Detoxing Mold and Mycotoxins

A review of the New Beginnings Nutritionals protocols to better understand when and how to treat mold overgrowth and mycotoxin exposures.

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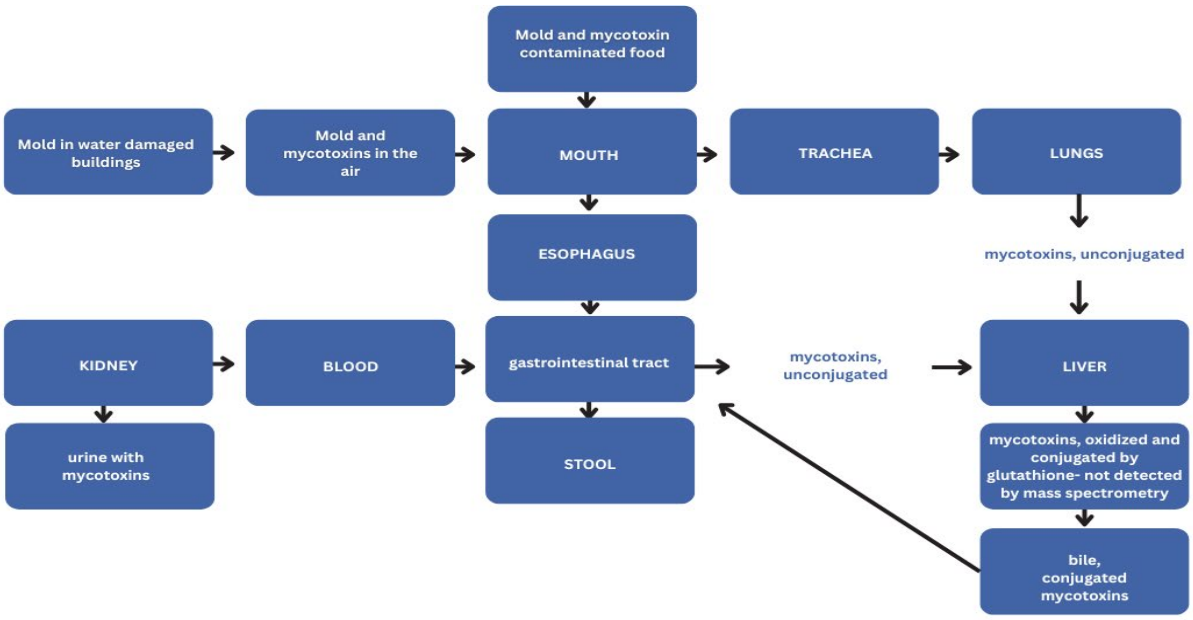
Introduction

Certain molds, and the mycotoxins they produce, can seriously impact health. Molds and their chemical byproducts can wreak havoc on the body, causing individuals to become acutely or chronically ill. To reduce the adverse effects of these exposures, New Beginnings Nutritionals (NBN) has developed protocols to support the elimination of both molds and mycotoxins and further support healing from exposures. This article aims to explain the benefits of these protocols and the evidence behind their use. **Please note that remediation of any moldy building in which the patient has been exposed needs to be remediated for the treatment to be successful.**

Exposure: A Brief Background

Mold overgrowth in the body and mycotoxin detoxification can be a complex process depending on the individual's clinical picture and the types of mold/mycotoxin exposure. To be most effective in supporting the elimination of mold and mycotoxins, it is imperative to understand the pathways of exposure and how that translates into metabolism, detoxification, and elimination.

Mold and mycotoxin exposure can happen in three ways: ingestion, inhalation, and dermal absorption.



Molds

The spores the molds disperse are typically inhaled and/or ingested. Colonization, the term for the growth of an organism without causing systemic infection, typically occurs in the sinuses, pulmonary system, and the gastrointestinal (GI) tract. Symptoms can often give clues as to where one should be suspicious of growth. Based on the symptoms, additional testing may be warranted to determine if there is significant mold activity and the treatments that would be best. In rare cases, the mold may cause systemic infection in immunocompromised individuals, which may require PCR tests for mold species in blood. The **Mold & Candida Colonization Packages** (adult and children) from NBN can address the gut colonization, targeting various molds, and will be discussed in more detail below.

Mycotoxins

Mycotoxins can be inhaled, or absorbed through the skin, going into the bloodstream. They can also enter the body via the ingestion route, which can be from oral intake of food/beverage containing mycotoxins or inhalation, where they may either be absorbed systemically or directly eliminated via the stool. Metabolism of mycotoxins is a complex process and is highly variable based on the chemical properties of the mycotoxins, as well as the overall health of the individual. Trying to support these routes and increase metabolism and elimination is the goal of the NBN **Advanced Mycotoxin Packages** (adult and child).

It is important to note that mycotoxins can also be produced internally through mold colonization within the system. An interesting study performed by researchers at MD Anderson in Houston found that mycotoxin levels decreased with the initiation of antifungal therapy, and there was evidence of a continued decrease of mycotoxins with the continuation of antifungal treatment. If colonization or infection produces mycotoxins, the mold itself must be killed to eliminate this source of mycotoxin exposure.

Detoxification and elimination mechanisms

Mold spores, if they don't have the opportunity to germinate and grow, may be eliminated mainly via the respiratory tract through mucociliary clearance and coughing, or through the GI tract via stool. Mycotoxins are a lot more complex and are processed and eliminated by the body in different ways, depending on the source of exposure and the chemical properties they possess.

When someone enters a space where mold spores and mycotoxins have been dispersed, there is potential for inhalation, allowing them to travel through the respiratory and gastrointestinal systems, as well as dermal absorption with contact. Systemic circulation of mycotoxins is common, but systemic mold infection is limited to severe mold exposure or immune deficiency. There is also the potential for mold spores and mycotoxins to enter the GI tract, directly through consumption of mold-contaminated foods or beverages. The mycotoxins from various routes of exposure are then processed in the body by metabolism, detoxification, and elimination

- **Liver**: Once transported to the liver from the bloodstream, certain mycotoxins can undergo biotransformation, where they go through phases 1 and 2 of detoxification, most commonly undergoing glucuronidation or glutathione conjugation in the second phase. Depending on their chemical properties, they may also get picked up by the bile, potentially undergoing enterohepatic recirculation, where they can get "stuck" in the recirculation phase. These chemically modified

mycotoxins will not be detected by tests using mass spectrometry, which is why labs using this technology do not recommend glutathione prior to testing. Such provocation increases mycotoxins bound to glutathione but decreases unmodified mycotoxins.

- **Renal**: When mycotoxins enter the kidney from the bloodstream, some have the potential to be reabsorbed through the tubules, leading to bioaccumulation, or they can be eliminated via urine. In either scenario, the type of mycotoxin, its chemical properties, and the health of the individual are significant factors that will influence the pathway.
- **Respiratory**: Inhaled mycotoxins can be expelled from the body through mucociliary clearance, coughing, and expectoration if they do not go through systemic circulation.
- **Skin elimination**: Certain mycotoxins absorbed through the skin may be eliminated through sweat by exercise or sauna treatment or may be lost by shedding skin cells.

Now that the pathways of exposure, metabolism, and elimination are understood, the protocols designed for NBN will be reviewed, keeping these concepts in mind.

Advanced Mycotoxin Package

ToxinPul®	• It mainly utilizes chlorella and humic/fulvic acids to eliminate mycotoxins, including ochratoxins and aflatoxins • It also has the added benefit of dandelion root and quercetin for liver support and vitamin C for antioxidant support
MycoPul®	• Utilizes charcoal, zeolite clay and humic/fulvic acids to adsorb various mycotoxins within the gut • It is helpful for ochratoxin, trichothecenes, aflatoxins, gliotoxins, and zearalenone(s)
Tri-Fortify®	• Helps support overall oxidative stress from exposure • Helps support glutathione conjugation in phase II detoxification of certain mycotoxins
Milk Thistle	• Additional liver support to withstand the stress of the mycotoxin load and detoxification
Calcium D-Glucarate / Enhansa® Curcumin	• Supports the glucuronidation pathway, which is a major pathway mycotoxins are detoxified
L-Taurine	• Supports bile production that influences mobilization of fat-soluble mycotoxins
PureLean® Fiber	• Works as a bile acid sequestrant and binder of mycotoxins to aid in their elimination • Supports the beneficial flora that become impacted by mycotoxin exposure • Can support constipation with adequate hydration • It may also support the gut lining integrity by supporting the production of SCFA by the beneficial flora
LactoPrime® Plus	• Supports the degradation and elimination of some mycotoxins and ensures the health of the microbiome populations impacted by mycotoxin exposures

Mold & Candida Colonization Package

*Candida Formula (specific to adult formula)	• Oregano Oil: potent anti-fungal and general antimicrobial • Berberine: antimicrobial, particularly with fungus • Pau D'Arco: well-known antifungal • Sodium Caprylate: sodium salt of caprylic acid, a well-known antifungal found in coconut oil. This form of caprylic acid is known to have better solubility than caprylic acid alone.
*Candida Yeast Formula (specific to child's formula)	• Garlic: antimicrobial found to be beneficial in fungus • Oregon Grape: contains berberine, which has antimicrobial properties • Uva Ursi: antimicrobial shown to have antifungal support • Pau D'Arco: well-known antifungal • Black Walnut: contains juglone, which has been shown to be a potent antifungal • Echinacea Purpurea: immune support • Olive leaf: anti-inflammatory, antioxidant, and antimicrobial • Grapefruit seed: potent antimicrobial
*Allimax	• Antimicrobial that has been found to possess significant antifungal properties
*Grapefruit Seed Extract (liquid or capsules)	• It is a well-known, potent antimicrobial that is beneficial in reducing fungus
CoreBiotic®	• Bacillus species probiotic promotes microbiome support during the killing phase while reducing the chances of clostridia overgrowth, which is common in antimicrobial therapy.

*Each botanical supplement should be rotated one at a time, on a weekly basis to prevent resistance

Supporting Detoxification Pathways

During the detoxification stages, many mycotoxins first undergo oxidation followed by glutathione conjugation or glucuronidation. Supporting these pathways is a primary focus of the Advanced Mycotoxin Packages:

Glutathione: Glutathione should be a supplement used with mycotoxin exposure for several reasons. It is a potent antioxidant which helps with oxidative stress. It detoxifies many mycotoxins by forming conjugates of mycotoxins that are more water-soluble and therefore easily excreted in the urine. In addition, some of the most common mycotoxins (like ochratoxin A) can down-regulate the formation of the rate-limiting enzyme in glutathione synthesis, which will result in a reduction in the intracellular level of glutathione.

Calcium d-glucarate /Curcumin/Milk thistle:
Calcium d-glucarate and curcumin (in the pediatric package) are needed to support the liver's phase 2 glucuronidation pathway, which reduces the toxicity of mycotoxins and renders them water soluble so they can be easily eliminated. Milk thistle is also added to protect and give extra support to this already overburdened organ.

Binders

Ingested mycotoxins in the gastrointestinal tract can either be absorbed, or eliminated via stool. The binders in MycoPul® and ToxinPul® help ensure the mycotoxins are eliminated via the stool, rather than absorbed.

Activated charcoal and clays tend to be the best adsorbers of mycotoxins. However, micronutrients and oral pharmaceuticals may also be adsorbed so these binders should be taken at least two hours before or after supplements and pharmaceuticals. MycoPul® may cause constipation so to maintain regular bowel movements it may be helpful to alternate with less-constipating ToxinPul® . ToxinPul® also contains other binders, such as chlorella and humic acids, increasing the binding capacity for other mycotoxins.

The fiber (PureLean® Fiber) not only binds to mycotoxins directly, but it also aids in detoxification by binding to the bile acids, pulling the mycotoxins (and potentially other toxins and toxicants) attached to the bile out of the hepatic recirculation. The fiber with attached bile salts and mycotoxins are then eliminated in the stool. Fiber also aids in supporting healthy GI motility, lining, and the microbiome. L-Taurine is included to help support the liver's bile production, adding additional organ support needed during detoxification.

Gut Health

Mold spores traveling through the GI tract have the potential to proliferate in the intestines, and if the mold is able to colonize, this must be addressed since it can be a continued source of mycotoxin exposure. Many have had success with rotating herbs and botanical extracts to address colonization, but if severe mold is present, pharmaceuticals like itraconazole may be warranted.

Mycotoxins are known antimicrobials, designed to be defense mechanisms for mold. Due to these antimicrobial properties, they have been shown to be detrimental to the gut microbiome. As a result, there is a need to support the microbiome during this process with high quality probiotics (LactoPrime Plus). There is also evidence demonstrating certain probiotics can help break down mycotoxins (Lactobacillus brevis and L. plantarum), which can further support their elimination.

The **Mold & Candida Colonization Packages** (adult and children) were created with potent botanical extracts that are known for their strong antifungal properties. The protocol using this package involves weekly rotation to prevent resistance, which may be a concern during treatment. This package offers a natural option to help treat not just colonized mold, but other harmful organisms that may exist, including candida. If running MosaicDx Organic Acid Test (OAT), the *furan* markers, *tartaric acid*, and *oxalic acid* are potential markers pointing to the presence of Aspergillus mold in the gastrointestinal tract.

The sequence of the antimicrobial or detoxification regimen is often questioned, and it's difficult to confirm which is ideal, as it will likely depend on the patient's tolerance and situation. Some patients can handle the killing phase (**Mold & Candida Colonization Packages** (adult and children)) first and use the detoxification support (**Advanced Mycotoxin Packages** (adult and child)) after treatment. While others need the detoxification support first, then the killing phase once able to tolerate other interventions. Regardless, if colonized mold is not addressed, the symptoms are likely to persist. Also, if an individual is still in the moldy

environment, initiating the killing phase may not be ideal since the potential for another overgrowth is much greater, and the potential for resistance may increase. With the numerous variables, it is difficult to say which way is better, but taking the whole clinical picture and what's optimal for the patient should provide guidance. You can also reach out to NBN for further support.

Conclusion:

In conclusion, metabolizing, detoxifying, and eliminating mold and mycotoxins involves various strategies within the body. Support aimed at liver function, enhancing bile acid production, and promoting healthy bowel movements are essential for facilitating the safe elimination of mycotoxins from the body. Additionally, addressing fungal colonization in the gut using antimicrobial treatment and toxin binding should also be considered in managing mycotoxin exposures. Remember, the source of these mycotoxins must be eliminated, and without eliminating the sources, these interventions will only be a band-aid to the problem.

With the help of clinicians and consultants, NBN has developed these protocols to support these aspects of mold and mycotoxin exposure for the purpose of providing the best patient outcomes.

Disclaimer: This article was written to present a broad overview of mold and mycotoxin pathways of detoxification as it relates to the supplement packages created by NBN. It is by no means exhaustive and should only be used as education on the aforementioned packages. It is at the discretion of the provider to determine when to use these protocols and what additional supports may be warranted.

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