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INDOOR ENVIRONMENTAL ISSUES AND INFORMATION . . . TODAY

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BLOOD TESTING FOR MOLD Science or Science Fiction?

As personal injury mold litigation continues to grow, so does the desire to find an objective indication of an individual's level of exposure and sensitivity to indoor molds. The FDA has well-established guidelines and standards for skin and blood tests used to determine if an individual is allergic to molds. Currently, however, there are no established guidelines or standards for blood serum tests claiming to indicate exposure and non-allergic hypersensitivity to mold.

Once ingested into the body, mold is referred to as an antigen. Antigens are substances that can induce a detectable hypersensitivity or immune response in the body. The body responds to each antigen by producing a specific antibody. The antibodies attach to proteins called "immunoglobulins" (Ig) of which there are several known classes (e.g. IgM, IgG, IgE, and IgA).

Production of IgE antibodies has long been associated with allergic responses. A person with an allergy produces a particular IgE antibody in response to exposure to a particular allergen, whereas a person without an allergy to that allergen does not produce any IgE antibody. An allergen causes an exaggerated or inappropriate immune response upon exposure. In response to the allergen, an IgE antibody adheres to mast cells triggering the release of histamine and resulting in tissue inflammation and symptoms such as runny nose, hives, watering eyes and/or asthma.

As we know, different people are triggered by different allergens in their environment. Some people have no allergic response when exposed to a particular mold, while others have a dramatic allergic response upon exposure to that same substance. The FDA has approved skin prick and blood testing to confirm an allergic (IgE) response and to identify the particular offending allergen. The FDA further regulates the allergens used for testing to ensure the potency and purity of the samples.

The Meaning of Air and Bulk Tests

The University of Minnesota's Environmental and Safety Group ("UMESG") has developed an Indoor Fungi Resources Guide. Included in the guide is a section devoted to interpreting laboratory results from bulk and air samples. The following summarizes this section:

What Type of Mold Species is Present

The UMESG suggests looking not just at the *amount* of organisms present in a sample as a whole but at the *particular type* of organisms present *down to the subspecies*, as the *subspecies* will determine whether or not an area is considered a potential health problem. Fungi that may look the same to the human eye can in fact be a variety of different mold species. Even among a single species of mold there are toxic and non-toxic subspecies that may or may not be present.

What Type of Sample was Taken

Other issues to consider when analyzing a test report include the type of sample taken and its limitations.

For example, **bulk sampling** refers to mold collected from a physical location where mold is found. If only bulk samples are analyzed, there may be difficulty in linking the bulk sources to airborne concentrations of fungal organisms.

Conversely for **air samples**, the level of fungal organisms may vary significantly during the course of a day due to activity levels in an area or fluctuations in temperature and humidity which cause the release of spores. Thus, the times, dates and temperatures at the time of sampling is important.

Viable-sampling consists of collecting a mold sample and culturing the sample in a laboratory to determine which molds are present. It is important to ensure that the appropriate environment for a particular type of mold is used for viable sampling to assure the accuracy of the results. Laboratories must be aware of which molds prefer which food sources, temperatures, and humidity when conducting their tests. Another issue to be considered is that rapidly growing fungi may crowd out slower growing organisms causing the later to be undetected in the laboratory sample. It is possible the spores captured are no longer viable and as such will not grow in the lab under any condition.

Test Data Which Warrants Further Action

The UMESG points out that there are no strict numerical standards for assessing whether the contamination in an area is acceptable. Nonetheless, as a guideline, it suggests that further investigation of

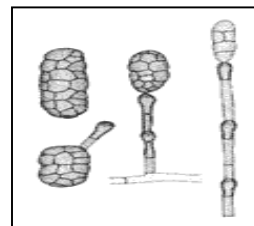
contamination sources is warranted in the following circumstances:

- The total indoor counts are greater than outdoor fungal counts when comparing indoor and outdoor ratios. (UMESG notes that outdoor samples are invalid when taken during or immediately after precipitation and may not be valid during winter months where outdoor fungal counts are usually below those indoors);
- Comparison of indoor and outdoor levels produces the following: (1) different organisms are present in the indoor sample than outside; (2) the predominate organism inside is different than the predominate organism outside; and (3) a monoculture of an organism is found in the indoor sample (if the organism is present only in a mixed outdoor sample or absent from samples taken in other areas indoors);
- If any of the above criteria are met and the organism is capable of producing carcinogens or mycotoxins;
- If necessary to comply with the Americans with Disabilities Act, even if the above are not identified. An example is where an individual has been diagnosed by a physician as allergic to a specific fungal organism, and
- An opportunistic fungal pathogen is found in an area that houses individuals who are immune compromised.

These guidelines are not meant to be all inclusive. The complete UMEHS guide can be found at: www.dehs.umn.edu/iaq/fungus/mycoglos.html.

Spore Defined:

Molds reproduce by means of spores. Spores are microscopic and vary in shape and size (2-100 micrometers). They can travel in several ways including passive



movements such as a breeze or waterdrop, they can be mechanically disturbed by a person or animal passing by or actively discharged by the mold where there are moist conditions or high humidity. Mold spores are specifically unicellular sexual or asexual reproductive bodies. See www.epa.gov/iaq/molds and www.aerotechlabs.com.

EPA Guidelines for the Evaluation and Remediation of Mold and Water Intrusion Problems in Schools and Commercial Buildings

The United States Environmental Protection Agency ("EPA"), through its Indoor Environments Division, has recently released its first set of guidelines designed for in-house maintenance personnel and outside professionals to assist in evaluation and remediation of mold and moisture problems. While promulgated for use in schools and commercial buildings, these guidelines may provide useful information for remediation in other structures as well. The EPA guidelines are found at <http://www.epa.gov/iaq/molds/index.html>.

The EPA guidelines address evaluating the severity of a mold problem; deciding whether to remediate the problem in-house or through outside professionals; creating, implementing and monitoring a remediation protocol concerning structures and their contents; and protecting the health of building occupants and remediators.

To summarize, the guidelines identify immediate action upon noticing a mold or water intrusion problem as a primary objective. If this assessment takes place within 24-48 hours of the onset of a water or moisture intrusion problem, the moisture can be completely dried before mold is able to congregate. Table 1 of the EPA guidelines provides recommended cleaning and drying methods for particular types of building and personal materials. The table can be accessed directly at <http://www.epa.gov/iaq/molds/table1.html>. The recommended methods are intended to avoid the need for remediation of mold growth by taking quick action before growth starts.

If mold has developed, the investigation and clean-up should follow Table 2 of the EPA standards, found at <http://www.epa.gov/iaq/molds/table2.html>.

Table 2 is designed to assist in determining whether to handle the mold problem in-house or through outside professionals. This determination depends upon the extent of the mold problem as determined by the square footage of the total surface area affected. The EPA advises that not all remediation efforts require a massive abatement by outside professionals.

Small problems which may be handled in-house

with less stringent protective equipment and containment measures involve less than 10 square feet of total surface area affected, whereas medium and large problems, requiring professionals and greater levels of protective equipment and containment, cover total surface areas between 10 and 100 square feet and greater than 100 square feet, respectively.

Recommended cleaning methods are provided for specific types of building and personal materials, as is guidance for whether certain items may need to be discarded and replaced. The guide provides a code for each of four cleaning methods: wet vacuum; damp-wipe; high-efficiency particulate air (HEPA) vacuum; and discard. These are described in detail at http://www.epa.gov/iaq/molds/i-e-r_cm.html.

The EPA recommends that references for outside professionals be checked to ensure that they have appropriate mold remediation experience, and that they are following the recommendations presented in the EPA's standards, the guidelines of the American Conference of Governmental Industrial Hygienists (ACGIH) found at <http://www.acgih.org> and guidelines from other professional organizations.

Further advice and guidelines are provided on the EPA website regarding whether sampling is needed, general sampling standards and references for analytical methods, planning a remediation protocol, communication with building occupants regarding remediation efforts and complaints of symptoms, the possible need for relocation of building occupants, key steps and inquiries to consider during the evaluation process, the possibility of hidden mold and how to know when mold remediation steps have been successful.

Only Kids:

"Mushrooms only grow when it is really wet, that's why they are in the shape of umbrellas."



"Science is built of facts the way a house is built of bricks; but an accumulation of facts is no more science than a pile of bricks is a house." Henri Poincare

Eliminating the Source; Moisture Control is Key

Because mold requires water to grow, it is essential to prevent or repair moisture problems in buildings. As is noted by the EPA standards, moisture problems can have many causes, some of which are discussed below along with the EPA's recommended repair methodologies:

- **Uncontrolled humidity and/or moisture due to condensation** – The EPA recommends that low indoor humidity should be maintained, below 60% relative humidity, ideally 50%, if possible. Control by either increasing surface temperature or reducing the moisture level in the air (humidity). Increase surface temperature by insulation or increasing air circulation. Reduce moisture level in air by repairing leaks and either increasing ventilation (if outside air is cold and dry) or dehumidifying (if outdoor air is warm and humid).
- **Changes in construction practices during the 1970's, 80's and 90's, resulting in tightly sealed, inadequately vented buildings, potentially leading to moisture build-up. Building materials, such as drywall, may not allow moisture to escape easily.**
- **Roof, window, plumbing and other leaks** – Repair leak source.
- **Landscaping, drainage patterns, and gutters that direct water into or under buildings** – Do not let foundations stay wet. Provide drainage and slope the ground away from the foundation.
- **Unvented or improperly vented moisture generating appliances** – Appliances should vent to the outside, where possible. Use of exhaust fans and opening of windows from kitchens and bathrooms.
- **Delayed or insufficient maintenance** – Create and implement repair and maintenance plans. Make regular inspections of roof, windows, HVAC, plumbing, outside drainage and other potential water sources. Routinely maintain heating, ventilation, HVAC, refrigerant, and other moisture related systems, including clean and unobstructed flow of drip pans. Wet, non-moldy materials should be dried within 48 hours.
- **Condensation and wet spots** - Dry within 48 hours.

Mold Legislative Update

As predicted in the last issue, CA State Senator Debra Ortiz' Toxic Mold Protection Act passed in both houses and Governor Davis has signed the bill into law.

Highlights of the bill:

- Department of Public Health convenes a taskforce to consider the feasibility of adopting permissible exposure limits to mold in indoor environments. The taskforce must report its results by July 1, 2003.
- Department of Public Health develops public education materials and resources to inform the public about the health effects of mold.
- Once permissible exposure limits are established, any property owner who knows or has reasonable cause to believe that mold exceeding permissible standards is present, must provide a written disclosure to potential buyers, renters, or occupants of the mold conditions.

MOLD TERMINOLOGY 101

Microorganisms must compete for available ecological niches and to do so have developed toxic and antibiotic products to inhibit or kill their competitors. The following terms relate to the substances, which some fungi are known to produce under certain conditions.

MYCOTOXINS: by-products of fungal growth that exist only under certain conditions and are non-essential to the growth and function of the organism. May or may not be aerosolized. Currently there is no direct test for the presence of mycotoxins in indoor environments, rather only indicators signifying that mycotoxins may be present. Some mycotoxins in sufficient dose can cause tissue inflammation, cardiovascular constriction, and adverse neurologic effects such as headaches, tremors and dementia.

Microbial Volatile Organic Compounds (MVOC's): defined in the mold context as aerosolized organic substances, including mycotoxins, that may be inhaled with adverse consequences. Insufficiently understood to have clinical significance for determining health effects. Some MVOCs are associated with a mold or mildew type smell.

*"The home of everyone is to him his castle and fortress, as well for his defense against injury and violence, as for his repose."
Edward Coke*

Continued from page 1, Blood Testing...

The IgE antibody, however, is only one of several types of antibodies that can be produced by the body in response to an antigen. The presence and function of other classes of Ig antibodies is not yet well understood. Many medical professionals agree that the presence of a particular antibody indicates the body's previous exposure to that particular antigen at some point. However, beyond this very general understanding, there is no further agreement about the significance of a particular antibody's presence in the body as it relates to mold exposure.

Some health practitioners collect blood samples to test for the presence and level of particular IgG antibodies to molds such as stachybotrys. They then claim that the presence of the stachybotrys IgG antibody is proof that a person has been exposed to that correlative level of mold, regardless of whether they are allergic to that mold.

These health practitioners use various blood serum tests such as RAST, ELISA, and Ouchterlony double diffusion assays to allegedly determine the level of IgG antibodies in a blood sample. Typically, the blood serum is introduced to a mold culture and the results are then interpreted. The blood test is then submitted as evidence of exposure regardless of whether the person is experiencing any adverse health symptoms. Some practitioners even use the findings to diagnose a condition known as hypersensitivity pneumontis (HP). HP is a non-allergic sensitivity to an antigen characterized by recurrent pneumonia type symptoms. General symptoms such as fatigue and malaise are also attributed to hypersensitivity from mold exposure.

Molds are omnipresent throughout the indoor and outdoor environment. It is common to find antibodies to a particular type of mold in people without a history of indoor mold exposure. Conversely, people claiming to have been exposed to certain molds in their indoor environment may not have detectable levels of the mold antibody in their blood serum sample.

Whether the level of antibody fluctuates over time and even disappears and at a different rate depending on the antigen, whether different people produce different levels of antibodies to the same dose of antigen, or whether the methods of serum testing for IgG are valid are all

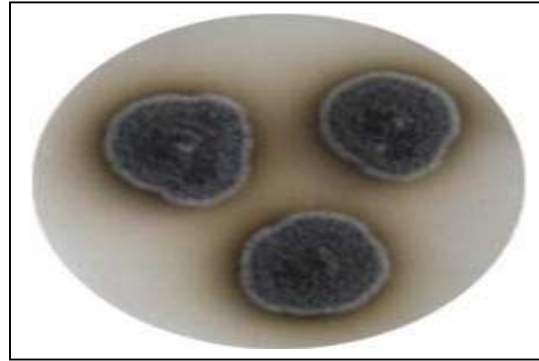


Figure 1: Photo of a culture sample of stachybotrys mold

issues deserving of further medical research.

Currently, there are no reliable scientific studies to support the alleged association between IgG antibodies and exposure to mold. Some experimental and clinical data is available but the conclusions are not generally accepted within the medical community. There is simply insufficient research regarding the meaning, if any, of the presence or absence of particular IgG antibodies in blood serum. Stachybotrys IgG tests in particular are known to cross-react with other mold subspecies resulting in "false positive" test results. Moreover, it is unclear what significance, if any, results from the presence or absence of a particular IgG antibody in the body. Defense counsel continue to fight to prevent the introduction of these tests as evidence of exposure in personal injury mold litigation with varying results.

In December 2000, the California Department of Health Services issued a firmly worded opinion letter concluding that the blood tests used to test for stachybotrys mold have "no clinical application at this time. [They] cannot be used to imply the presence or exposure to this specific mold or its toxins". See www.dhs.ca.gov/ps/deodc/ehib.

Despite the Department of Health Services' edict, some practitioners continue to use the IgG testing to assist them in "diagnosing" mold exposure and to claim that mold has caused specific adverse health symptoms. To date, the tests have mainly been used by plaintiff attorneys as leverage in litigation, and not for clinical treatment.

Contributions made by Michael Pietrykowski, Bill Peters, Laura Geist, Molly McKay, Brett Stewart and Haley Norton. This is a Gordon & Rees, LLP publication. If you have any questions or comments regarding its contents, please contact us at cordonrees.com.