Mold and Mycotoxins: Often Overlooked Factors in Chronic Lyme Disease

by Scott Forsgren with Neil Nathan, MD, and Wayne Anderson, ND

'Lyme' Is More than Lyme Alone

In the recently released book *Why Can't I Get Better? Solving the Mystery of Lyme and Chronic Disease,* by Richard I. Horowitz, MD, a compelling argument is made that there is much more to chronic Lyme disease than Lyme alone. In fact, Horowitz unveils his "16-Point Differential Diagnostic Map," which suggests numerous "nails" in the foot that must be explored in order to regain wellness. He further expands the concept of "chronic Lyme disease" by suggesting MSIDS, or multiple systemic infectious disease syndrome, as a more encompassing term for the multiple underlying factors involved in chronic illness.

Exposure to mold in this water-damaged apartment in Miami, Florida, was the beginning of one young woman's long struggle with chronic illness. Most of the time, molds are not this readily visible, but they can be equally damaging to the genetically susceptible who are exposed.

In my personal experience recovering from Lyme disease after a tick bite in 1996 in Northern California, the journey has been one of uncovering many stones and addressing numerous layers of issues that were affecting my health. While borrelia, bartonella, babesia, ehrlichia, and many other microbial factors did play a role, it was not until I read the book *Mold Warriors,* by Ritchie C. Shoemaker, MD, in 2006 that I considered the possibility of mold as another key part of the systemic body burden that had without my awareness made me ill for so many years.

Upon further evaluation, it was determined that I had been living in an apartment for nearly 10 years that was contaminated with numerous molds, including *Stachybotrys*, better known as "toxic black mold." Removing myself from this constant, daily exposure to an environment that was not conducive to my recovery was an important step to take. Moving to a safer setting was one of the best things that I did as part of my journey back to health. I do not think I would be where I am today if I had not discovered and addressed this ongoing, toxic environmental factor that was contributing to my then poor state of health.

The connection between those struggling with chronic Lyme disease and ongoing exposure to toxic molds and mycotoxins is quite clear. Dr. Wayne Anderson has found that exposure to Lyme disease can make one more susceptible to mold illness, and vice versa; exposure to mold can make one more susceptible to Lyme disease. Both have the potential to affect the immune system and make the other more difficult to treat.

Dr. Neil Nathan has found mold toxicity to be a big piece of the puzzle in a very significant portion of patients with chronic Lyme disease. Lisa Nagy, MD, has suggested that many Lyme patients have a damaged

immune system resulting from mold or pesticide exposures and that a focus on Lyme and coinfections may not always be the right focus.

One of the downsides of "chronic Lyme disease" is that Lyme often becomes the focus of treatment, when in fact it may not be the dominant stressor that the body is burdened by. The intent behind this article is to suggest a more expanded view of chronic Lyme disease and to consider that both environmental exposures to toxic molds and the production of mycotoxins resulting from fungal colonization in the body can be significant issues in terms of symptom presentation, as well as both the severity and duration of the illness.

What Are Molds and Mycotoxins?

Mold and yeast are both different types of fungi. Molds are multicellular fungi and grow in filamentous hyphae, or long threadlike branches. They produce airborne spores and are often quite colorful. In nature, molds are the recyclers of organic waste. While they are closer to plants than animals, they cannot undergo photosynthesis and thus rely on organic matter for nutrition. They reproduce using both sexual and asexual methods.

Yeasts are single-celled microscopic fungi that are round or oval in shape and are generally colorless in appearance. They reproduce asexually via mitosis or budding. Yeasts are often used in fermentation of alcoholic beverages such as wine and beer and as well as in baking. Some yeasts, such as *Candida albicans*, can be opportunistic infections in humans.

Mycotoxins are toxic chemicals produced by both molds and yeasts. They are believed to be used by fungal organisms as a protective mechanism, as a way to stake out their territory, and to allow for further proliferation of the fungi. Additionally, within a host, they may be used by the fungi to weaken host defenses in support of persistence of the fungal organisms.

The environment in which the fungi live may be directly correlated to the output of mycotoxins. The more threatened the fungi are by the surrounding environment, the more they may utilize mycotoxin production as a protective weapon. Mycotoxins are not essential for the fungi to maintain their existence, but they do provide a competitive advantage. In some cases, humans get caught in the crossfire.

Mycotoxins in the body may be the result of external exposure to molds or internal, colonizing fungal organisms. They are generally found intracellularly and may be stored in body fat, myelin, tissues, organs, and other body sites.

While there are hundreds of different mycotoxins that have been discovered, some of the more common ones include aflatoxin, ochratoxin, citrinin, ergot alkaloids, patulin, fumonisin, trichothecene, and zearalenone. The focus of this article will be on aflatoxin, ochratoxin A, and trichothecene, given that these can be readily measured via laboratory testing performed on a urine sample, providing a useful tool for practitioners working with patients with mold-associated illnesses.

Ongoing mold and mycotoxin exposure can be a very serious issue, creating illness in the genetically susceptible. Sadly, the importance of evaluating for the potential of mold illness and taking appropriate corrective actions is often overlooked by many practitioners and patients alike.

Shoemaker's Mold Contributions

Shoemaker deserves tremendous credit for being the voice that brought mold illness to our awareness. His "biotoxin pathway" and treatment protocol have been instrumental pieces of the puzzle for many struggling with chronic biotoxin illness. Biotoxins are toxins created by living organisms. Mycotoxins are a subset of biotoxins and are produced by fungal organisms.

Visual contrast sensitivity (VCS) testing is often a very useful biotoxin screening tool that can be performed online. Mycometrics ERMI (Environmental Relative Moldiness Index) is arguably one of the best evaluation tools for the presence of mold in an indoor environment. Numerous lab tests were brought to our attention by Shoemaker's work including HLA testing, which looks for genetic predispositions to various biotoxin illnesses, and markers such as TGF-β1, C4a, C3a, MSH, VIP, VEGF, and MMP-9. The information that a trained practitioner can ascertain from the results of these tests is significant in the work to guide a biotoxin-illness patient back to a higher level of health.

Cholestyramine is used in many with Lyme disease and mold illness as a direct result of Shoemaker's discoveries. Losartan, VIP nasal spray, and other useful therapeutic options have been introduced to biotoxin-illness sufferers through his work.

Shoemaker's approach has benefited and will continue to benefit many suffering with otherwise unexplained illnesses. No article on the topic of mold illness would be complete without a mention of his important contributions, and while not the focus of this article, his work has been life changing for many, myself included. More information about his protocol, his books (*Mold Warriors,* 2005; *Surviving Mold,* 2010), and the recently introduced doctor certification program can be found on his website. Several integrative practitioners now incorporate a combination of the Shoemaker Protocol with several of the other options discussed in this article.

Mold and Mycotoxin Symptoms and Associated Conditions

Symptoms produced in humans as a result of mold and mycotoxin exposure are widely varied and may range from no response or simple allergy to cancer or even death.

"Symptoms can be caused by mold allergy, mold colonization (or infection), or mold toxicity, or a

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combination of these," said Nathan. "Until Shoemaker raised awareness around the toxicity component, we had focused exclusively on allergy and infection. It is the understanding that mold toxicity, with its marked, uncontrolled outpouring of inflammatory cytokines, produces the same wide array of unusual symptoms that we see in Lyme disease and its coinfections that has dramatically improved our ability to diagnose and treat a large subset of patients that had been previously struggling to get better."

The symptoms may depend on the types of molds and mycotoxins, the duration of the exposure, and the overall health of the exposed person. Mycotoxins damage the immune system and may make one more sensitive to bacterial endotoxins found on the outer membrane of bacterial cell walls. With an increased sensitivity, the body's response to *Borrelia burgdorferi*, the causative agent of Lyme disease, and coinfections may be heightened and lead to a further exacerbation of overall symptoms.

Mycotoxins can cause coughing, wheezing, asthma, shortness of breath, sneezing, burning in the throat and lungs, and sinusitis. Memory loss, confusion, brain fog, and cognitive impairment may present. Vision problems, eye irritation, headaches, swollen lymph nodes, ringing in the ears, dizziness, hearing loss, fatigue, muscle weakness, multiple chemical sensitivities, joint pain, muscle pain, irregular heartbeat, seizures, depression, anxiety, irritability, psoriasis, skin irritation, fever, chills, sleep disorders, coagulation abnormalities, and numerous other symptoms have all been associated with mycotoxin exposures.

According to Dr. Joseph Brewer at the 2013 ILADS (International Lyme and Associated Diseases Society) annual meeting, mycotoxins bind to DNA and RNA, alter protein synthesis, increase oxidative stress, deplete antioxidants, alter cell membrane function, act as potent mitochondrial toxins, and alter apoptosis.

Molds and their mycotoxins may negatively affect the endocrine system, including sex hormones, thyroid function, and adrenal function. Mold exposure may lead to food allergies and chemical sensitivity. In some cases, POTS (postural orthostatic tachycardia syndrome) may be mold induced.

Fibromyalgia and chronic fatigue syndrome (CFS) have both been associated with mycotoxin exposure. Other conditions that may have a mycotoxin component include various cancers, diabetes, atherosclerosis, cardiovascular disease, hypertension, autism, rheumatoid arthritis, hyperlipidemia (elevated cholesterol), inflammatory bowel disease, lupus, Sjögren's syndrome, Crohn's disease, multiple sclerosis, Alzheimer's disease, Raynaud's disease, kidney stones, and vasculitis.

It has been suggested that elevated cholesterol may be a protective mechanism of the body as a response to mycotoxin exposure. Statin drugs have antifungal properties, and one of the mechanisms through which they may help to lower cholesterol is through the reduction of mycotoxins as systemic fungal populations are reduced.

In those with chronic Lyme disease, it is difficult to separate the symptoms associated with mold and mycotoxin exposure from those associated with Lyme disease or even with heavy metal toxicity. The overlap is significant, and as a result, all of these items must be explored as symptoms believed to be associated with Lyme disease may not be entirely the result of Lyme itself.

Mold and Mycotoxin Testing

The evaluation and treatment of mold- and mycotoxin-related illnesses has garnered attention from doctors who treat patients with chronic Lyme disease. New and evolving options for practitioners to diagnose and treat their patients have emerged over the past several years.

As an initial screening option, mold plate testing can be helpful in providing someone with visible proof that there may be an issue in the living environment. Mold plates are often available at local hardware stores or can be purchased through companies such as Tennessee Mold Consultants, Immunolytics, or EMLab P&K.

The Mycometrics ERMI has been a highly valuable tool for many practitioners and patients alike in evaluating the potential of ongoing mold exposure in the indoor environment. Several labs perform ERMI testing, but Shoemaker's work is based on the ERMI performed by Mycometrics. It analyzes a collected dust sample for the presence of molds associated with water-damaged buildings using quantitative PCR and compares these values with other common indoor molds to determine the ERMI score. The score is then evaluated to determine if the living environment is likely safe and conducive to one's recovery. If one has a mold-susceptible HLA DR type (discussed later), an ERMI score below 2 is generally desired. A more recent test called HERTSMI-2 is available from Mycometrics that is less extensive but may be helpful to determine if a previously contaminated environment is safe for one to reenter after remediation.

Air sample tests can be used when looking for molds, but Shoemaker has been very clear that these are of limited value. Air samples represent a snapshot in time and do not show the complete picture. It is not uncommon for air sample testing to return negative results in the same environment where an ERMI is highly positive. 99% of the toxic substances in a water-damaged building are carried by mold fragments too small to be detected by air testing or mold plates.

Stachybotrys is the most famous of the pathogenic molds. This "toxic

black mold" produces a mycotoxin called trichothecene. *Stachybotrys* is rarely found outdoors. Given that it is not readily airborne, air sampling is generally not an effective tool for this particular mold; thus dust sample testing using the ERMI may be a better option.

While mold plates and ERMI testing are often helpful options for evaluating the indoor environment for the presence of mold, they do not consider the people living in the environment and whether they are affected.

Antibody testing for various molds can be performed. ALCAT offers a Molds Panel that looks for intolerances and sensitivities to about 20 different molds using a blood test. Nagy has discussed Alletess Medical Laboratory for IgG antibody testing to various molds. When these tests are positive, this could be explained by allergy or sensitivity response to exposures in the environment or could also potentially be the result of a colonization of fungal organisms in the body that the immune system is responding to.

RealTime Laboratories in Carrollton, Texas, introduced a panel in 2006 that evaluates a patient's urine for the presence of three different mycotoxins: aflatoxin, ochratoxin A, and trichothecene. This represents an exciting option for evaluating the mycotoxin burden in a patient. This will be discussed later in this article.

Recent Mold and Mycotoxin Publications

In April 2013, Brewer published "Detection of Mycotoxins in Patients with Chronic Fatigue Syndrome" in *Toxins*. The study looked at the CFS, or myalgic encephalomyelitis (ME), population to determine if there might be a connection between the condition and mycotoxin exposure from water-damaged buildings. Healthy controls with no known toxic mold exposures were compared with those with CFS/ME. Urine samples were evaluated for the presence of aflatoxin, ochratoxin A, and trichothecene. Of 112 samples assayed, 104 (93%) revealed the presence of at least one of the three mycotoxins. The most commonly identified was ochratoxin A (83%) followed by trichothecene (44%) and then the combination of ochratoxin A and trichothecene (23%). None of these were observed in the population of 55 healthy controls. Testing of the environment in many of the CFS patients revealed mold and mycotoxin exposure. The conclusion of the study was that mycotoxins could be a cause of mitochondrial dysfunction in the CFS population, which may explain fatigue and other symptoms.

A second publication titled "Chronic Illness Associated with Mold and Mycotoxins: Is Naso-Sinus Fungal Biofilm the Culprit?" was published in *Toxins* in December 2013 by the same lead author. This publication built on the earlier work by looking at potential sources of ongoing mycotoxin exposures that may be involved in chronic illness. It suggested that the sinuses were the most likely colonizing site for molds, leading to the ongoing production of internal mycotoxins. Essentially, once molds colonize in the body, even if one is removed from the environment where water damage may have led to ongoing mold and mycotoxin exposure, mycotoxins are produced internally, which serves as a constant source of additional toxic body burden. It is as if there is a mycotoxin factory open for business 24 hours a day, 7 days a week, with the end result being a toxic, polluted body.

It has been known for some time that people with chronic rhinosinusitis harbor numerous fungal organisms. Of the fungal organisms that have been observed such as *Aspergillus*, *Chaetomium*, *Fusarium*, *Penicillium*, and *Trichoderma*, many of these have the potential to produce mycotoxins. The publication notes that in one study, both those with sinusitis and controls had equal prevalence of fungal organisms and that essentially everyone has nasal fungi. However, mycotoxins were not found in nasal washing from healthy controls, though they were in those previously exposed to a moldy environment.

Fortunately, the publication continues to suggest approaches that have resulted in protocols which attempt to resolve the ongoing fungal organisms that may be at the core of the ongoing mycotoxin burden. Amphotericin B has been used intranasally with observed clinical improvements, and oral antifungals are often used concurrently. Intranasal therapy must also consider the likely presence of biofilms that protect the mycotoxin-producing organisms from antifungal therapies. In one study of 25 people with evidence of urinary mycotoxins, 90% had dramatic decreases in symptoms with targeted treatment.

As with many antimicrobial therapies, it has become more and more evident that the role of biofilms must be considered in order to maximize the therapeutic benefits. This polysaccharide sludge layer protects the organisms that live within it. Different types of organisms, such as fungi and bacteria, form a community within the biofilm that conveys considerable protection to these organisms and reduces the amount of an antimicrobial agent that actually makes it to the intended target. Biofilms make chronic infection more possible and treatment strategies more difficult. NAC and EDTA were mentioned in the article as potential tools for disrupting the biofilm layer, thus making the fungal organisms more susceptible to antifungal therapies.

At the ILADS 2013 annual meeting, Brewer shared that CSF consists of immune dysregulation, abnormal cytokine profiles, autoimmunity, and immune deficiency. Cognitive issues, central nervous system issues, endocrine abnormalities, oxidative stress, and mitochondrial dysfunction are common hallmarks of CFS. The

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overlap between the key issues in CFS and those that can be attributed to mycotoxins is notable.

Genetic Predisposition to Mold and Mycotoxin Illness

Practitioners such as Nathan and Anderson integrate the best of the Shoemaker Protocol with the recent findings by Brewer and their own clinical experience into a "best of all worlds" integrative approach.

Anderson has said many times that if he could only run one test, the HLA DR panel would be the one that he would choose because it provides him the most useful information from any single test. HLA stands for human leukocyte antigen and is found on the 6th chromosome; they are immune response genes involved in immune system recognition of an antigen. With the HLA DR results, one can look at the various combinations, which Shoemaker has identified and published, to determine if a patient is more likely to have a biotoxin illness from mold, Lyme disease, or other sources of biotoxins.

The degree to which one is made ill by mold and mycotoxins has been associated with one's genetic predisposition. In the overall population, the inability to adequately recognize and excrete mold toxins is about 25%. However, in those with chronic illness, this number is much higher.

When one's immune system cannot recognize and tag a biotoxin, the body is unable to effectively identify and remove that toxin from the system. Mycotoxins may be excreted via the kidneys into the urine or via the liver and bile into the feces. Further, enterohepatic recirculation of toxins is a common problem. As toxins are released in the bile and move through the gastrointestinal system, they are reabsorbed rather than excreted, as they are not recognized as harmful by the body. As a result, a person becomes and remains highly toxic unless the practitioner intervenes with an appropriate treatment protocol.

Not all people with chronic mold- and mycotoxin-associated illness will test positively with the RealTime Laboratories mycotoxin panel. There may be cases in which it is very clear that the person has an issue with mold, but the test may not identify mycotoxins. This is not to suggest that the test is not of value, but rather that the practitioner needs to know how to prepare the patient to optimize the results. In patients with an HLA DR type associated with mold biotoxin illness, Anderson has found an association with their compromised ability to excrete mycotoxins via the urine. More specifically, some patients need to have their urine tested after a sauna session, which can mobilize mold toxins, or a challenge test with glutathione to demonstrate that they do indeed have a high level of mycotoxins in their system. These patients require a treatment protocol that supports the excretion of mycotoxins in order to optimize the test results.

Everyone has two HLA alleles, one from the father and one from the mother. Four combinations are known to be the primary mold-susceptible types (7-2/3-53, 13-6-52 A/B/C, 17-2-52A, 18-4-52A). Anderson has found that when only one of the alleles has a primary mold-susceptible pattern, there may be a milder illness presentation associated with the mold and mycotoxin issues. This does not mean that the person won't have issues with ongoing mold exposure, but the treatment itself is often easier and the immune system often responds more appropriately when the body is dealing with this layer of the illness.

In contrast, a person with two mold-susceptible alleles will generally present with a more significant illness. They will be more likely to have a higher burden of intracellular mycotoxins. Until the detoxification systems are supported and working more effectively, these toxins may remain stuck inside the cells and thus may not be present when one is attempting to identify mycotoxins in the urine. Anderson has found that the more one's genetic predisposition is toward mold-associated biotoxin illness, the more additional detoxification support will be needed; further, more aggressive antifungal therapies may be needed to treat any molds that may be colonizing the body. He has observed that the likelihood of colonization and how deeply inngrained in the system the mold issue may be can also depend on how susceptible the person is to mold-related illness based on genetic predisposition.

In those with a single allele defect, the colonizing molds will attempt to grab and expand their territory in the body, but the immune system can still control this expansion somewhat and the surface area affected will be mild to moderate. In those with a double allele defect, meaning that both HLA DR patterns are mold susceptible, there is often much more significant colonization. These same people often had more frequent ear infections as children, developed asthma as teenagers, experience irritable bowel syndrome with bloating and gas, and have sinus infections. Females may have more common vaginal yeast infections and a higher propensity toward interstitial cystitis. There is far less ability for the body to respond to colonizing molds and to detoxify from their mycotoxins when a double allele defect is present.

Anderson's observation has been that those with a single mold-associated allele are often more easily treated for colonization. The treatment is more difficult than in a person with no mold-associated defects, but far easier than in a person with a double mold allele defect. In those with a double defect, a significant focus on detoxification is critical.

Beyond mold-susceptible or borrelia-susceptible HLA DR types, there are the multisusceptible HLA DR types (4-3-53, 11/12-3-52B, 14-

5-53B). With respect to the mold component of the illness, Anderson has found that the multisusceptible HLA types are generally easier to treat than those with primary mold-susceptible patterns. His observation has been that those with the multisusceptible types are more affected by formaldehyde, petroleum-based chemicals, solvents, pesticides, and insecticides. These then become the focus of detoxification. In Anderson's world, detoxification is often the most important aspect of treatment.

Anderson has found that if one was born with a predisposition to mold biotoxins activated early on in life and later was infected with Lyme and associated coinfections, Lyme disease may be layered on top of the underlying fungal issue, and the fungal issue may not be what the person needs to address at that time. If the Lyme-related infections are what is drawing the attention of the immune system at that moment, it may only be after this layer is addressed that the fungal symptoms appear. In other words, some patients can have a significant mold load, but the practitioner may not be able to address that issue until the body is no longer being provoked by the Lyme layer.

Anderson has also observed that there can be seasonal influences that affect the primary layer that the body is dealing with. The immune system may have prioritized Lyme or a particular coinfection and may be ignoring underlying fungal issues; this can then flip in the winter when the rain hits. The increased exposure to molds in the winter may lead to the reprioritization of the fungal layer by the immune system. At that point, Anderson may need to shift from treating the Lyme-related issues to treating the mold issue. If mold allergy is present, this may also be seasonally influenced. The protocols are dynamic and must constantly be adjusted based on several factors such as the environment, new exposures, and what the immune system deems the dominant issue or pathogen.

While HLA DR testing is often very helpful, it is important to note that this is a genetic potential but does not represent whether or not the specific genes have been expressed. There may be additional gene correlations that are equally important but simply not yet known. So, while this is often a very useful guide, a less than optimal HLA DR result is far from the end of the story in terms of one's potential for recovery.

CASE STUDY

Patient is a 37-year-old woman with the diagnosis of chronic fatigue syndrome who had not responded to any previous treatment. Testing for Lyme disease was negative. In May 2013, *ochratoxin* was 1.4 ppb, *aflatoxin* was 0, and *trichothecene* was 0.25 ppb. On cholestyramine, chlorella, clay, and charcoal alone, she improved 70%; reporting that she felt better than she had in years. Upon retest, she showed no *ochratoxin* or *aflatoxin*, but her *trichothecene* level increased to 0.4 ppb, which may be an indication of further detoxification under way. She was then placed on Sporanox with amphotericin B and EDTA nasal sprays and will be seen soon for follow-up.
Source: Dr. Neil Nathan

RealTime Laboratories Mycotoxin Testing

While RealTime Laboratories has offered mycotoxin testing since 2006, it has only recently become better known in the CFS and chronic Lyme disease communities, largely due to recent publications by Brewer. The test looks for aflatoxin, ochratoxin A, and trichothecene.

While the test has been a very positive addition to many practitioners' arsenal of diagnostic tools, special consideration must be given in order to optimize the results. Mycotoxins are generally stored intracellularly. For the toxins to be excreted in the urine, they have to leave the cell. In some of the sickest mold patients, if the mycotoxins are sequestered inside the cells, the level of mycotoxins in the urine may be very low and thus the test results may be negative. While the molds themselves live outside the cell, mycotoxins are intracellular poisons and must be released to be excreted from the body. Mycotoxins are lipophilic; that is, attracted to fat. One must open the detoxification pathways and facilitate the body's ability to release the stored toxins.

Prior to performing the urinary mycotoxin panel, the practitioner must ensure that the patient can detoxify in order to optimize the results. Some practitioners such as Nagy have found the use of far infrared (FIR) sauna (only when tolerated and not in patients with POTS or untreated adrenal insufficiency) prior to the urine collection to be very helpful.

Both Nathan and Anderson have observed some patients who tested negative after a FIR sauna challenge but later tested highly positive when supporting detoxification with liposomal glutathione. These patients had far more issues clinically than what the test showed, and using liposomal glutathione for a week or more prior to the test collection can assist in opening up the cell membranes and facilitating excretion of stored mycotoxins. Nathan has also observed marked increases in the mycotoxin levels after incorporating binders into a patient protocol. As antifungal therapy is initiated, additional mycotoxins may be released into the system which may result in higher levels of mycotoxin excretion. As the immune system and cellular health improve, this can further increase the level of mycotoxin excretion.

Anderson has found the RealTime mycotoxin testing to be very reliable and values the quantitative nature of the results. He often performs the test ➤

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on patients when mold-related illness is suspected or when their HLA DR pattern leans toward mold-associated biotoxin illness. It gives him insight into how close to the surface the mold and mycotoxin components of the broader illness may be. In a chronically ill patient, the mold and mycotoxin component of the illness is often one of many layers. An attempt to look for mycotoxins in the urine is often the most productive when this layer comes to the surface.

While urine is the easiest specimen to obtain, the testing can be done on tissues, sputum, nasal secretions, and bronchial lavages. It is difficult to find mycotoxins in the blood, as the macrophages pick these up and move them quickly into tissue. Testing urine gives an overall picture of mycotoxins anywhere in the body, whereas nasal secretions would only reveal localized mycotoxin production. Thus urine is more widely used, as it provides insights relative to the broader body burden of mycotoxins.

One of the advantages of the RealTime testing is that after the initial panel has been run for a patient, subsequent testing to track progress of treatment is offered at a lower price for 18 months from when the initial test was performed.

In Nathan's experience with the RealTime testing, a very high percentage of his unusually compromised patient population shows some degree of mycotoxin burden. Some patients may not have current environmental mold exposures but may have had an exposure years earlier which led to ongoing colonization of the sinuses, gut, skin, lungs, or possibly dental cavitation areas.

Mold and Mycotoxin Illness Treatment

Both Nathan and Anderson have worked with patients with mold- and mycotoxin-associated illness for several years. They are intimately familiar with the Shoemaker Protocol and have used it with patients with positive results. While the Shoemaker Protocol is not the focus of this article and is not covered in the approach outlined here, a combination of approaches may be used. With the recent publications from Brewer on the potential for colonization of fungal mycotoxin-producing organisms, they have incorporated a treatment approach based on these newer findings.

There are three main steps:

- removing the exposure
- binding internal mycotoxins
- treating colonizing molds in the body

The first and extremely critical step in treatment is to ensure that there are no ongoing environmental exposures. This includes evaluating any environments where one regularly spends time, such as home, office, or school. Mold plates can be a reasonable initial screening option. Mycometrics ERMI testing is often very helpful, and working with a skilled environmental engineer may also prove beneficial. In order to optimize the treatment outcome, *removing the exposure* is key.

The second step is to consider *binding internal mycotoxins*. As previously discussed, one's genetic predisposition may play a role in one's ability to efficiently excrete mycotoxins from the system. In most chronically ill people, there are impairments in the detoxification system. Having appropriate binders on board minimizes this issue, as the toxins are then bound and more effectively excreted from the system. Binders should be started slowly and worked up over time in order to avoid an exacerbation of symptoms that can occur when too many toxins are being released in the system at once.

Cholestyramine has been used for biotoxin illness for years based on the work of Shoemaker and is often an excellent binder. It is believed by some to be a better option for ochratoxin than for aflatoxin or trichothecene. Welchol is another option that can be used as an alternative to cholestyramine for those who cannot tolerate it, though it is not as effective. Cholestyramine is best obtained from a compounding pharmacy in order to avoid sugar (which feeds yeast that produce more mycotoxins) and artificial sweeteners. Commercially available cholestyramine from conventional pharmacies may include large amounts of sugar or artificial sweeteners. It is generally taken 30 minutes before a meal, and no other supplements or medications are taken for at least 90 minutes after the meal to avoid reduced absorption of these items.

For aflatoxin and trichothecene, charcoal and bentonite clays are often the most beneficial binders. Calcium D-glucarate may support removal of trichothecene. Depending on the results of the RealTime Laboratories mycotoxin testing, both cholestyramine and additional binders may be used concurrently. Both charcoal and clays should be taken away from foods and other medications.

Chlorella is another useful binder that may be gentler when initially embarking on a mycotoxin-reduction protocol. Other binders that may be useful include zeolites, chitosan, modified citrus pectin, apple pectin, beta-sitosterol, glucomannan, diatomaceous earth, and others.

Anderson often selects a binder in relation to how frequently the patient has a bowel movement. Constipation is the enemy of any detoxification protocol. If the patient tends to be more constipated, he will generally avoid the use of cholestyramine or charcoal and instead consider chlorella or modified citrus pectin. Modified citrus pectin adds fiber, which often enhances bowel movements. If one tends to have diarrhea, cholestyramine or charcoal may be perfect options.

A combination product that some practitioners have found helpful is Advanced Naturals TOXIN

AbsorbMax, which includes guar gum, glucomannan, activated charcoal, and citrus and apple pectins in one formula. A number of practitioners have found Supreme Nutrition Takesumi Supreme (carbonized bamboo) to be a beneficial binder. Pure Encapsulations CholestePure has been useful.

Other substances that have been found helpful in dealing with mycotoxins include alpha-lipoic acid and liposomal glutathione. Glutathione is a master detoxifier and one of the most powerful antioxidants in the body and has been shown to be very helpful in the detoxification of mycotoxins. It is involved in modulating the immune system and reducing inflammation. It supports the body in the removal of heavy metals. Nathan cautions, however, that for some patients, glutathione may provide negative feedback to the body's ability to methylate and should be used carefully. There are several excellent oral liposomal products that may be very helpful for supporting mycotoxin detoxification. These include QuickSilver Scientific Therasomal Glutathione, Researched Nutritionals Tri-Fortify Orange, Bulletproof Upgraded Glutathione Force, and ReadiSorb Liposomal Glutathione. NAC may be used as a glutathione precursor.

ReadiSorb consulting physician Timothy Guilford, MD, has researched the link between mycotoxins and glutathione and has found that mycotoxins block the formation of glutathione in the body. They interfere with the Nrf2 pathway and create an environment that allows them to persist. Glutathione levels are often low when TGF-β1 is elevated, which is common in mold patients. Low-grade fungal colonization in the sinuses can slowly deplete glutathione. Chronic infections can better persist in the body when glutathione is depleted, as glutathione is involved in intracellular killing of infections; thus liposomal glutathione can be a very powerful weapon in helping the body to deal with both infections and mycotoxins.

Supporting the body with drainage remedies that facilitate optimization of the detoxification systems and organs is another helpful strategy in removing toxins from the system. The liver, kidneys, and lymphatics are prime targets for this type of support. Nathan incorporates homeopathic drainage remedies from Pekana such as RENELIX (kidney support) and ITIRES (lymphatic support), especially in patients who have strong reactions to other attempts to detoxify the system and have a compromised ability to detoxify. He finds Beyond Balance TOX-EASE to be very helpful for this purpose.

Anderson follows a very specific order in approaching detoxification. First, the gastrointestinal system must be considered, as patients cannot adequately detoxify if they are constipated. Next, the liver, gallbladder, kidneys, and lymphatic system must be supported. Finally, toxins in the cells must be removed. However, you cannot start by attempting to dump intracellular toxins if the routes of elimination are not open, or you will make the patient more ill. "You simply add more traffic to the traffic jam," says Anderson.

Sweating via FIR sauna therapy is another excellent supportive detoxification modality that can be very effective in helping the body to rid itself of mycotoxins. In fact, the output of urinary mycotoxins has been shown to be higher after a sauna session, and this is a technique often used to maximize the mycotoxins identified through urinary mycotoxin testing.

The final step of the mycotoxin treatment protocol is *treating colonizing molds in the body*.

Mold does not technically live inside the body except in conditions such as end-stage cancers or HIV. Molds have the potential to colonize those areas considered outside membranes of the body, meaning that they are open to the external environment and separated from the blood by the epithelium, which acts as a barrier. Potential sites of colonization in the body for mycotoxin-producing fungi are the sinuses, gut, bladder, vagina, and lungs. Surprisingly, the lungs are often the least affected, as they contain lysosomes that serve as a protective mechanism against colonization. While the fungal colonization itself generally does not occur inside the body, the toxins produced by these organisms can enter the body and the intracellular compartments of the cells. Treatment for colonization of molds focuses primarily on the sinuses and gastrointestinal system.

For treatment of fungal organisms in the sinuses, an emerging option is the use of nasal amphotericin B, which helps to kill fungi used in conjunction with EDTA to dissolve biofilms. Biofilms are known to make treatment of chronic infections more difficult, as they serve as a protective barrier for the organisms that make it far more difficult to get the antimicrobial agents to where they need to go. Amphotericin B and EDTA are in generally used in separate preparations, with amphotericin B being used in the morning and EDTA in the evening or vice versa. Nasal itraconazole may be explored in some patients. The agents are delivered using an atomizer called the NasaTouch (available from ASL Pharmacy), which helps to deliver the compounds deep into the sinuses. ➤

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Treatment is started very gently, as one can have a very strong response that may make it difficult to tolerate the therapy if not done properly. Over time, the dosages are increased but only to the level that the patient can comfortably tolerate. A thick yellow or green mucus discharge has been reported in some patients and is believed to be a good sign.

As the fungal organisms die, they can create significant inflammation. There can also be an allergic response to the dead molds. The use of a nasal corticosteroid to help reduce inflammation and make the treatment more tolerable has been discussed, but steroids are often best avoided in those with chronic Lyme disease. Other options that have been explored include the use of glutathione as a nasal spray which can help to reduce the swelling and inflammation of the sinus tissues.

Other practitioners have used similar approaches but with different compounds, such as the use of nystatin both orally and in a nasal spray or the use of a nasal spray made with ketoconazole, triamcinolone (a corticosteroid), and cromolyn.

Nonprescription nasal options that may be worth exploration include Physician's Standard Nasal Clear, Argentyn 23 Silver Hydrosol, ACS 200 Nasal Spray, Propolit Nasal Spray (propolis), Seagate Olive Leaf Nasal Spray, Happy Sinus with Silver, NutriBiotic Grapefruit Seed Extract Nasal Spray, and CitriDrops Nasal Spray. Nathan and Anderson have found that silver can often be a helpful adjunct treatment for those dealing with colonizing molds, especially in the sinuses.

To address fungal overgrowth in the gut, the first step is to consider and address the biofilms in the gastrointestinal tract. This is often initiated with Klaire Labs Interfase Plus or Beyond Balance MC-BFM. These are slowly increased and then followed by the addition of an antifungal. Itraconazole (Sporanox) is commonly used and again started slowly and increased as tolerated. Other useful agents may be voriconazole (VFend), caspofungin (Cancidas), micafungin (Mycamine), or posaconazole (Noxafil).

There are a number of herbal antifungal agents that may be considered, such as Byron White Formulas A-FNG and Beyond Balance MYCOREGEN. Anderson has used A-FNG as a multipurpose tool in that it both helps to support the body with removal of stored intracellular mycotoxins and serves to reduce fungal organisms in the body. He may use oregano oil or undecylenic acid.

CASE STUDY

Patient is a 50-year-old woman who presented four years ago with Lyme disease, babesia, and bartonella. She did fairly well with antibiotic and herbal treatments, realizing improved energy and cognition and fewer joint pains and headaches. Improvement was estimated at 70%, though she was not back to full health. In May 2013, urinary mycotoxin testing revealed ochratoxin 1.4 ppb, aflatoxin 1.4 ppb, and trichothecene at 2.34 ppb. She was treated with cholestyramine, charcoal, and clay as binders along with nasal amphotericin B/EDTA and oral Sporanox. In January 2014, she felt significant improvements in energy and cognition. Her headaches were virtually gone. Retesting showed aflatoxin was 0, trichothecene down to 0.05 ppb, while ochratoxin had increased to 3.64 ppb. The increase in ochratoxin may be the result of the antifungal therapies' leading to an additional release of mycotoxins from dying fungi or the body's ability to better detoxify and excrete previously stored mycotoxins. **Source**: Dr. Neil Nathan

The importance of having a strong detoxification program on board while attempting to reduce fungal populations is key to the success of treatment. A common symptom of undersupported detoxification while attempting to reduce the fungal colonization is depression. Metals and fungal organisms generally live in communities. As the fungal organisms are killed, this may release metals into the system. This is another reason why detoxification is so critical to consider as part of the broader treatment protocol.

Some practitioners have found coffee enemas a good option for mycotoxin detoxification; however, consideration should be given to the source of the coffee to ensure that additional mycotoxins are not being introduced into the system.

To summarize, the basic treatment model consists of removing the source of any environmental exposures, binding internal mycotoxins, and treating colonizing molds in the body in both the sinuses and gastrointestinal system.

Mold, Mycotoxins, and Candida

Candida overgrowth is another factor in systemic mycotoxin overload, as these organisms produce mycotoxins within the body. Additionally, as antifungal therapies are implemented to reduce the burden of candida in the body, the yeast can produce further mycotoxins in response to attempts to eliminate them. The more aggressively that one attempts to rid the body of candida, the more the focus on detoxification should be increased to help remove any additional mycotoxins from the system. Mycotoxins produced by candida include *gliotoxin,* which is known to suppress the immune system.

Another common mycotoxin produced by candida and other yeasts includes acetaldehyde, a metabolic product of ethanol. It irritates membranes and damages the liver. It explains why some people with candidiasis feel groggy or even drunk after eating sugar or carbohydrates

which are then fermented in the gut by the yeast. Acetaldehyde can also negatively affect methylation.

In my discussions with Anderson, he has observed a connection between people living in the presence of mold from a water-damaged building and candida overgrowth. Treating candida is often far more difficult if the patient is still being exposed on an ongoing basis to other molds in the living environment. In a number of cases, Anderson has worked with patients who reported vaginal discharge associated with candida infection shortly after moving into a moldy home. Living in an environment with ongoing mold exposure leads to immune dysregulation that allows candida to overgrow in the body. Anderson has noted that abnormally high candida antibodies are commonly found in his patients.

While candida is technically a yeast and not a mold, it does produce mycotoxins that negatively affect health and thus needs to be considered in a treatment protocol. Fortunately, it responds to many of the same antifungal therapies used for the treatment of colonizing molds.

Mycotoxins and Electromagnetic Fields

Another interesting consideration in the treatment of mycotoxin illness is one's level of exposure to electromagnetic fields. Dietrich Klinghardt, MD, PhD, has discussed research from Europe which has shown that molds react in a defensive manner when exposed to high levels of EMFs; in so doing they release up to 600 times more mycotoxins. EMFs led to faster proliferation of the molds themselves. Thus, implementing mechanisms that reduce ongoing EMF exposures may be a supportive intervention when dealing with systemic fungal colonization and mycotoxin-associated illness.

Mold Allergy

Nathan and Anderson have each noted that one can have both mold toxicity and mold allergy. Each of these may need to be treated separately in order to fully address the broader mold illness. Immune therapies such as low dose allergen (LDA) injections can be helpful in those presenting with an allergic response, or an overreaction of the immune system, to the molds.

Desensitization may be approached using sublingual drops that are personalized to the specific patient. Some practitioners have used homeopathic remedies such as Allergena Mold Mix, bioAllers Allergy Treatment Mold/Yeast/ ➤

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Dust, Professional Complementary Health Formulas Household Dust/ Mold Allersode or Toxic Fungi-Mold Nosode, Energetix Myco-Chord, Physica Energetics Myco-Tox, and others.

Mycotoxins in Foods

While food-borne mycotoxins may not be as significant as those from ongoing environmental exposure or persistent fungal colonization, they are another consideration for those dealing with mycotoxin-associated illnesses. When someone is already burdened by an overload of toxins and a likely weakness in detoxification capacity, anything that can be done to further reduce exposure to additional toxins is a worthwhile consideration. Some have suggested that food allergies and leaky gut syndrome may be associated with the consumption of mycotoxins in foods.

Some of the more common sources of mycotoxin-contaminated foods include corn, wheat, barley, rye, peanuts, sorghum, cottonseed, some cheeses, and alcoholic beverages such as wine and beer. Sugar can both be contaminated with mycotoxins and also feed mycotoxin-producing fungi that may already inhabit the body. Other foods that may be affected by mycotoxins include oats, rice, tree nuts, pistachios, Brazil nuts, chilies, oilseeds (seeds that yield oil), spices, black pepper, dried foods such as fish and fruits, figs, cereals, coffee, cocoa, beans, peas, and breads. Fruits such as apples, pears, grapes, and apricots and their juices may be a source of mycotoxins. Coconut oil, while delivering many health benefits, is a potential concern if sourced from dried coconuts; thus purchasing a high-quality product may be important.

Milk, eggs, and meat may be indirectly contaminated through mycotoxin-contaminated feed consumed by the animals. This is another reason that grass-fed meats are a superior option, as mycotoxins rarely grow on grass, and thus the concentration of mycotoxins in the fat of grass-fed animals is generally lower than in their grain- or corn-fed counterparts.

According to the Bulletproof Executive's Dave Asprey, 52% to 91.7% of green coffee beans are contaminated with mold. 50% of brewed coffee beans may be moldy. Decaffeinated varieties are more likely to have mycotoxins, as caffeine protects coffee beans from mold. Coffee may be one of the most commonly used food products that can lead to an ongoing source of mycotoxin exposure. In fact, Asprey has created "Upgraded Coffee" with particular attention to the entire production process to minimize the potential for the presence of mycotoxins.

Temperature and humidity are important factors with regard to how foods are stored throughout the production process. These affect the likelihood of mycotoxins' being present in the resulting food products.

Mycotoxin	Associated Molds	Example Binders	Potential Food Sources
Aflatoxin	• *Aspergillus flavus* • *Aspergillus parasiticus*	• Clays (bentonite, montmorillonite) • Charcoals • Zeolites • Glucomannan • Diatomaceous earth	Milk, cheese, eggs, meat (contaminated feed), cereals, wheat, spices, tree nuts, peanuts, pistachios, Brazil nuts, chilies, oilseeds, corn, spices, black pepper, dried fruit, figs, dried coconut
Ochratoxin	• *Aspergillus albertensis* • *Aspergillus alliaceus* • *Aspergillus auricomus* • *Aspergillus carbonarius* • *Aspergillus niger* • *Aspergillus ochraceus* • *Aspergillus sclerotiorum* • *Aspergillus sulphureus* • *Aspergillus wentii* • *Penicillium nordicum* • *Penicillium viridicatum* • *Penicillium verrucosum*	• Cholestyramine • Zeolites • Glucomannan • Diatomaceous earth	Cereals, wheat, corn, oats, coffee, dried fruit, wine, beer, cocoa, nuts, beans, peas, bread, rice, cheese, meats (contaminated feed, especially pork and poultry), dried and smoked fish, soybeans, garbanzo beans
Trichothecene	• *Cephalosporium* • *Fusarium* • *Myrothecium* • *Stachybotrys* • *Trichoderma* • *Trichothecium* • *Verticimonosporium*	• Clays (bentonite; montmorillonite) • Charcoals • Zeolites • Glucomannan • Diatomaceous earth	Grains, cereals, wheat, barley, oats, corn, rye, durum, soybeans, potatoes, sunflower seeds, peanuts, bananas

This table is a partial listing of organisms that may produce mycotoxins. The focus is on the specific mycotoxins tested via urinary mycotoxin testing from RealTime Laboratories. Additional sources of mycotoxins or mycotoxin binders may not be listed in this table. Some of the binders mentioned above are from veterinary literature, as mycotoxins are a serious concern in the production of animal products such as milk, eggs, and meat.

Though there are standards in the food industry and limits on mycotoxins set for safety, food contamination with mycotoxins is a worldwide problem.

Food-borne mycotoxins may be a factor in ongoing gastrointestinal inflammation. Consumption of moldy foods or mycotoxins may be an increased risk factor for conditions such as irritable bowel disease. While there can be many factors involved in leaky gut syndrome, it has been suggested that fungi and mycotoxins may have the ability to damage the intestinal lining, which may lead to increased intestinal permeability and further exaggerated immune responses and to increased inflammation.

Making wise food choices both in reducing potential sources of mycotoxins consumed and in reducing sugars and other yeast-promoting foods should be given adequate consideration in those dealing with the effects of molds and mycotoxins.

Broadening the Horizon May Lead to Big Rewards

When it comes to the treatment of chronic Lyme disease, it becomes more and more apparent that many of the symptoms that patients present with are often not caused by Lyme alone. There is tremendous overlap in the symptoms associated with Lyme disease, heavy-metal toxicity, and mold and mycotoxin illness. In order to optimize patient outcomes and regain optimal health, broadening the horizon in chronic Lyme disease evaluation and treatment often pays off with big rewards. Here's to your health!

Resources

Much of the information in this article is the result of conversations with Neil Nathan, MD, and Wayne Anderson, ND, in addition to information from various conference presentations and online resources.

Informational Sites from Doctors and Practitioners

Dr. Dietrich Klinghardt: http://www.klinghardtacademy.com/images/stories/neurotoxin/NeurotoxinProtocol_Jan06.pdf

Dr. Lisa Nagy: Mold and Mycotoxins: http://lisanagy.com/acatalog.php?id=1

Dr. Ritchie Shoemaker: http://www.survivingmold.com

Dr. John A. Tafel: Detoxification: Mold and Mycotoxins Protocol: http://www.drjohntafel.com/?page_id=617, http://www.drjohntafel.com/?page_id=619

Dr. Jack Thrasher: Toxicology of Mycotoxins: http://www.drthrasher.org/page36.html, http://www.drthrasher.org/page7.html (Recommended Physicians)

Laboratories and Pharmacies

ALCAT: http://www.alcat.com
ASL Pharmacy: http://www.aslrx.com
Alletess Medical Laboratory: http://www.foodallergy.com
EMLab P&K: http://www.emlab.com
Immunolytics: http://www.immunolytics.com
Mycometrics: http://www.mycometrics.com
RealTime Laboratories: http://www.realtimelab.com
Tennessee Mold Consultants: http://tennesseemold.com

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Videos and Podcasts

Nathan N. Mold, Lyme, and coinfections. Gordon Medical Associates. http://www.gordonmedical.com/unravelling-complex-chronic-illness/radio-interview-with-neil-nathan-md-mold-lyme-and-coinfections.

———. Mold toxicity. Mendocino Coast Television. http://mendocoasttv.org/ cdhWellnesslecturemold toxicitydrnathan1.html.

Additional Useful Resources

blackmold.awardspace.com.

Bennett JW, Klich M. Mycotoxins. *Clin Microbiol Rev*. Jul 2003;16(3):497–516. http://www.ncbi.nlm.nih.gov/pmc/articles/PMC164220.

Bulletproof Executive's Dave Asprey: Mycotoxins. http://www.bulletproofexec.com/?s=mycotoxins; Get stable energy and perform better by avoiding these: http://www.bulletproofexec.com/bulletproof-video-get-stable-energy-perform-better-by-avoiding-these; The molding of the world part 1: how we made mycotoxins into the health disaster they are today. http://www.bulletproofexec.com/mycotoxins-in-america; How to biohack the ultimate healthy home: part 3, with Bulletproof Exec Dave Asprey. http://www.bengreenfieldfitness.com/2014/03/mold-in-your-home; Why bad coffee makes you weak. http://www.bulletproofexec.com/why-bad-coffee-makes-you-weak.

Dr. Shrader's LDA: a dramatically effective immunotherapy for allergy. http://www.drshrader.com/lda_therapy.htm.

Food Safety Watch: Lawley R. Aflatoxins. Feb. 1, 2013. http://www.foodsafetywatch.org/factsheets/aflatoxins; Ochratoxins. http://www.foodsafetywatch.org/factsheets/ochratoxins; Trichothecenes. http://www.foodsafetywatch.com/public/983print.cfm.

Forsberg NE. Mycotoxins and immunotoxicology. Oregon State University, Department of Animal Sciences. http://www.omnigenresearch.com/file_download/9/mycotoxins_and_immunotoxicity_11_04.pdf.

Liposomal glutathione (and research articles on mycotoxins). http://www.lipoglut.com.

Mold-Survivor.com: Lillard-Robers S. Symptoms of fungal exposure. http://www.mold-survivor.com/symptoms.html; The toxic effects of fungal exposure. http://www.mold-survivor.com/assoc.illness.html.

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Disclaimer

Information is not intended to treat, diagnose, cure, or prevent any disease. Nothing in this text is intended to serve as personal medical advice. All medical decisions should be made only with the guidance of your own medical authority.

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Scott Forsgren is a health writer, advocate, and coach. He is the editor and founder of BetterHealthGuy.com, where he shares his now 17-year journey through the world of Lyme disease and the myriad of factors that it often entails. He has been fortunate to have written for publications such as the *Public Health Alert*, *Explore!*, *Bolen Report*, and *Townsend Letter*. Scott expresses gratitude for the information shared by Dr. Neil Nathan and Dr. Wayne Anderson in support of this article. More information on his work is available at http://www.BetterHealthGuy.com.

Neil Nathan, MD, is a medical doctor at Gordon Medical Associates in Santa Rosa, California. He is a gifted physician and healer who is always excited about the next opportunity to learn something new that might benefit his patients. He looks at each patient "as an opportunity to discover which component of healing might still be missing." He specializes in Lyme disease, chronic fatigue syndrome, fibromyalgia, thyroid conditions, chronic illness, chronic pain, and autism. His healing toolbox includes tools such as chelation, craniosacral therapy, Frequency Specific Microcurrent, homeopathy, hormone balancing, nutrition, prolotherapy, trigger point injection therapy, and more. Dr. Nathan is a graduate of the Pritzker School of Medicine. His highly rated book *Healing Is Possible: New Hope for Chronic Fatigue, Fibromyalgia, Persistent Pain, and Other Chronic Illnesses* is available on Amazon.com. More information on Dr. Nathan is available at http://www.neilnathanmd.com and http://www.gordonmedical.com.

Wayne Anderson, ND, is a naturopathic doctor at Gordon Medical Associates in Santa Rosa, California. He has been in practice for 33 years. He integrates mind and body patient care with the strengths of alternative and conventional medicine. He tailors a program unique for each patient to meet their specific needs. His focus on patients with chronic illness led him to the realization that chronic Lyme disease was an important part of these conditions. He has a deep understanding and mastery in the treatment of chronic illness and always strives to learn new options to help his patients. His toolbox consists of tools such as protocols for Lyme disease and mold illness, naturopathic medicine, detoxification, leaky gut syndrome and dysbiosis protocols, functional medicine, autoimmune therapies, multiple chemical sensitivity protocols, hormone replacement therapy, and more. In preparing for this article, Dr. Anderson shared his excitement and passion for his patients in saying, "We are so right there. We are so close. The brass ring is just outside of our grasp." Dr. Anderson is a graduate of the National College of Naturopathic Medicine in Portland, Oregon. More information on Dr. Anderson is available at http://www.wayneanderson.com and http://www.gordonmedical.com.