Mold—Is It a Health Hazard in The Workplace?

By Kimberly J. Gordon, RN, MA, COHN-S and Fred Gerr, MD

Over the past few years, questions and concerns about mold and its effects on health have been raised repeatedly in newspapers, magazines, and television ‘special report’ programming. With the increased attention to mold, many people are concerned about the possibility of mold-related illness in the workplace. Let’s examine this and other related questions.

What are molds and fungi?

Mold is a visible collection of microscopic fungi stalks found in virtually all indoor and outdoor environments. The fungi are one of the five "kingdoms of life." The five kingdoms of life are:

- Monera (bacteria, blue-green algae)
- Protista (amoeba, paramecium)
- Fungi (penicillium, aspergillus, mushroom)
- Plant (mosses, crops, trees)
- Animal (insect, mammal)

Fungi are plant-like organisms that lack chlorophyll. This lack of chlorophyll requires fungi to absorb food from other sources. Fungi have cell walls and require oxygen to live. They can be parasitic (get their nutrients from other living things), saprobic (get their nutrients from dead organic matter), or both. Since they do not use light to make food, they can live in damp, dark places.

(Continued on page 2)

Machine Safety Guidline

Page 4 OSHA Recommends Eliminating Manual Lifting of Nursing Home Residents When Feasible

OSHA Safety and Health Topics Website

OSHA Announces New Assistant for Emergency Preparedness

Tornado Safety in the Workplace

By Kimberly J. Gordon, RN, MA, COHN-S

Spring is here, so is tornado season. Although, tornados can strike any time of the year; they occur at a higher rate in the spring and summer. Weather conditions can change at any time, making the formation of a tornado possible, but they frequently occur between 3 and 9 p.m. Tornados cause an average of 70 fatalities and 1500 injuries each year (National Weather Service).

(Continued on page 5)
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There are two main categories of fungi: molds and yeasts. The molds are multicellular and the yeasts are composed of a single cell. Examples of molds include: mushrooms, Stachybotrys chartarum, Aspergillus fumigatus, and Penicillium. An example of yeast is Saccharomyces cerevisiae, also known as baker’s yeast. While there are two broad categories, there are over 100,000 species of fungi, adding to the confusion that sometimes surrounds discussion of molds.

Molds produce microscopic spores that can be transported in air or water, or carried by insects. Mold spores can almost always be found drifting through indoor and outdoor air. In order to grow, spores and fungi need:

- food (presence of nutrient source)
- sufficient moisture/humidity
- temperature
- light (really to make spores rather than growth).

Fungi grow when nutrients and moisture are present in the right amount. While most fungi prefer damp environments, some fungi are xerophilic — they grow in relatively dry environments.

Are fungi good or bad?

Fungi are almost always found in decaying organic materials like leaves and spoiled food. Fungi help break down these materials so they can be reused by other living things. In other words, fungi are useful for the environment. Mushrooms are used in cooking while yeast is used to make bread rise. Fungi use our trash as food which is then made into soil. If fungus is good, can it also be bad? Bad fungus is simply good fungus in the wrong place. When mold spores land on damp areas indoors, they may begin to grow and digest whatever they are growing on. This is their way to survive. Molds can grow on surfaces like wood, paper, carpet, and food. If too much fungus grows in an environment inhabited by people, then potentially hazardous exposures may occur.

Does mold in the air affect one’s health?

There are three kinds of health effects that may occur after exposure to airborne fungi:

- allergic reaction
- toxic effect
- infection

What are Allergic Reactions?

Allergies are conditions that result from an immune system reaction to foreign substances or materials that enter the body. Allergic reactions can be immediate or delayed. Immediate allergic reactions to mold include:

- Rhinitis (runny nose — may also sneeze and have watery eyes)
- Conjunctivitis (eyes become red, itchy, swollen with mucous discharge)
- Sinusitis (sinuses may be painful and draining)
- Asthma (difficulty breathing possibly with wheezing and productive cough when exposed)

Asthma is actually a chronic lung disease characterized by narrowing and inflammation of the air passages. Asthma can be caused by many environmental stimuli and these can differ from person to person. When stimuli from a particular environment regularly cause one’s asthma to worsen, the illness may be called “Environmental Asthma.”

A group of related chronic lung diseases called hypersensitivity pneumonitis (also called extrinsic allergic alveolitis) can occur as a result of a delayed allergic reaction to mold. These are a group of lung disorders resulting from repeated exposure to a wide variety of airborne hazards, including some fungi. Examples include: bird fancier’s lung, farmers lung, and humidifier lung. Health effects include: cough, difficulty breathing, fever, chills, and an overall sick feeling following an exposure. Because some forms of hypersensitivity pneumonitis can result in permanent lung damage, physicians should maintain a high index of suspicion.

What are Toxic Effects?

The toxic effects from fungi exposure comes from mycotoxins or glucans. Mycotoxins are metabolic products made by fungi, including mold. Some of the mycotoxins have clinical uses, such as penicillin. Others can be harmful to one’s health. Aflatoxin, if eaten in contaminated food, can cause liver cancer. Mycotoxins in homes and offices have not been clearly associated with any disease in humans (ACOEM).

Glucans are mold cell walls, which can produce an irritant effect. Organic dust toxicity syndrome is one such effect from glucans (Gerr).

What is Fungal Infection?

Fungi can cause infection in differing body parts. For example, fungi can cause conjunctivitis (an infection of the eye) or it can cause athlete’s foot. While fungi can cause infection in some persons, it is rare for persons with normal immune systems to get a systemic fungal infection (Gerr).

Are there myths about health effects from exposure?

Yes. In fact, the following health effects are not known to be caused by exposure to fungi in homes or offices:

- bleeding from the lung or into body tissues
- diarrhea, vomiting or bleeding of the intestine
- lack of coordination
- depression or difficulty thinking
- headache
- rash or peeling of skin
- sensitivity to light
- kidney problems
- infertility or changes in reproductive cycle
- suppression of the immune system (Gerr).

How does a doctor determine if mold is causing a health effect?

According to American College of Occupational and Environmental Medicine (ACOEM), medical evaluation of health problems potentially related to indoor mold should include:

- a complete medical history
- a complete occupational and environmental history
• assessment of previous exposures and pre-existing medical conditions
• physical examination
• assessment of possible sources of exposure to mold and dampness
• workers must be assessed individually (ACOEM).

Can mold be a problem in the workplace?

When discussing fungi in the workplace, one must consider the overall quality of the indoor air. While fungi can affect indoor air quality, there are many other factors that may contribute to the problem. Other contaminants like asbestos, radon, tobacco smoke, pesticides, lead, carbon monoxide and volatile organic compounds (VOCs) must also be considered. In addition to the non-biological contaminants mentioned above, biological ones like viruses, bacteria, mites, insects, dander (from people and pets), algae, and pollen must also be considered (Gerr).

Indoor air quality problems and health issues related to it may result from more than one of these contaminants. A given person may be exposed to a variety of contaminants. The exact cause of one’s complaints can be difficult to pinpoint. Often the signs and symptoms experienced by the person are not specific, making diagnosis challenging.

Can workplaces prevent mold growth?

Yes, appropriate measures can be taken to prevent mold growth in the workplace. Mold can grow in a many places including machining fluids and locations where organic materials (including paper and cardboard) are handled or stored. The most successful way of limiting mold exposure is to control moisture levels and water entry. If heavy mold exposure is present, engineering controls and personal protective equipment should be used to reduce aerosol generation and minimize worker exposure until it has been remediated (ACOEM).

Is environmental sampling for mold in the workplace needed?

Environmental sampling is one way to determine the presence of mold. The sampling usually shows a mixture of many types of organisms—some maybe harmful—but many are unavoidable components of the indoor and outdoor environments. Environmental sampling may be used to test hypotheses about causes of illness and pathways that workers may be exposed. Because molds are almost always present in any workplace, the key questions to ask before getting environmental sampling are:

• Is mold present in excessive amounts?
• Can workers be exposed?
• Is the mold likely to cause health effects? (Sanderson)

How does one clean up mold if a workplace is infested?

If sampling shows unacceptable high levels of mold and the sources have been identified, clean-up is in order. Containment of the mold contaminated area is recommended. Containment includes vacating the infested work area and the application of plastic coverings to contain contamination and protect uncontaminated surfaces. Ventilation systems serving the containment area must be shut down. Negative pressure, HEPA filtered fans and outside air exhaust may also be necessary. Persons performing the clean up must use the appropriate personal protective equipment. If the area of mold infestation is small, a NIOSH-95 half-face, air purifying respirator; gloves; and eye protection are recommended. For larger areas, a full-face, air purifying respirator; disposable full body coverall; gloves; and foot covers are needed (Jones).

The clean up process involves demolition, cleaning, vacuuming, and disposal. If a porous surface like drywall or carpet has mold infestation, discarding the materials is recommended. Surfaces like metal, hard plastic, glass, wood, and concrete may be retained if properly cleaned. Employers may seek professional consultation to determine what is best for them.

The mold infested area should first be cleaned with water and detergent. A biocide, a chemical used to kill the fungi, should then be applied. Employers may need approval from the city, county or state to use such biocides. Vacuuming the area may also be needed. Once the mold infested area is cleaned, proper disposal of discarded materials is imperative. The materials need to be properly bagged, sealed and discarded. City and state codes may dictate this step (Jones).

How do you prevent mold growth?

Prevent conditions that support and promote mold growth. Sources of mold include outdoor air; intrusion of water through the building exterior or HVAC system; water damaged walls, ceiling, carpet and furnishings; chronic moisture condensation; potted plants; and animals (Sanderson).

Preventive maintenance is a must. Make sure heating, ventilation, and air conditioning systems (HVAC) are kept clean and in proper working order. Fix any leaks, keeping work areas clean and free from water. Controlling moisture is the key!

Your local occupational health provider, industrial hygienist and WORKSAFE IOWA Associate can serve as a resource for employers with questions about mold in the workplace.

Sources:
Gerr, Fred Md. “Health Effects of Exposure to Fungi” presented at the Facts about Mold short course on April 2, 2003, Iowa City, IA.
Sanderson, Wayne E., PhD, CIH, CSP. “The Facts About Mold: Clean-up & Remediation” presented at the Facts about Mold short course on April 2, 2003, Iowa City, IA.
Sanderson, Wayne E., PhD, CIH. “Evaluating Mold Infestation” presented at the Facts about Mold short course on April 2, 2003, Iowa City, IA.

Doctor Fungus website accessed at http://www.doctorfungus.org/mycoses/index.htm
OSHA Recommends Eliminating Manual Lifting of Nursing Home Residents When Feasible

The Occupational Safety and Health Administration (OSHA) announced in mid-March the first in a series of industry-specific guidelines for the prevention of musculoskeletal disorders in the workplace. OSHA’s Guidelines for Nursing Homes focuses on practical recommendations for employers to reduce the number and severity of workplace injuries by using methods found to be successful in the nursing home environment.

The Guidelines for Nursing Homes is divided into five sections:

1. developing a process for protecting workers
2. identifying problems and implementing solutions for resident lifting and repositioning
3. identifying problems and implementing solutions for activities other than resident lifting and repositioning
4. training
5. additional sources of information.

OSHA emphasizes that specific measures or guideline implementations may differ from site to site. Still, the agency recommends that all facilities minimize manual lifting of residents in all cases, and eliminate such lifting when feasible. Further, OSHA encourages employers to implement a basic ergonomic process that provides management support while involving workers, identifying problems and implementing solutions, addressing reports of injuries, providing training and evaluating ergonomics efforts.

OSHA announced last April the agency’s strategy to reduce ergonomic injuries. The four-pronged approach includes guidelines, enforcement, research, and outreach and assistance. In addition to nursing homes, the agency is preparing industry-specific guidelines for the retail grocery store and poultry processing industries.

Information on SARS

Information Regarding Severe Acute Respiratory Syndrome (SARS) is a new reference developed by OSHA. The reference is designed to provide relevant and timely information regarding SARS to employers and employees. The reference includes employee training information as well as what to do if a worker experiences symptoms. OSHA may update this reference as additional information concerning SARS becomes available.

The "Information Regarding Severe Acute Respiratory Syndrome (SARS)" can be accessed at http://www.osha-slc.gov/dep/sars/index.html

OSHA Safety and Health Topics Website

A variety of health and safety topics have been assembled on the "OSHA Safety and Health Topics" website. More than 150 topics are listed to provide users relevant reference materials including standards, directives, training materials, and other related information.

You can access "OSHA Safety and Health Topics" at http://www.osha.gov/SLTC/index.html

OSHA Announces New Assistant for Emergency Preparedness

The Occupational Safety and Health Administration (OSHA) is dedicated to saving lives, preventing injuries and illnesses, and protecting America’s workers. In light of this goal, John L. Henshaw, Assistant Secretary of Labor for Occupational Safety and Health, appointed John Ferris as OSHA’s new Special Assistant for Emergency Preparedness. Mr. Ferris will coordinate OSHA’s efforts to address emergency preparedness and response in workplaces.

Source: OSHA website accessed 03/24/03 at http://www.osha.gov

Machine Safety Guideline

According to the National Institute for Occupational Safety and Health (NIOSH), about 155 workers die each year from being caught in, crushed by, or otherwise fatally injured from heavy industrial machinery. NIOSH is partnering with business, labor, and the insurance industry to evaluate the effectiveness of a guideline to prevent such injuries. The American National Standards Institute (ANSI) presently has a voluntary guideline directed at machine safety.

The ANSI guideline, ANSI B11 TR3, describes a strategic process for employers to use in assessing the risk of machine-related injuries in the workplace. The assessment helps companies determine where to focus efforts to reduce the risk of injury. The ANSI guideline tailors the concepts of an international voluntary standard, ISO 14121, to workplaces in the United States.

The study will help employers assess the effectiveness of the ANSI guideline in practice, and if the changes made under the guideline will improve safety in their workplaces.

Source:
National Institute for Occupational Health & Safety website accessed 03/08/03 at http://www.cdc.gov/niosh/ansiguide.html

Tornado Safety in the Workplace

(Continued from page 1)

Tornados produce wind speeds from 30 to 250 miles per hour or greater. They can be one mile wide and stay on the ground over 50 miles making workplaces challenging in terms of tornado safety. Large buildings with high roofs, like warehouses are very susceptible to tornado and wind damage. Large open work areas provide little to no protection from tornados and high winds. Workers must be familiar with the workplace emergency action plan and tornado safety policies (National Weather Service).

The National Weather Service has a series of alerts used to notify the public of impending severe weather. A “tornado watch” is issued when atmospheric conditions are right for the development of a tornado - be ready to take cover. A “tornado warning” is issued when a tornado has been sited in your vicinity or is spotted on Doppler radar – take cover immediately (National Weather Service).

Consider how workers are made aware of these weather alerts. Many work areas have no windows making a visual alert impossible. Other work areas have no access to radio or other media warnings to inform of severe weather.

The National Weather Service recommends having a NOAA Weather Radio equipped with battery back-up and tone alert functions at all worksites. The weather radio should be housed at a central location manned whenever workers are present. Workers should be notified of alerts and emergency action plans put into effect when warnings are issued. It is suggested to have a multi-phase plan for severe weather including what to do in the case of a watch vs. warning.

Tornado safety tips for work sites:

• Have a written emergency action plan specific for severe weather including tornados;
• If a watch is issued encourage workers to remain at the worksite (avoid travel in company and personal vehicles);
• If a tornado warning is issued, move workers to the basement or safe zone if no basement exists;
• The safe zone should be an interior room, with no windows, on the lowest level of the building (e.g. bathroom or storage area). Avoid rooms with high ceilings and large open areas (e.g. warehouse);
• Designated safe rooms can be constructed with reinforced walls;
• Workplaces may have more than one identified safe zone;
• Make sure the safe zone can accommodate the number of workers assigned to it;
• Departments or work groups may be assigned different locations;
• Once in the safe zone, workers should assume the protection position – kneal on the floor with head down and hands covering head (the “turtle position” as my children call it);
• Workers should not leave the workplace in the case of a warning (workers are safer at work than in their vehicles on the road);
• Have a mechanism to account for all workers in each safe zone (a supervisor or worker may be assigned this function);
• Have emergency equipment available in this safe zone including flashlight with extra batteries, bottled water, and blankets. A weather radio and two-way radios are also recommended;
• Once the warning has been lifted, workers may be released from the safe zone;
• If a tornado hit the worksite, assign tasks to workers in each safe zone. Do this prior to leaving the area. Workers will be concerned about coworkers but also their family members and children who may be at other locations.

A tornado drill is recommended. Workers will be familiar with their assigned safe zone as well as duties that may be assigned in the event of a tornado. Make sure all workers know what to do and where to go in the event severe weather strikes while at work.

Source:
Question: If a workplace has visible mold growth on a wall, how should it be cleaned?

Answer: The size of the mold infestation and amount of remediation (clean-up) needed will influence how this area is cleaned. Overall goals include removing porous water-damaged materials that support fungi growth and cleaning those structures or materials that can be retained.

Procedures for addressing visible mold generally depend on the type of material affected (sheet rock, paneling, concrete, etc.) and the amount of contiguous surface area affected. In most instances, guidelines provided by several health agencies that address cleaning and remediating fungi contamination are very useful (see links below).

Only persons involved in the clean-up process should be in the work area. They should be trained in the use of personal protective equipment, and mold remediation protocols. Employers may seek professional consultation to determine the appropriate protocols for their own specific situations.

http://www.dehs.umn.edu/iaq/flood.html
http://www.epa.gov/iaq/molds/images moldremediation.pdf
Upcoming Occupational Health Courses

NIOSH-Approved Spirometry Training for Workers Screening
July 30-31, 2003
November 6-7, 2003
The University of Iowa, Iowa City, Iowa
The 2-day courses are designed to provide a comprehensive theoretical framework combined with practical training necessary to conduct spirometry testing and screening for workers. Contact Kimberly Gordon at the University of Iowa, College of Public Health at 319/335-4423 or kimberly-gordon@uiowa.edu for details.

Session I: May 14-16, 2003
Session II: June 18-20, 2003
The University of Iowa, Iowa City, Iowa
The purpose of the course is to provide basic information and skills to enable the health care professional to function as a practitioner in the prevention of occupational illnesses and injuries in the farm community. This training and certification is also designed to enable the establishment of a member clinic of the AgriSafe Network. Contact Kay Mohling at the University of Iowa, College of Public Health at 319/335-4219 or e-mail kay-mohling@uiowa.edu for details.

Occupational Hearing Conservationist Certification and Recertification Courses
May 15-16, 2003
Allen College, Waterloo, Iowa
This course will familiarize the participant with all facets of occupational hearing conservation. Upon satisfactory completion, the information will be provided to the Council for Accreditation in Occupational Hearing Conservation (CAOHC) to receive certification. Contact Marlys Nelson RN, COHN-S at 319/235-3523 or by e-mail nelsonmj@ihs.org for more information.

Supervisor Training for Drug & Alcohol Abuse Testing
July 10, 2003 - 8:00 a.m. to 10:00 a.m.
Work Fitness Center, Bettendorf, Iowa
This 2-hour training satisfies the Iowa drug law and DOT requirements for initial supervisor training. To register call the Work Fitness Center at 563/421-3680 x229.

Associate Safety Professional: Safety Fundamentals Preparation Workshop
June 2-June 4, 2003
The University of Iowa, Iowa City, Iowa
This three-day review course is designed for those preparing for the Safety Fundamentals Examination, leading to the designation of Associate Safety Professional (ASP). This course is an excellent review for those desiring to determine whether they are ready for the Safety Fundamentals Examination; identify areas where extra preparation is needed; become familiar with resources available to prepare for the exam; learn about certification requirements and scoring procedures; and review content material in an informal environment utilizing a “testing” format including an opportunity for discussion. You may attend the Certified Safety Professional: Comprehensive Training and CSP Examination Preparation Workshop on June 5-7 at a reduced rate! Contact Rick Bonar, at the University of Iowa, College of Public Health at 319/335-4416 or richard-bonar@uiowa.edu for details.

Certified Safety Professional: Comprehensive Training and CSP Examination Preparation Workshop
June 5-June 7, 2003
The University of Iowa, Iowa City, Iowa
This three-day course is designed to prepare individuals for the Comprehensive Examination leading to certification as a Certified Safety Professional (CSP). The course covers the four areas of the exam: engineering; management; information management and communications; and professional conduct and ethics. The course consists of lectures, sample problems, and discussions on a variety of subjects to prepare the participant for the exam. You may attend the Associate Safety Professional: Safety Fundamentals Preparation Workshop on June 2-4 at a reduced rate! Contact Rick Bonar, at the University of Iowa, College of Public Health at 319/335-4416 or richard-bonar@uiowa.edu for details.

Annual Refresher Course for Drug & Alcohol Abuse Testing
July 15, 2003
8:00 a.m. to 9:00 a.m.
Work Fitness Center, Bettendorf, Iowa
This 1-hour training satisfies the Iowa drug law requirement for annual supervisor training. To register call the Work Fitness Center at 563/421-3680 x229.
HEALTH & SAFETY REPORT

WORKSAFE IOWA
Occupational Medicine Associates Network

Work Well Clinic
St. Luke’s Hospital
Cedar Rapids, IA
(319) 369-8153

Iowa Methodist
Occupational Health
Iowa Methodist
Medical Center
West Des Moines, IA
(515) 241-2020

Tri-State
Occupational Health
Medical Associates Clinic
Mercy Health Center
Dubuque, IA
(563) 582-2525

Trimark Corporate
Health Services
Trinity Regional
Medical Center
Fort Dodge, IA
(515) 574-6810

St. Luke’s
Occupational
Health Services
St. Luke’s Health System
South Sioux City, NE
(402) 494-2065

Jennie Edmundson
Occupational
Medicine Clinic
Council Bluffs, IA
(712) 328-7009

Work Fitness Center
John Deere Health Care
Trinity Health Enterprises
Quad Cities
(309) 764-9675

Allen Occupational
Health
Allen Memorial Hospital
Waterloo, IA
(319) 235-3885

UI HealthWorks
University of Iowa
Health Care
North Liberty, IA
(319) 665-2111

The Workplace Health and Safety Report is published quarterly by WORKSAFE IOWA for members of its Occupational Medicine Associates Network. WORKSAFE IOWA is an occupational and environmental health outreach program of the Department of Occupational and Environmental Health, College of Public Health, The University of Iowa. For more information on the WORKSAFE IOWA Occupational Medicine Associate in your area, please refer to the list at left.

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http://www.public-health.uiowa.edu/worksafe