

# Tequesta Family Practice

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## **Fungi & Mold Related Health Problems**

Thanks to Frances, Jeanne, Wilma & Faye, we've become pretty familiar with the fact that moisture and mold go hand in hand in hyphae (part of the filaments of mold). It can certainly be an unsightly mess, but what else can it do to you?

Fungi come in two major forms. Yeast is a budding organism that is essentially a single-celled organism. Molds are forms of fungi that spread out via their hyphae and can cover large areas.

There are four major sorts of problems that fungi can cause;

Infection is what happens when the fungus starts to grow in us or on us. Jock itch, Athletes foot, Toenail and Fingernail fungus are all examples of mold infection *on* us. When the infection is *in* us, things get more serious. This usually doesn't happen to folks with a healthy intact immune system. Folks who suffer from HIV/AIDS and other immune suppressing syndromes such as organ transplantation, cancer, chemotherapy and other issues are more likely to be infected with fungi growing in their bodies.

Fungi can produce allergic reactions. Typically it only happens to folks who are susceptible to an allergy from a given fungus. If you have hay fever and/or asthma symptoms worse with wet and windy weather, this may apply to you. Luckily it's not generally to serious and can be controlled with medications specific for the symptoms caused. Steroids, antihistamines and bronchodilators are the mainstays of therapy for these folks.

Fungi can be ingested and cause problems as well. While most of us enjoy a good glass of wine without much thought of this, recall that yeast ferments grape juice into wine and grains into beer. Many of us are actually big fans of fungi! Blue cheese is also a gift from the Kingdom of Fungi. They can be good for us and enhance our lives. Some of the members of this kingdom can be downright nasty however.

Toxins are chemicals produced by an organism that causes detriment or death to another organism. They generally provide a survival advantage to the organism producing them. Penicillin is a toxin produced from fungi. Chances are that you've seen it growing as a greenish fuzz on a rotting piece of fruit. Used properly, it can be life-saving for us. It evolved to keep bacteria from being able to get all of the nutrients from fruit that fell to the ground, leaving the fungi to be able to benefit more than the bacteria in the environment. The diversity of life is amazing. This diversity is ensured by the ability to develop ways of competing with other life forms allowing it to thrive in certain environmental niches. Unfortunately, sometimes we get in the way of these toxins. While the intoxication caused by a low-level of ingestion of yeast excretions can be a pleasant experience. Other toxins can be much more formidable.

A given fungus that forms toxins will not form these toxins continually. They're only formed during certain conditions that tend to trigger the mold into producing the toxin.

Luckily, one of the hallmarks of intoxication is that once the source of the poison is removed, an otherwise healthy individual should be able to clear the toxin from their system and then hopefully heal allowing them to return to their pre-illness status. Healing isn't always 100% or guaranteed however. Some of the toxins can be potent cancer causers as well, meaning that long term surveillance against this disease may need to be intensified.

Human and other animal foodstuffs are a major potential source of nutrient for fungi. Spores of a wide range of fungi are common in the air. If conditions are suitable (access, high water activity and moderate temperature), fungi colonize the foodstuffs. Some common air-borne fungi are known to produce extremely toxic compounds; these include *Aspergillus*, *Alternaria*, *Fusarium* and *Penicillium*.

Common toxins include alkaloids, cyclopeptides, and coumarins. The compounds are active at extremely low concentrations and have a rapid effect. The toxins may cause death. In sublethal quantities, the toxins may also trigger cancer, and influence the physiology of the consumer. Many of the compounds are heat stable remaining active after cooking or treatment of foodstuff. The potential for damage is particularly important for human foods, and food for livestock held in intensive conditions.

*Ergotism* is a toxic syndrome caused by the ingestion of rye contaminated with alkaloids produced by *Claviceps purpurea* which can cause blood vessels to constrict leading to hallucinations, gangrene of the limbs and death. These hallucinations were thought to be responsible for many of the famous witchcraft trials in Salem hundreds of years ago. Lysergic acid is another fungal toxin, it's better known as LSD. Aflatoxins from *Aspergillus flavus* can contaminate peanuts causing a potentially lethal syndrome with liver failure.

Despite this list of impressive effects in some settings, the vast majority of the time it has been difficult to link a particular fungal toxin to a particular effect or complaint. The toxins are generally present in low quantities and only occasionally will enough toxin be present acutely to cause a dramatic and clearly linked syndrome. *Mycotoxins* (mold-toxins) are also relatively large and non-volatile molecules (that is, they do not readily release into the air).

There are so many potential toxins that can come from fungi and myriad other sources, it can be quite difficult to discern and define the true cause of the problem. Symptoms can be quite vague and nonspecific, but nonetheless cause great suffering.

Another confounding issue is that the molds can produce *Volatile Organic Compounds (VOC's)* such as formaldehyde and other compounds by their very metabolism. These VOC's can also cause toxic syndromes. z

*Sick Building Syndrome* is a phrase that is used to describe a building that tends to cause problems for those that occupy it. Typically symptoms will be present during and for hours to days after exposure.

Commonly, after a few days away from the sick environment, the various symptoms will resolve, only to re-occur upon re-exposure to the source of the problem.

While it's very easy to attribute the cause of symptoms to a mold or discoloration on a portion of the building, the problem can become quite complex and difficult to solve. As with any illness, the appropriate cure needs to be matched to the correct disease: treating with anti-fungals may not work if the cause of illness is from Radon or heavy metal fumes, pesticide residues or other agents involved with the building. What symptoms can be anticipated from a sick building, exposure to VOC's possibly from fungi, or other toxic fungal exposure?

The following summary of toxins and their targets is adapted from Smith and Moss (1985), with a few additions from the more recent literature. While this compilation of effects does not describe the effects from multiple exposures, which could include synergistic effects, it does give a better idea of possible results of mycotoxin exposure to multiple molds indoors.

- Vascular system (increased vascular fragility, hemorrhage into body tissues, or from lung, e. g. , aflatoxin, satratoxin, rosidins).
- Digestive system (diarrhea, vomiting, intestinal hemorrhage, liver effects, i. e. , necrosis, fibrosis: aflatoxin; caustic effects on mucous membranes: T-2 toxin; anorexia: vomitoxin).
- Respiratory system: respiratory distress, bleeding from lungs e. g. , trichothecenes.
- Nervous system, tremors, incoordination, depression, headache, e. g. , tremorgens, trichothecenes.
- Cutaneous system : rash, burning sensation sloughing of skin, photosensitization, e. g. , trichothecenes.
- Urinary system, nephrotoxicity, e. g. ochratoxin, citrinin.
- Reproductive system; infertility, changes in reproductive cycles, e. g. T-2 toxin, zearalenone.

- Immune system: changes or suppression: many mycotoxins.

*Stachybotrys chartarum* is a genus of mold that grows on water damaged materials. It is a greenish-black fungus that likes material with a high cellulose content such as wood and the paper on drywall, fiberboard etc. It's a common culprit in buildings that have been flooded. It tends to produce spores in the range of 36-104°F and under certain as-yet undefined conditions can produce mycotoxins. The mycotoxins can be quite powerful; just touching it is enough to cause a rash, it can cause lethal bleeding within the lungs of infants and small children. Depending on the length of exposure and volume of spores inhaled or ingested, symptoms can manifest as chronic fatigue or headaches, fever, irritation to the eyes, mucous membranes of the mouth, nose and throat, sneezing, rashes, and chronic coughing. In severe cases of exposure or cases exacerbated by allergic reaction, symptoms can be extreme including nausea, vomiting, diarrhea and bleeding in the lungs and nose. Stillbirth and birth defects are also possible. 1 milligram of pure toxin is enough to kill a horse. The Dept of Defense has been looking into "weaponizing" the toxins of this fungus. What should you do if you have black mold growing where you live or work?

Probably the easiest first step would be to go to a major hardware store and get a "mold detection kit", which is typically a petri dish with nutrient that is mixed according to the directions in the package. Follow the directions and leave the dish uncovered as directed, then cover it with it's lid and see what happens. If growth is discovered it can be sent to the supplier of the dish for analysis to let you know if the dish is growing a toxic form of fungus.

*The Environmental Relative Moldiness Index (ERMI)* is a Quantitative, Real-Time Polymerase Chain Reaction (QPCR) panel of testing for indoor molds that was developed by the United States Environmental Protection Agency (US-EPA). This panel includes 26 mold species and groups of species that are known to thrive in water-damaged homes. This panel also includes 10 species and groups of species of molds that are found in all homes, with or without water damage. Each species and group of species is enumerated from DNA extracted from dust samples taken from both the living and sleeping quarters of homes.

Concentrations of each of the 36 molds are used to derive an "ERMI Score" that rates the "moldiness" of each sample against those tested by the US-EPA. These values range from approximately -10 (low moldiness) to 20 (high moldiness). If you are growing toxic fungi, call a qualified remediation expert to deal with this issue. Remember; these toxins can cause cancer, birth defects and a variety of symptoms. Intoxication implies that the illness from these agents will generally resolve when they're removed from your environment provided you make sure you follow good health recommendations to allow you to detoxify your body from the effects of the toxins.

Detoxification is a subject that has been discussed in articles published in this forum and are available on the website.

Stay Healthy!

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