

Health Effects of Mold and Damp Buildings

Classroom Objectives:

- Identify at least four 5 common symptoms associated with mold exposure and/or damp buildings
- Identify at least four health effects or illnesses associated with mold exposure or damp buildings.
- List the four Routes of Exposure to mold
- Define sensitization, inflammation, asthma and irritation
- Define mycotoxins.

(All questions are highlighted. Points that should be brought out in the answers are included but this text is not designed to be read verbatim)

Introduction: (45 minutes)

Case history:

We're going to focus on mold because we know more about mold overexposure than other types of exposures in damp buildings. We say *overexposure* because we're all exposed to mold indoors and out – everyday. We're just beginning to understand the impact of damp and/or moldy buildings on the health of occupants. There's some way to go, but the experts have definitely made an association between certain health complaints and exposures to damp or moldy buildings. Most of our knowledge of over- exposure to mold does not come from indoor exposures but from epidemics of people and farm animals that ate heavily contaminated food. Here's a brief history of these moldy food epidemics worldwide. There were 65 mold epidemics associated with ingestion of moldy food worldwide between 1591 and 1889: 1920's: fatal kidney disease caused by mold in Denmark and the Balkans; 1930's Stachybotrycosis 30% of horses in Russia from eating moldy hay; 1944: Alimentary Toxic Aleukia epidemic in Russia from eating moldy bread, 10% of the population was affected and it was often fatal; 1952: Aflatoxicosis, killed poultry that ate moldy corn (*Aspergillus*).

The jury is still out on the extent of illness associated with over-exposure to mold or damp buildings. We do know that the concentration of mold that people are exposed to in buildings is not anywhere as heavy as that in the food poisoning examples above. The health consequences of indoor exposure can be very

serious and we need to protect people from these exposures. We'll explore the health issues today.

ASK: People in high humidity areas have always been exposed to mold. So why are we especially concerned about the health effects of mold exposure right after a hurricane or severe flooding?

Ask: What are some possible symptoms of mold exposure and damp building exposure?

Itchy/Watery eyes

Sore throat

Bloody nose and ears

Respiratory Problems

Wheezing

Runny nose

Fever

Memory Loss

Trouble concentrating

Rashes

ASK: "What are some of the illnesses or health effects associated with the symptoms you identified above."

List answers on a flip- chart – You should make sure that all four categories are mentioned – allergies, asthma, irritation symptoms and mold infection.

- **Allergies** – About 20% of the US population has the genetic pre-disposition to develop an allergy to many substances Mold and other microscopic things such as dust mites, animal dander and pollen have proteins that can cause an allergic reaction (sometimes in a very small amount) in people who are sensitized to them

ASK: "What do you think sensitization means?"

"What happens to someone who is sensitized to an allergen and comes into contact with it at another time?"

Individuals that are genetically predisposed may become allergic or sensitized to a protein substance when first exposed. After an initial sensitization they are

prone to react to the substance every time they come in contact with it.

ASK: “How many of you have been told by a doctor that you have an allergy? How many of you suspect that you have an allergy?”

- ***Asthma*** – This is a disease of the lungs. It causes repeated episodes of wheezing, breathlessness, chest tightness and nighttime or early morning coughs. There is a growing asthma epidemic in the US. Nearly 13 million children have been diagnosed with asthma and many more have probably not been treated. Workers from many industries have developed asthma because of workplace exposures. Education workers have a higher prevalence of work-related asthma compared to the general working population.

Asthma is one of the most serious chronic illnesses in this country.

We know that mold exposure and damp buildings can trigger asthma attacks in people who are asthmatic. Some researchers believe that long-term mold exposure or exposure to damp buildings can cause a new case of asthma.

ASK: “How many of you have an asthma diagnosis? If you have any of the symptoms we talked about, see your doctor.”

- ***Inflammation*** (secondary infections) – People who are repeatedly exposed to moldy/damp buildings can develop chronic inflammation of the mucous membranes. Inflammation is the body’s response to irritation; it can cause pain, swelling, redness and heat in body tissues.
 - Constant inflammation can set people up for “secondary” bacterial or viral infections of the sinuses or lungs (sinusitis, bronchitis).

ASK: “Has anybody ever had a sinus infection or bronchitis?”

- ***Irritation*** – People aren’t just exposed to mold allergens in the building, they can be exposed to compounds that the mold produces called **microbial volatile organic compounds (MVOCs)**. **MVOCs**
 - are produced during fungal metabolism and given off as a gaseous waste by-product.
 - are an indicator of active and past fungal growth
 - have an distinct odors: earthy, musty, weedy, nutty

The symptoms of exposure to MVOC’s may look like an allergy – irritated eyes, nose and throat, coughing and sneezing and skin

rashes.

- **Infection** – On rare occasion, people who can become directly infected with molds. Most that do have weakened immune systems. Examples of mold infection include aspergillosis – an infection with aspergillus that is commonly found growing on hay and other crops; histoplasmosis caused by histoplasma (a naturally occurring fungus found in the Ohio valley).

There have been incidents where immune-compromised patients in hospitals undergoing mold remediation have developed aspergillosis.

ASK: What groups would have a higher risk of health effects?

- Children
- Elderly
- People with immune deficiencies (AIDS/HIV, immune deficient, transplant patients, cancer patients, lung issues/weakness)
- People with respiratory issues or allergies

Routes of Exposure or Entry

ASK: "How are we exposed to mold?" **(write answers on the flip chart)**

Inhalation, ingestion, contact

Emphasize these three answers and make sure that each of these is defined. Another answer that may come up during this brainstorm is injection - but do not list this unless someone mentions it.

So to understand how mold can affect us, we need to know how we are exposed. Inhalation would be a big issue with mold because the spores can become airborne.

Ingestion would be a concern when it came to eating moldy food.

ASK: "How does mold get to lungs?"

Mold is usually inhaled:

Explain about the size of mold.

Briefly discuss micron sizes and body's natural defenses against spores.

Nose hair- 10 microns or more

Mucus- 5-10 microns

Cilia- 2-5 microns

Alveoli- less than 2 microns

Nose hair STOPS particles, as well as mucus, however note that esophagus have cilia and mucus to CATCH particles, and moves them to the back of the throat, then out via coughing, spitting, swallowing. Alveoli CATCH 2 microns or less. Alveoli are where the oxygen exchange takes place. Most mold spores are about 4 micron in size.

Put into perspective for them:

You could place over 20 million five micron spores on a postage stamp.

Ask: what are Mycotoxins?

Mycotoxins = poisons used by mold to defend itself and compete for access to a water or food source. Experts are not sure what role they play in symptoms or disease in exposed individuals.

Many adverse health affects may be caused by a body's reaction to Mycotoxins.

(FYI: the different mycotoxins)

Trichothecenes, Beta Glucans, Nitric Oxides, Aflatoxins

Both viable and non-viable mold spores produce mycotoxins

Viable:

Spores that have the ability to germinate given the right conditions.
(roughly 25% of all spores in any given area)

Non-viable:

Spores that can never grow into mold phase. (roughly 75% of all spores in any given area)

Discuss: Diagnostic Checklist. (10 minutes)

It is in handout form. Read through together as a group.

- When did the symptoms(s) or complaint begin?
- Does the symptom or complaint exist all the time, or does it come and go?
- Is it associated with times of day, days of week, or seasons or the year?
- If so, are you usually in a particular place at those times?
- Does the problem abate or cease, either immediately or gradually, when you leave work or your home?
- Does it recur when you return?
- What is your work?
- Have you recently changed assignments or has your employer recently changed locations?
- If not, has the place where you work been redecorated or refurnished, or have you recently started working with new or different materials or equipment?
- Describe your work area.
- Does anyone else in your workplace have a similar problem?
- (this may suggest either a common source or a communicable condition)

Explain: this could help to find out if there is a mold problem at your work place and home and give you a starting point.

Small Group Activity (15 minutes)

Hand out Small Group Activity questions on Mold.

Toxicology of Mold

Small Group Activity

1. Toxicology is the study of what?

The study of effects of hazardous substances on the body

2. What are mycotoxins?

Poisons used by mold to defend itself and compete for access to a water source

3. What are four health effects or symptoms of microbial growth?

Itchy/Watery eyes	Runny nose	
Sore throat	Fever	
Bloody nose and ears	Memory Loss	Trouble
concentrating		
Respiratory Problems	Rashes	
Wheezing		

4. What are the Routes of Entry of Mold?

Inhalation, ingestion, contact

5. What is the difference between Viable and Non-Viable?

Viable can reproduce and Non-Viable can't

6. Can dead mold spores still give off mycotoxins?

yes

7. Who is most susceptible to effects of mold?

Children People with immune deficiencies (AIDS/HIV, immune deficient, transplant patients, cancer patients, lung issues/weakness)

Elderly People with respiratory issues or allergies

8. What is the difference between Acute and Chronic health effects?

Acute means large dose in a short time

Chronic means a smaller dose over a long time

Report Back:

(15 minutes)

Show slides:

(5 minutes)

- 1) Mold spores retain their ability to cause allergic reactions and health problems regardless of their ability to reproduce.
- 2) Health Effects of Mold Exposure
- 3) Parts of the Mold that cause symptoms
- 4) Allergies and asthma
- 5) Risk Factors
- 6) **What is Asthma**
- 7) **Pathology of asthma how it effects the lung**
- 8) **Diagnosing asthma – patient check-list**
- 9) **Reducing mold exposure – eliminate asthma exacerbations**
- 10) **MVOC's and Irritation symptoms (Microbial Volatile Organic Compounds)**
- 11) **Penicillin**
- 12) **Economically important antibiotics**
- 13) **Size of mold in microns matters as to where it can get into your body (Explain how the body stops different size...the nose....the mucus membrane**
- 14) **Childs lung with mold**
- 15) **Moldy corn**
- 16) **Chickens lung with mold**
- 17) **Moldy straw**
- 18) **Horses mouth from eating moldy straw**

Summarize:

(5 minutes)

Damp buildings and indoor exposure to mold may cause long term health effects. what we have to remember is to notice some of the early signs of exposure to mold. Once we can recognize those we can start to fix the problem. And remember not all mold is bad for you. Just like in poisonous snakes they need their venom to make anti-venom to protect us. Mold is no different; some mold is used for good things for us.

If you are having these symptoms, take the symptom and workplace environment check lists to your doctor.

