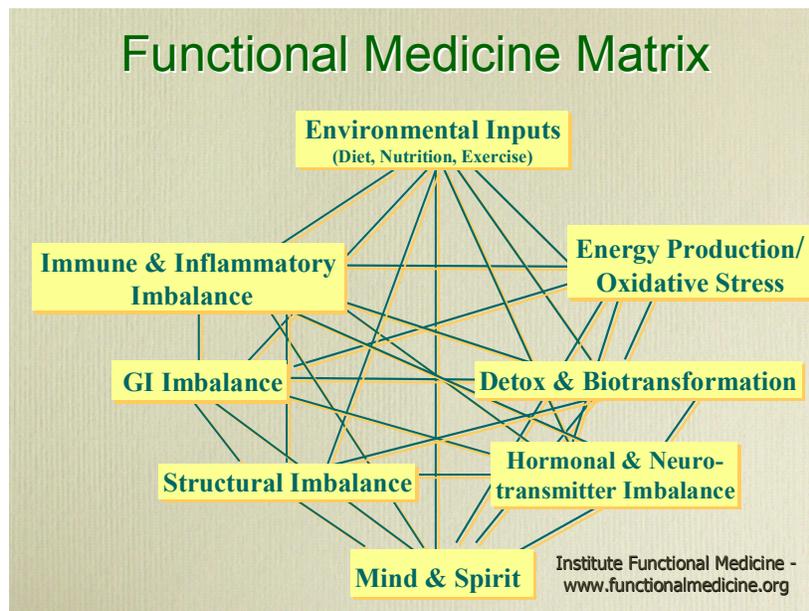


Lyme Disease – A Functional Medicine Approach
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“Lyme disease is the latest great imitator and should be considered in the differential diagnosis of MS, ALS, seizure and other neurological conditions, as well as arthritis, CFS, gulf war syndrome, ADHD, hypochondriasis, fibromyalgia, somatization disorder and patients with various difficult-to-diagnose multi-system syndromes”.¹

As Lyme disease spans across the entire body; encompassing all systems; an equally encompassing and individualized treatment path is required to recover health. Functional Medicine^{2,3} is a comprehensive, individualized approach focusing on the interrelated function of the whole person rather than a disease-treatment focus. In my practice, functional medicine provides the context within which to fully address the needs of my chronically ill patients. The body is encouraged to heal by relieving the system of stresses and dysfunction at a cellular level.

The attached diagram, Functional Medicine Matrix, identifies the components of a treatment approach emphasizing the recovery of healthy function of the body to combat the disease. It is important to recognize in the treatment of Lyme disease that all systems are interconnected. What appears to be an overwhelming treatment task can be sorted out and points of dysfunction addressed to free the body to heal as described in the Functional Medicine Matrix.



The following discussion will illustrate the application of each of the areas of the Functional Medicine Matrix beginning at the top of the Matrix and proceeding clockwise. Emphasis will be placed on how each area influences the personalized treatment of a Lyme patient and how understanding the integration of the Matrix influences outcome.

Environmental inputs include balanced nutrition coupled with regular exercise. Moderate exercise impacts the disease process by influencing gene expression, which leads to changing how the body's internal terrain responds. Exercise increases circulation and lymphatic flow throughout the body, thereby decreasing the collection of toxins which can further damage the cells. In a similar way, a lack of exercise results in gene expression which may trigger disease and increase toxicity and ineffective overall body function. Moderate exercise is the body in motion such as daily walks, swimming or rebounding to tolerance.

Hippocrates' famous injunction to "let food be thy medicine" is conversely evident today as industrialized food invokes disease. Simply, we are what we eat. Industrialized foods are the Standard American Diet (SAD diet) comprised of processed simple carbohydrates (white flour and sugar) stripped of nutrients with added artificial flavors, dyes, hormones and chemical preservatives. In the same manner that genetically modified and hormone- and/or antibiotic-laced feed grain increases fat disposition in animals, so too, the consumption of refined grains laden with chemicals increases fat deposition in humans. Most people are unaware that a cup of pasta, which is quickly converted to glucose, is equivalent to the insulin impact of a Snickers® candy bar.

In earlier decades we had no choice about the source of our food. Supermarket shelves offered only industrialized or chemically-treated foods, proclaiming the scientific benefits of enriched, synthesized nutrients. After all, Tang® must be better than oranges; it's the drink of astronauts.

Gratefully, today we have the means to obtain foods that can be our medicine. Farmer's markets are ubiquitous and there are organic food sections in the supermarkets. People have a greater interest in diets that reflect healthier, nutrient-rich, whole foods balancing complex carbohydrates (fresh vegetables and fruits) and proteins derived from sources free of hormones, antibiotics and preservatives. Examples include the Mediterranean diet, the Zone diet, the DASH diet, and the South Beach diet. Benefits of eliminating attractively packaged, bleached white, unnatural foods are documented to contribute to the proper management of cancer, obesity, autoimmune disease, diabetes and cardiovascular disease.

Food is important to achieving health because food communicates a biological response through the signaling system of our genes. Does your food send dysfunctional or health-promoting messages that calm inflammation, strengthen the detoxification process, provide nutrients for effective metabolism, increase usable energy and influence the proper secretion of the hormones? Laboratory tests are available to determine the various balances and imbalances, including nutrient insufficiencies as measured by the cellular incorporation of the nutrients and not simply blood concentration values. Also, some clinicians successfully use other means of identifying nutritional stresses, such as applied kinesiology or Electro Dermal Screening (EDS).

A proper diet can be far-reaching in preventing DNA damage, remedying genetic errors in metabolism caused by enzyme deficiency, providing the building materials for rejuvenation, and decreasing the cellular decay caused by oxidative stress.

Although it is impossible to recover and maintain health without nutritional balance; dietary and lifestyle change can be the most resisted form of treatment for all patients, including those with Lyme disease. The use of supplements is only a small part in achieving nutritional balance. As reflected in the Matrix, there is an interconnection among diet, nutrition, and all of the associated systems. Conversely, all of the other systems have a direct impact in achieving proper nutrition. For example, imbalance of the gastrointestinal (GI) tract is counterproductive to nutrition's ability to make a contribution to health.

Further complicating the care of the Lyme patient is an increase of food and environmental sensitivities, largely due to the disruption of the immune system. These acquired sensitivities cause inflammation of the GI tract, decreasing the permeability of nutrients. This increase in inflammation can also produce an increase in antibodies, affecting the immunological system, as large protein molecules leak through the walls of the intestine to the gut-associated lymphoid tissue (GALT). In turn the adrenal glands are over-stimulated to produce more cortisol to overcome the inflammation, which subsequently starts a cascade of hormonal responses resulting in psychological changes and increases the struggle to get better. Thus giving a glimpse of the panoramic view of how illness affects the function of the whole body.

Energy production and oxidative stress is the next step as we move clockwise around the Functional Medical Matrix. "I am so discouraged because I am so tired all the time. I can hardly find the energy to do the simplest things." Many of my patients with Lyme disease make this complaint. Managing the byproducts of energy production – oxidative stress, antioxidant defense and repair of oxidative damage- can restore energy and promote healing.

The conversion of nutrients into energy is accomplished by oxidation. The cells of our bodies can be likened to a mini-nuclear reactor producing energy via oxidation. Like a nuclear reactor, the body needs to contain the energy production and byproducts to prevent harm to itself and repair to the cells where containment of the reaction failed. Lethargy and fatigue are expressions of decreased energy production and a decrease in this oxidative containment, causing increased oxidative stress.

Fatigue is the most noticeable symptom of low energy production and high levels of oxidative stress. Contributing to this imbalance are insufficient detoxification and immunological response.

Returning to nutritional habits, oxidative stress is increased by an abundance of glucose, (conversion of simple carbohydrates) and leads to decreased immunological response. It can also lead to insulin resistance, which can extend into Syndrome X or metabolic syndrome. Syndrome X includes a combination of elevated cholesterol, elevated blood pressure, increase in girth of waistline and diabetes. Improper glycemic control is also a contributing factor for polycystic ovarian disease (PCOS), and a marked increase in adolescent obesity. These circumstances directly cause more inflammation, leading to increased infection, which can be debilitating for a Lyme patient.

Laboratory measurements are available to assess the levels of oxidative stress, including the resulting DNA damage and toxicities. These values are then used as markers to evaluate the improvement of the condition based on interventions to reduce oxidative stress and improve immunological response. Toxicities are stored chemicals in the body that decrease the efficacy of energy production.

Detoxification and Biotransformation, the next step on the Functional Medicine Matrix, increase energy production by freeing up resources needed to make energy. Add in hormonal balancing with a proper thyroid function, enhancing overall metabolism of the body, and energy production is increased while fatigue is decreased. Next add in the proper use of antioxidants, either from a food or supplemental source, and oxidative damage decreases while energy increases.

Detoxification is the metabolic process of the body, facilitated by enzymes, which changes toxins into less toxic or more readily removable substances. Biotransformation is the body's use of enzymes to cause a series of chemical alterations to a compound, especially a drug, rendering a different compound from the medication taken. The processing of medications and that of toxins by the body is very similar. The key to detoxification and biotransformation is the presence of specific enzymes in sufficient quantity to permit the chemical change.

If there are insufficient enzymes to allow proper detoxification, the result is increased toxicities, which increase cellular damage. This is best illustrated by Parkinson's disease which has increased by 70% from the use of pesticides and herbicides. These toxins are similar to the side-effects of medication. If the process of biotransformation is deficient or absent due to missing enzymes, the result can be undesirable drug side-effects and signs of toxicity.

This variation in enzymes is seated in the genetic structure of the DNA. Extensive work on genetic coding has given insight into the duality of genetic expression. The internal environment is the terrain of the body's composition. In brief, the DNA will switch on and off to form different messengers conveying information throughout the body. A person can have a balanced and healthy internal environment or could be nutritionally deficient and have an inflamed internal environment. The patient controls the internal environment.

A good illustration of the impact of the internal environment is the birth defect of spina bifida, a birth abnormality in which the spine is malformed and lacks its usual protective skeletal and soft tissue coverings. The risk of developing this devastating defect is greatly reduced by improving levels of folic acid, a B vitamin, prior to conception. This deficiency of folic acid does not affect all pregnant women the same way; further illustrating the individuality of genetic expression.

Knowing that (1) specific enzymes are the key to detoxification, (2) enzymes are turned off and on by the genetic coding of the DNA, and (3) DNA expression could be altered by inputs to the internal environment, then it follows that (4) detoxification is greatly dependent on how we manage our internal environment.

Toxic Load is the sum total of the accumulation of chemicals or molecules that are foreign to our biological systems. Toxins may originate externally from toxic chemicals in the environment, as in mercury and petrochemical products and/or they may originate internally from foods we eat or medications or supplements we take.

The means to invigorate the detoxification pathways is begun by a laboratory evaluation of Phase I and Phase II of the liver detoxification profile. This information, coupled with the individual's genetic coding for detoxification and biotransformation, gives the road map to reducing the toxic load and increasing the detoxification process.

As represented in the Functional Medicine Matrix, detoxification and oxidative stress are closely coupled. The improvement of one usually leads to the improvement of the other. The management of the internal environment by proper diet and nutrition greatly influences the genetic DNA signaling. Yet the interconnection of the remainder of the Matrix also plays a part. For instance, when there is an imbalance of intestinal flora (causing bloating, Candida or Leaky Gut Syndrome), the GI tract may increase the toxic load by absorbing toxins from other living organisms throughout our bodies.

Hormonal and neurotransmitter imbalance is an indicator of the endocrine system which is a body control system that maintains a stable internal environment by producing chemical regulatory substances called hormones and neurotransmitters (brain chemistry). The endocrine system responds either through a sensory input via the brain or through direct environmental and food exposures. The environmental exposure is mediated by the immune and digestive systems. The dynamic interplay of all the factors included in the Functional Medicine Matrix gives rise to balance or imbalance of the endocrine system, signaling the synthesis and secretion of the messenger chemicals to cells throughout the body.

Balance and imbalance are relative terms for positive and negative sensory information. A positive sensory response promotes growth and reproduction. This is complimented with energy, a vibrant immune system and vitality. Positive sensory response is associated with balanced levels of the hormone insulin, which has an anabolic or building effect by interacting with other minor anabolic hormones like growth hormone, thyroid, estrogen, testosterone and DHEA. A negative sensory response leads to avoidance and contractural response. The body shows signs of shutting down with decrease in growth and reproduction combined with depression and immune suppression. A negative sensory response is also associated with the hormones of cortisol and adrenaline, which lead to a stress adaptation and body response.

The hormonal signaling system affects all body functions, from glucose metabolism to inflammation and cognitive capacity. All of the hormones work together to create a symphony of health. It requires investigation to determine the reason for endocrine disharmony. The simple replacement of hormones without consideration of this process can result in an imbalance which creates new clinical risks and complications. A laboratory and clinical understanding of the individual situation is paramount in proper treatment. Determining individual hormonal modulations; investigation of the sensitivity of the cells to hormone messages, availability of transport binding proteins and capacity of detoxification at the receptor sites are factors to be considered in safely restoring

hormonal harmony. Follow-up evaluation is also required to respond to individual changes over time.

A balanced endocrine symphony supports the function of every body system. Of particular impact for the Lyme patient is the interplay of the adrenal and thyroid glands although all endocrine instruments must be considered. If one is out of tune, all are affected.

Mind and spirit play an integral role in physical health. “Even the greatest skeptic must now admit that a wealth of evidence exists to prove in the most stringent scientific terms that the functions of the mind do influence the health of the body and that sickness in the body can affect our moods and emotions through molecules and nerve pathways”⁴

Mind and spirit are paramount in overcoming cancer as well as overcoming Lyme disease. Functional Medicine recognizes the influence of emotional and spiritual health on all other aspects of the Matrix.

Groundbreaking work published in 1993 by neuroscientist Candace Pert, MD, identified the physical, molecular expression of these intangible aspects of health. “We must take responsibility for the way we feel. The notion that others can make us feel good or bad is untrue... Why we feel the way we do is the result of the symphony and harmony of our own molecules of emotion that affect every aspect of our physiology.”⁵

Our mind and spirit affect our emotions, directly impacting stress mediators of functional health as seen in the suppression of the immune system and elevation of cortisol and brain aging in combination with memory impairment, central obesity and increase in inflammatory cytokines within the brain.

A popular artist, Sally Hass, conveys this point in one of her works. “Attitude is everything, pick a good one.” How one achieves the balance of mind and spirit is as unique to each individual as his/her DNA. The essential significance to recovery and maintaining health is to recognize and attend to this aspect along with all other aspects of the Matrix.

Structural imbalance is a crucial consideration in Lyme disease as it can be destructive to the muscular skeletal system. Migratory muscular skeletal pain is usually one of the first heralding symptoms of Lyme disease. Sometimes this is further complicated by an autoimmune presentation diagnosed as rheumatoid arthritis (RA). RA is one of the common look-alike diagnoses of Lyme disease. When the Lyme disease is properly addressed, some of those with a rheumatoid arthritis diagnosis will undergo a degree of remission dependent on the degree of joint destruction.

In keeping with the confusion and complexity of Lyme, a group of individuals may experience a continuation of autoimmune disease typical of rheumatoid arthritis demonstrated both clinically and in laboratory testing following treatment of the Lyme disease. The dual diagnosis individuals require particular attention to decreasing as many inflammatory factors as possible while treating and watching the clinical presentation. A medication-only route to reducing inflammation can also suppress the immune system.

The Functional Medicine approach addresses the reduction of inflammation with the possibility of reducing the use of anti-inflammatory medications.

Increasing joint and muscle discomfort leads to increased structural compensations and improper use of muscle groups contributing to further destabilization and possible injury. The accompanied chronic pain also develops a neurogenic inflammation developing a chronic fatigue or fibromyalgia profile.

Substantial implication exists to indicate that inflammatory joint disease is directly related to inflammatory bowel disease as suggested by the following quotations from journals of rheumatology:

“In ankylosing spondylitis the incidence of gut inflammation was significantly higher ... These findings provide further arguments... joints disease is triggered through the gut.”⁶

“The arthritis also resolved promptly, suggesting that it was associated with the bowel disorder.”⁷

Conversely, resolution of inflammation of the bowel leads to resolution of joint inflammation.

Gastrointestinal imbalance is evident in a defect of absorptive and digestive function based primarily on an imbalance of the intestinal flora with mucosal integrity.

A breakdown in the mucosal integrity results in decreased nutrient uptake and activation of the immune system known as the gut-associated lymphoid tissue (GALT), representing 70% of the immune system and mucosa-associated lymphoid tissue (MALT). There is significant documentation in the medical literature of the association between the gut-liver-immune function. For instance, “An elevated prevalence of clinical and subclinical autoimmune thyroid autoimmunity was found in Sardinian celiac patients”.⁸

A Functional Medicine method to strengthen the gut is the “4R Program.”

- REMOVE any causation agents of intestinal distress; (this includes food allergies and sensitivities, antigens, pathogens and parasites);
- REPLACE the necessary enzymes for digestion; and
- REINOCULATE the bowel with friendly intestinal pre- and probiotics; followed by
- REPAIR of the gut mucosal integrity nutrients.

Dr Jeffery Bland comments, “Basic science and clinical observation indicate significant signals that control function are being sent from the gut as it is exposed to the products of food and microbiological activity. The gut translates the message it receives and sends it on to the rest of the body through the release of various mediators that influence receptor sites on tissues very distant from the gut. The influence can be associated with diseases ranging from dementia to cardiovascular disease, liver disease and behavior disorders in childhood, potentially even autism”.⁹

One of the cornerstones of Lyme disease treatment is aggressive antibiotic therapy, further disrupting the balance of the GI tract resulting in an overgrowth of Candida. Candida can become a chronic condition, making its own destructive contribution to systemic health. Dietary changes to discourage Candida growth along with the 4R program can rebalance a disrupted GI balance.

Restoring GI balance has particular significance on the efficacy of nutritional therapy and the immune system. Immunological response and reduction of any other inflammatory factor will improve the chances of overcoming the immunological attack by Lyme disease.

The immune and inflammatory imbalance is at the forefront of the characteristics of Lyme disease. Comprehensively addressing the preceding aspects of the Matrix culminates in supporting the function of the immune system at the cellular level.

Optimizing diet, nutrition and exercise; increasing energy production and reducing oxidative stress; use of detoxification protocols, rebalancing hormones and neurotransmitters; attending to the mind and spirit; incorporating structural therapies; optimizing the GI environment equals reduction of the total stress load of the body allowing the immune system to respond to the invader, the Lyme disease complex.

The most current thought on how the immunological system interacts with Lyme is discussed by Dr Raphael Stricker in the article “Lyme disease: point/counterpoint”¹⁰.

Conclusion

In closing, there is not and never will be a medication that can surpass a person’s individual DNA makeup to overcome disease and promote health. The key lies in the ability to efficiently express the DNA code that lies within us, to redirect any misalignment that causes illness through enhancing the functionality of the internal environment.

When we consider all that affects our health; the task to recovering health appears insurmountable at first. However, the Functional Medicine Matrix provides a practical road map to recovery. Working clockwise from the top of the Matrix, rediscover your health in partnership with a functional medicine practitioner.

Dr. Muran practices functional medicine in partnership with his wife, Sandy Muran, Clinical Nutritionist, at the Longevity Healthcare Center for New Medicine in San Luis Obispo, CA. Visit his website: www.longevityhealthcarecenter.com.

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