

## Mold and Indoor Air Quality

### Indoor Air Quality and Your Health

During the last several years, we all have heard about illnesses and structural problems within homes as a result of exposure to toxic mold and fungal microorganisms. And there seems to be an increase of allergy symptoms and hypersensitivity, particularly in young children, as a result of mold. Learning more about mold and the causes of these problems is the first step in knowing how to maintain a quality home environment.

Building Related Illness (BRI) and Sick Building Syndrome (SBS) are terms used when health symptoms are experienced while in a particular building (including the home) and relief from these symptoms only occurs after leaving the site. Causes of BRI and SBS are often related to poor Indoor Air Quality (IAQ). Poor IAQ can be caused by many different factors such as: Inadequate or contaminated ventilation systems Humidity problems High particle (house dust) levels High allergen levels (dust mites or cockroaches, pollen, mold, animal dander) Chemical exposure to building materials or cleaning agents Pesticide use Environmental tobacco smoke Exposure to the byproducts of combustion (carbon monoxide) Exposure to indoor molds and bacteria. Americans generally spend more than 90% of their day indoors; thus, exposure to indoor pollutants can have a considerable health impact on individual sufferers as well as schools and businesses. In fact, indoor levels of pollutants may be 2-5 times, and occasionally more than 100 times, higher than outdoor levels according to Environmental Protection Agency studies of human exposure to air pollutants. IAQ problems may lead to increased medical expenses due to health problems (direct costs) and lost productivity due to discomfort or absenteeism (indirect costs).

### Mold and Its Dangerous Effect On Indoor Air Quality

Mold, also called mildew or fungus, is an organic substance that comes in a variety of species and colors and is often recognized by its musty smell. Mold has been implicated as a major cause of Building Related Illness (BRI) and Sick Building Syndrome (SBS). Studies have shown that exposure to indoor mold can induce respiratory illness in adults, and can cause early onset asthma and allergies in children. Molds produce allergens (substances that can cause allergic reactions), irritants, and in some cases, potentially toxic substances (mycotoxins). Inhaling or touching mold or mold spores may cause allergic reactions... They can be immediate or delayed. Molds can also cause asthma attacks in people with asthma who are allergic to mold. In addition, mold exposure can irritate the eyes, skin, nose, throat, and lungs of both mold-allergic and non-allergic people.

From the EPA - A Brief Guide to Mold, Moisture and Your Home A recent Mayo Clinic Study (1999) found that 96% of chronic sinus infections were caused by molds. Molds have also been implicated in other non-allergy related illnesses. A wide variety of symptoms have been attributed to the toxic effects of fungi. Symptoms such as fatigue, nausea, and headaches, and respiratory and eye irritation have been reported. Some of the symptoms related to fungal exposure are non-specific, such as discomfort, inability to concentrate, and fatigue.

From the New York City Department of Health & Mental Hygiene. Types of Mold You Should Know About There are a number of different molds that can be found in the home. Some of these molds favor outdoor environments for growth but readily enter the home by circulating through doorways, windows, and systems like heating and air conditioning units. Mold can grow on almost any substance as long as it has a carbon-based food source, moisture, oxygen, and the temperature is between 40 and 100o F. We've listed these molds at the genus level but there are sometimes many different species - some more toxic than others. For example, *Aspergillus* has well over 100 species including *flavus*, *ochraceus*, and *parasiticus*. *Alternaria* A large spore mold that can deposit in the nose, mouth and upper respiratory tract causing an allergic response. Indoors, it is often found in carpets, textiles, house dust and potentially damp areas like window frames and showers. It can also be found in plant soil. *Aspergillus* Usually found in warmer climates in areas of water damage or extreme dampness. *Aspergillus* species are also commonly found in house dust. Many species produce mycotoxins which may be associated with disease in humans and some animals. Also found in building materials and in fall leaves and other decomposing matter like compost piles.

*Cladosporium* The most commonly identified outdoor fungus, but it can easily enter into the house through the HVAC and other airflow entryways. *Cladosporium* also has an indoor species that grows on textiles, wood and other porous, damp areas. Both indoor and outdoor species are triggers for hay fever and asthma symptoms.

*Penicillium* A very common mold known to cause allergies, hay fever and asthma. Species may be found growing on wallpaper, wallpaper glue and decaying fabrics in water-damaged buildings or homes. It is also found in carpet and in interior fiberglass duct insulation. Some species can produce mycotoxins. From the University of Minnesota Fungal Glossary and the Environmental Microbiology Laboratory

### How Do I Know If I Have A Mold Problem?

If you think your home or office might have a mold problem it's time to do a little detective work. First, consider your symptoms or those of your loved ones. When you leave the suspected area do the symptoms dissipate? Do you smell anything different when you enter the area (a musty smell for example)? Are there any visible signs of mold growth (even a little) like shown in the pictures? Carpet, dry wall, wood, attic space and insulation, and even bare earth in a crawl space should be checked. Do you or have you ever had a water leak in any part of your home? The source could be rain, plumbing, an appliance or condensation.

If you don't see any visible signs of indoor mold, don't breathe a sigh of relief just yet. Unfortunately, there are many places for indoor mold to hide. For example, indoor mold can be behind baseboards, under carpeting, in the ventilation system, or behind drywall. You should also be wary of any area that has been wet at one time but now appears dry: even

non-living mold spores can cause adverse health symptoms. While hidden mold is more difficult to detect, it can often be recognized by odor. If you suspect you might have a mold problem, the next step is to utilize a do-it-yourself mold test or contact a professional IAQ consultant for testing.

#### Mold Testing Techniques

Testing is an effective and recommended way to discover if mold is present, how much mold is present, and what types of mold are present. Having said that, please realize that these tests should be used as an initial screening procedure and that further testing may be needed to fully characterize your environmental conditions. There are two main test methods available that are very easy to use.

The Air Sample method usually utilizes a culture plate (or petri dish) that must be refrigerated until time of use. It is then left open in the test area for about an hour. Live mold spores that are in the air then settle on the plate and will grow on the media over the course of 5 to 7 days. The plates are sent to a test lab where they are carefully examined. This method allows for the specification of different types of live molds at the genus level and can show how severe the problem is based upon how many colonies grow on the plate. It is important to note that this test method is a "snapshot" view of live airborne mold spore in the location tested. But mold spores can be released intermittently, based upon activity levels in the area, relative air pressure, and other variables, so the air sample snapshot may not reflect the true nature of the condition. Also, mold spores don't have to be live to cause health problems, and dead ones won't grow on the plates. Finally, molds grow at different rates. Slow growing molds (like *Stachybotrys*) could become hidden on the culture plate by the more rapid growing molds.

The Tape-Lift method of mold detection, as the name implies, utilizes a peel-off tape strip that is pressed on the surface to be tested. The sample is then applied to a glass slide and read at a test lab under a microscope at 400 to 1000 times magnification. Spores are identified by visual characteristics such as size, shape, texture, and color. A heavy load of background material on the slide - like dust, dirt or other debris - might obscure the view of any mold spores present. A report is sent, usually showing a semi-quantitative estimate at the genus level. Because some spores look the same under a microscope (such as *Penicillium* and *Aspergillus*) they are listed together, and because there are literally thousands of different spore types, you may sometimes see spores reported as "unidentifiable". Because tape-lift tests read both living and non-living spores, this sampling method reveals a historical account of what has occurred in an area over time rather than a snapshot of what is currently in the air.