The Health Effects and Politics of Mold

The Impact on Occupants of Damp, Moldy Buildings (Center for School Mold Help, Sept. 2007, updated Sept. 8, 2009)

The impact of mold on health has been described, in recent years, as "controversial". This description becomes problematic for people who find themselves ill from damp or moldy buildings, despite an increasing wealth of evidence. Currently, authoritative statements from the research community and prominent world governmental bodies are evolving, changing with each new set of findings. We shall present some of these statements, including what the World Health Organization (2009), US Centers for Disease Control, NIOSH (National Institute of Occupational Safety and Health), OSHA, Health Canada & more say on the topic, with commentary on why there may yet be a controversy. Finally, we will summarize the impact on the individual and society.

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According to Aristo Vojdani, PhD, M.T., Director, ImmunoSciences Lab, Beverly Hills, CA:
The health effects (of mold exposure) generally fall into seven categories:

- Type-1 Allergy or Immediate-Type Hypersensitivity
- Delayed-Type Hypersensitivity Reaction
- Infection
- Mucous Membrane and Trigeminal Nerve Irritation
- Adverse Reactions to Odor or Pseudoallergy
- Toxicity or Neurotoxicity by Molds and Mycotoxins
- Immunotoxicity Induced by Molds and Mycotoxins

(Detection of Mold and Mycotoxin Antibodies and DNA in Blood, Saliva and Lung Secretions, Dr. Aristo Vojdani)

At this writing, it is abundantly clear that mold exposures can harm human health, demonstrated in thousands of studies world-wide, and proclaimed by credible authorities, including, but not limited to the following, with excerpts from their corresponding publications or points of view summarized below:

What some authorities say about mold and health:

Institute of Medicine:

concludes that excessive indoor dampness is a public-health problem:

a. Due to new or enhanced growth of fungi and other microbial agents.

b. Bacteria and fungi can cause allergic responses, non-allergic, toxic and inflammatory effects.

c. Available evidence suggests that classrooms commonly have dampness problems.

d. IOM finds an association between dampness and lower respiratory illness in otherwise healthy children.

e. IOM finds an association between mold and other agents in damp buildings and lower respiratory illness in otherwise healthy children

f. Recommends public health goals: to prevent or reduce the incidence of potentially problematic damp indoor environments…particularly in vulnerable populations.

(IOM, Damp Indoor Spaces and Health, 2004) http://www.schoolmoldhelp.org/content/view/225/65/

CDC:

"Mold can cause or worsen certain illnesses (e.g., some allergic and occupation-related diseases and infections in health care settings)." http://www.cdc.gov/health/mold.html

Aspergillosis: "In immunosuppressed hosts: invasive pulmonary infection, usually with fever, cough, and chest pain. May disseminate to other organs, including brain, skin and bone. In immunocompetent hosts: localized pulmonary infection in persons with underlying lung disease. Also causes allergic sinusitis and allergic bronchopulmonary disease... Transmission: Inhalation of airborne conidia (spores). Nosocomial infection may be associated with dust exposure during building renovation or construction." http://www.cdc.gov/ncidod/dbmd/diseaseinfo/aspergillosis_t.htm

CDC statements on mold have been evolving over the last ten years, with the CDC being, in the past, singularly resistent to stating that mold exposures can cause harm to healthy individuals. It has now come up with references to the safety of "undisturbed mold", that we have not seen in the literature. Certainly, disturbing mold causes the spread of spores, mycotoxins and mold fragments, increasing the danger. Now, at least, faced with the illness of millions in the hurricane-impacted regions of the USA, the CDC finally admits, in this document, that mold can harm health, and that this is poorly

understood - especially, it would appear, at the CDC. Extensive excerpts follow:

Mold Prevention Strategies and Possible Health Effects in the Aftermath of Hurricanes and Major Floods

Prepared by

(Mary Brandt, PhD et al, June 9, 2006)

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"For the majority of persons, undisturbed mold is not a substantial health hazard. Mold is a greater hazard for persons with conditions such as impaired host defenses or mold allergies. To prevent exposure that could result in adverse health effects from disturbed mold, persons should 1) avoid areas where mold contamination is obvious; 2) use environmental controls; 3) use personal protective equipment; and 4) keep hands, skin, and clothing clean and free from mold-contaminated dust.

Clinical evaluation of suspected mold-related illness should follow conventional clinical guidelines. In addition, in the aftermath of extensive flooding, health-care providers should be watchful for unusual mold-related diseases. The development of a public health surveillance strategy among persons repopulating areas after extensive flooding is recommended to assess potential health effects and the effectiveness of prevention efforts. Such a surveillance program will help CDC and state and local public health officials refine the guidelines for exposure avoidance, personal protection, and clean-up and assist health departments to identify unrecognized hazards.

Some micro-organisms, including molds, also produce characteristic volatile organic compounds (VOCs) or microbial VOCs (mVOCs). Molds also contain substances known as beta glucans; mVOCs and beta glucans might be useful as markers of exposure to molds (7).

Some molds are capable of producing toxins (sometimes called mycotoxins) under specific environmental conditions, such as competition from other organisms or changes in the moisture or available nutrient supply. Molds capable of producing toxins are popularly known as toxigenic molds; however, use of this term is discouraged because even molds known to produce toxins can grow without producing them (6). Many fungi are capable of toxin production, and different fungi can produce the same toxin (6).

How Persons Are Exposed to Mold

Mold exposure can produce disease in several ways. Inhalation is usually presumed to be the most important mechanism of exposure to viable (live) or nonviable (dead) fungi, fungal fragments or components, and other dampness-related microbial agents in indoor environments. The majority of fungal spores have aerodynamic diameters of 2--10 µm, which are in the size range that allow particles to be deposited in the upper and lower respiratory tract (5). Inhalation exposure to a fungal spore requires that the spore be initially aerosolized at the site of growth. Aerosolization can happen in many ways, ranging from disturbance of contaminated materials by human activity to dispersal of fungi from contaminated surfaces in heating, ventilating, and air-conditioning (HVAC) systems. Fungal spores also can be transported indoors from outdoors. Overall, the process of fungal-spore aerosolization and related issues (e.g., transport, deposition, resuspension, and tracking of fungi to other areas) are poorly understood.

Persons can be exposed to mold through skin contact, inhalation, or ingestion. Because of the ubiquity of mold in the environment, some level of exposure is inevitable. Persons can be exposed to mold through contact with airborne spores or through contact with mycelial fragments. Exposure to high airborne concentrations of mold spores could occur when persons come into contact with a large mass of mold, such as might occur in a building that has been flooded for a long time. Exposure to mycelia fragments could occur when a person encounters a nutrient source for mold that has become disrupted, such as would occur during removal of mold-contaminated building material. Skin contact or exposure by inhalation to either spores or mycelial fragments also could occur in a dusty environment, if the components of dust include these fungal elements.

For the majority of adverse health outcomes related to mold exposure, a higher level of exposure to living molds or a higher concentration of allergens on spores and mycelia results in a greater likelihood of illness. However, no standardized method exists to measure the magnitude of exposure to molds. In addition, data are limited about the relation between the level of exposure to mold and how that causes adverse health effects and how this relation is affected by the interaction between molds and other microorganisms and chemicals in the environment. For this reason, it is not possible to sample an environment, measure the mold level in that sample, and make a determination as to whether the level is low enough to be safe or high enough to be associated with adverse health effects.

Persons affected by major hurricanes or floods probably will have exposure to a wide variety of hazardous substances distributed by or contained within the floodwater. This report does not provide a comprehensive discussion of all such potential hazards; such situations will of necessity require case by case evaluation and assessment. Guidance has been provided by CDC for such issues in a number of documents, including NIOSH Hazard Based Interim Guidelines: Protective Equipment for Workers in Hurricane Flood Response (9) and the CDC guidance: Protect Yourself From Chemicals Released During a Natural Disaster (10).

Factors That Cause Disease from Mold

Numerous species of mold cause infection through respiratory exposure. In general, persons who are immunosuppressed are at increased risk for infection from mold (11). Immunosuppression can result from immunosuppressive medication, from medical conditions and diseases that cause immunosuppression, or from therapy for cancer that causes transient immunosuppression. Although certain species of mold cause infection (5,8,11), many mold species do not cause infection. Infections from mold might be localized to a specific organ or disseminated throughout the body.

Many of the major noninfectious health effects of mold exposure have an immunologic (i.e., allergic) basis (6). Exposure to mold can sensitize persons, who then might experience symptoms when re-exposed to the same mold species. For sensitized persons, hay fever symptoms and asthma exacerbations are prominent manifestations of mold allergy (6). Although different mold species might have different propensities to cause allergy, available data do not permit a relative ranking of species by risk for creating or exacerbating allergy. In addition, exposure to beta glucans might have an inflammatory effect in the respiratory system (12).

Prolonged exposure to high levels of mold (and some bacterial species) can produce an immune-mediated disease known as hypersensitivity pneumonitis (13). Clinically, hypersensitivity pneumonitis is known by the variety of exposures that can cause this disorder (e.g., farmer's lung, woodworker's lung, and malt worker's lung).

Ingesting toxins that molds produce can cause disease. Longterm ingestion of aflatoxins (produced by Aspergillus species) has been associated with hepatocellular cancer (14). In addition, ingestion of high doses of aflatoxin in contaminated food causes aflatoxicosis and can result in hepatic failure (11). Whether concentrations of airborne mold toxins are high enough to cause human disease through inhalation is unknown, and no health effects from airborne exposure to mold-related toxins are proven.

Fungi can cause a variety of infectious (52--58) and noninfectious conditions (6,44,45,47,59,60). Several basic mechanisms can underlie these conditions, including immunologic (e.g., IgE-mediated allergic), infectious, and toxic (6). Several of these mechanisms contribute to pathogenesis of a fungal-induced disease. The types and severity of symptoms and diseases related to mold exposure depend in part on the extent of the mold present, the extent of the person's exposure, and the susceptibility of the person (e.g., persons who have allergic conditions or who are immunosuppressed are more susceptible than those without such conditions). Molds produce a variety of volatile organic compounds (6,7,60), the most common being ethanol (61), which are responsible for the musty odors associated with fungal growth. Exposure to moldy indoor environments is also associated with a variety of upper and lower respiratory tract symptoms (6).

Institute of Medicine Report on Damp Indoor Spaces and Health

In recent years, the issue of how damp indoor spaces and mold contamination affect human health has been highly controversial. In response, CDC commissioned the Institute of Medicine (IOM) to perform a comprehensive review of the

scientific literature in this area. The resulting report (6) was published in 2004 and remains the most current and authoritative source of information on this subject. The IOM categorized its findings into four categories:

sufficient evidence of a causal relation,

sufficient evidence of an association,

limited or suggestive evidence of an association, and

inadequate or insufficient evidence to determine whether an association exists.

"Inadequate or insufficient evidence to determine whether an association exists" does not rule out the possibility of an association. Rather, it indicates that no studies examined the relation or that published study results were of insufficient quality, consistency, or statistical power to permit a conclusion about an association. No conditions exists for which the IOM found sufficient evidence of a causal relation with mold or with damp indoor spaces. Several of the conditions are of particular interest to those engaged in the response to major hurricanes or floods (Table 3). Sufficient evidence links upper respiratory tract symptoms (e.g., nasal congestion, sneezing, runny or itchy nose, and throat irritation) to damp indoor environments and mold (with exposure to mold often determined by self-report). Similarly, sufficient evidence exists for a link with the lower respiratory tract symptoms of cough and wheeze. Sufficient evidence also was found for a link between damp indoor environments, mold, and asthma symptoms in sensitized persons with asthma. Evidence also is sufficient for an association between mold exposure and hypersensitivity pneumonitis in a small proportion of susceptible persons, invasive respiratory and other fungal infections in severely immunocompromised persons, and fungal colonization of the respiratory tract or infection in persons with chronic pulmonary disorders.

IgE-Mediated Diseases Caused by Fungi

IgE-mediated, or allergic, responses underlie the most common types of diseases associated with exposure to fungi (6,45,47,48,49). Atopy, or the genetic predisposition to form IgE responses to aeroallergens, is an important risk factor (45,47,48,49). Clinical conditions associated with allergies include allergic rhinitis and asthma (6,45,47,48,49). Allergic rhinitis is often associated with allergic conjunctivitis and sinusitis (45,47,49).

Symptoms of allergic rhinitis include sneezing; itching of the nose, eyes, mouth, or throat; nasal stuffiness; clear rhinorrhea; and, if associated with allergic conjunctivitis, red, itchy eyes. If associated with sinusitis, persons also might complain of sinus fullness or postnasal drip, often purulent (47--49). Signs on physical examination include pale, boggy nasal mucosa; nasal obstruction; and conjunctival redness. Examination of nasal scrapings or secretions indicates eosinophilic inflammation (47--49). If appropriate allergy prick skin testing reagents or in vitro tests for serum specific IgE are conducted, they demonstrate specific IgE-sensitization to causative allergens (45,47--49). Skin testing reagents and blood tests documenting IgE-sensitization to molds are, with few exceptions, poorly standardized and of unclear sensitivity and specificity (45). The conventional hierarchy of treatment is avoidance of exposure to inciting agents; pharmacotherapy with antihistamines, decongestants, or anti-inflammatory agents (e.g., nasal steroid sprays); or, as a last resort, allergen immunotherapy (47--49). Immunotherapy with fungal allergenic extracts is, with a few exceptions, of unknown efficacy (47).

Asthma is a disease characterized by episodic, reversible airways obstruction and eosinophilic airways inflammation (45,47--49,62,63). Over time, chronic asthma can lead to airways remodeling and irreversible airways obstruction (45,47--49,62,63). Persons with asthma often have symptoms such as chest tightness, wheezing, dyspnea, or cough (45,47--49,62,63). Physical examination during active asthma might indicate wheezing, but results of examinations between attacks are most often normal (62,63). If performed during an active asthma attack, spirometry most often indicates obstruction that reverses with inhalation of a bronchodilator (62,63). Persons with asthma generally exhibit bronchial hyperreactivity to methacholine challenge (45,47--49,62). However, a small proportion of persons without asthma and a substantial proportion of persons with airway disorders, including chronic obstructive pulmonary disease (COPD), also might exhibit hyperreactivity to inhaled methacholine (49); therefore, test results must be considered together with other clinical information (47--49,62,63). Approaches to demonstrating specific IgE sensitization to molds and limitations of available methods are as described for allergic rhinitis (45,47--49). Asthma is associated with airways inflammation that can be demonstrated by examining induced sputum for eosinophils or measuring exhaled nitric oxide (47), but these tests are often not performed in clinical settings.

Comprehensive guidelines for the staging and treatment of asthma are provided by the National Institutes of Health (62,63). Identifying and avoiding triggers, including occupational triggers, is a critical element of treatment. It is important

to identify persons with asthma triggered by materials in flood-damaged areas so avoidance measures can be taken. Drug treatment of asthma consists of symptom controllers such as bronchodilators and anti-inflammatory agents (e.g., corticosteroids or leukotriene antagonists) (47--49,62,63). The role of allergen immunotherapy with most fungal agents in treatment of asthma is unclear (48). Therapy with monoclonal anti-IgE is a recently developed treatment option that can be used in carefully selected patients when other, less expensive modalities fail to reduce dependence on systemic corticosteroids (63). The exacerbation of symptoms of asthma is consistently associated with damp buildings (6). If persons with asthma must engage in activities within damp or mold contaminated buildings, their asthma should be well controlled before entering these buildings, and those around them should be aware of the signs of asthma symptoms. The onset of symptoms while in damp moldy environments, especially while wearing PPE, should be an indication to leave the area and to seek appropriate medical care.

Allergic Diseases Associated With Airways Colonization

Allergic bronchopulmonary aspergillosis (ABPA) is a disease that can occur when the airways of persons with obstructive pulmonary diseases (e.g., asthma or cystic fibrosis) become colonized with Aspergillus fumigatus or other Aspergillus species (6,17,45,47--49). Inflammatory responses lead to additional airways damage. Marked worsening of existing asthma is a typical presentation of ABPA. Symptoms include recurrent episodes of bronchial obstruction, fever, malaise, expectoration of brownish plugs, peripheral blood eosinophilia, hemoptysis, and sometimes asymptomatic pulmonary consolidation. Other features include immediate skin test reactivity to Aspergillus spp. antigens, precipitating serum antibodies to A. fumigatus, markedly elevated serum total IgE, fleeting lung infiltrates, and central bronchiectasis (45,47--49). Criteria for diagnosis have been published (45,47--49). Airways colonization with other fungal species can result in a similar clinical picture. Although no known relation exists between levels of exposure to Aspergillus spp. and development of ABPA, clinicians should suspect and evaluate for the condition when appropriate.

Allergic fungal sinusitis (AFS) is typically noninvasive and occurs in allergic, immunocompetent patients (6,45,47--49): most have asthma, and 85% have nasal polyps (47). Invasive fungal sinusitis can occur in patients who are immunocompromised with illnesses such as diabetes, hematologic malignancies or immunosuppressive treatments or chronic steroid therapy (6,47). Fungal colonization is associated with a characteristic allergic mucin containing high levels of eosinophils (6,45,47--49). The mere presence of fungi in the nasal passages is not indicative of an active infection.

Hypersensitivity Pneumonitis

Hypersensitivity pneumonitis (HP), also known as extrinsic allergic alveolitis, is a granulomatous interstitial lung disease (6,17,45,47--49). A wide range of materials, including fungi, can be inhaled and thus sensitize susceptible persons by inducing both antibody and cell-mediated immune responses (6,17,45,47--49). Re-exposure of sensitized persons leads to lung inflammation and disease (6,17,45,47--49). Building-related HP caused by fungi and bacteria has been well documented (6,17). Usually, only a small fraction of those with a given exposure develop HP; therefore, poorly understood host factors play an important role in disease pathogenesis (6,47--49).

The presentation of HP is complex and can be either acute, subacute, or chronic (6,47,48). The acute form is often associated with heavy exposures and characterized by chills, fever, malaise, cough, and dyspnea appearing 4--8 hours after exposure (6,47,48) and is often confused with pneumonia. The chronic form is thought to be induced by continuous low-level exposure. Onset generally occurs without chills, fever, or malaise and is characterized by progressive shortness of breath with weight loss (47,48). Chronic HP can be confused with idiopathic pulmonary fibrosis or other forms of interstitial lung disease (47,48).

The diagnosis of HP, especially the chronic form or when presentation is mild, is often missed early in the course of the disease. If it does occur in the aftermath of major hurricanes or floods, a high degree of clinical suspicion is required for detection. In general, when HP is suspected, a clinical and exposure history should be performed. Patients should be asked about their possible exposure to damp and water-damaged areas, farms, birds, hot tubs, and other environments that might cause HP. Environmental sampling for the presence of microorganisms known to cause HP and serologic testing for circulating precipitins can help to establish causative exposures (47--49). Chest imaging using chest radiographs or high-resolution computed tomography scanning of the thorax, lung-function tests, broncholaveolar lavage, and lung biopsy all have roles in diagnosis (47--49). Although established criteria exist for the diagnosis of hypersensitivity pneumonitis (64,65), in the setting of a documented post-disaster HP outbreak, a noninvasive approach to identifying cases could be more appropriate and cost-effective than requiring conventional diagnostic testing. A recent, large multicenter study indicated that under conditions of low or high prevalence, six predictors could be used in combination for noninvasive diagnosis of HP (66):

exposure to a known offending antigen,

positive precipitating antibodies to the offending antigen,

recurrent episodes of symptoms,

inspiratory crackles on physical examination,

symptoms occurring 4--8 hours after exposure, and

weight loss.

Optimal treatment is elimination of causative exposures. The IOM report (6) provides information about management of building-related HP that is relevant to reoccupation of structures contaminated by fungi after major hurricanes or floods. Such management includes giving standard medical therapy (e.g., systemic corticosteroids and removing sources of fungal contamination from the environment). In some cases, if efforts to remove mold from a building are unsuccessful in relieving symptoms, the patient might need to move to another home or office.

Inhalation Fevers

Inhalation fever is a general name given to a variety of influenza-like, self-limited syndromes that might be caused by a variety of stimuli. Two types of inhalation fevers are of potential concern after major hurricanes or floods.

Humidifier fever is characterized by fever, respiratory symptoms, and fatigue with onset within hours after exposure to contaminated humidification systems (6,17,45,47). Obtaining a supportive history is critical to diagnosis. Thermophilic actinomycetes; other bacteria, including species of Legionella and Pseudomonas; and protozoa have been associated with humidifier fever (17). Aerosolized endotoxin derived from Gram-negative bacteria has an important role in this condition (17,47). Although humidifier fever can be confused with acute HP, it is a short-term ailment and removal from exposure is effective treatment (17,47). Humidifier fever is thought to represent a nonspecific inflammatory response to exposure (17,47).

Organic dust toxic syndrome (ODTS) has been reported among workers in a variety of agricultural and industrial settings and is thought to involve inhalation exposure to materials with heavy microbial contamination (67--69). Etiologic exposures that cause ODTS are often a poorly defined mixture of substances, including fungi, bacteria, and microbial constituents such as endotoxin (67--69). ODTS is characterized by fever and influenza-like symptoms, including general weakness, headache, chills, body aches, and cough occurring 4--12 hours after heavy exposure to organic dust (67--69). Dyspnea also is sometimes present. Results of chest auscultation and chest radiographs are usually normal (67,68). The peripheral white blood count is often elevated during attacks. Accurate patient history is critical for making a correct diagnosis. Although the symptoms resemble those of acute HP, they are not caused by response of the immune system to a specific antigen in the environment (67,68). ODTS poses a risk for workers performing renovation work on building materials and is a realistic concern for workers handling heavily contaminated materials in the aftermath of major hurricanes or floods. ODTS is best prevented by minimizing exposure through engineering controls, administrative controls, and respirators (69). For agricultural workers handling organic dusts, CDC recommends using the most practical respirator with the highest assigned protection factor.

Toxic Effects of Fungi

Certain common molds can produce metabolites with a wide range of toxic activities such as antibiotic (e.g., penicillium), immune-suppressive (e.g., cyclosporine), carcinogenic (e.g., aflatoxins), emetic, and hallucinogenic (e.g., ergot alkaloids) (6,11,17,59). Mycotoxins are fungal metabolites that poison humans and animals. Although ingestion is the most common route of exposure, inhalation and dermal contact also are exposures of concern (6,11,17,59). Mycotoxin production is dependent not only on species and strain of mold, but also on environmental conditions (e.g., temperature, water activity, light) and growth substrate (11,17). Thus, the presence of toxin-producing mold species does not necessarily indicate whether mycotoxins are present.

Mycotoxins were prematurely proposed as the cause of a disease outbreak of eight cases of acute pulmonary

hemorrhage/hemosiderosis in infants in Cleveland, Ohio, in 1993 and 1994 (70). The cluster was attributed to exposure to mycotoxins produced by Stachybotrys chartarum. Subsequent reviews of the evidence concluded that insufficient information existed and no such association was proven (71).

Almost all of the known effects of mycotoxin exposures are attributable to ingestion of contaminated food (72). Health effects from inhalational exposures to toxins are not well documented. IOM found inadequate or insufficient evidence for a link between exposure to damp indoor environments and molds with a variety of conditions that have been attributed to toxicity (6) (Table 3). Certain case studies of agricultural and remediation workers have described adverse health effects such as skin irritation, skin necrosis, cough, rhinitis, and bloody nasal exudate after inhaling or touching materials with heavy fungal contamination (73--76). Whether these effects resulted from exposure to mycotoxins or from a general overload of organic material is unknown. No commercial clinical diagnostic tools are available to determine whether a person's health effect is related to exposure to mycotoxins. Because of the lack of information about noningestion mycotoxin exposure and adverse health effects in humans, precautions should be taken when handling heavily contaminated building materials.

Fungal Infections

No reports of increased fungal infections related to floods in the United States exist. However, anecdotal case reports of fungal infection after floods include Apophysomyces elegans wound infection in a man who sustained traumatic injuries after the southeast Asian tsunami in December 2004 (77). A. elegans belongs to the Zygomycetes class of fungi. Infections are most commonly seen in immunocompromised and diabetic patients, and rarely in immunocompetent persons. The cause of infection in immunocompetent persons is usually cutaneous trauma with direct implantation of fungal organisms into the wound from soil contamination (78).

Theoretically, infection with fungal species that contaminate buildings, building constituents, and the environment after major hurricanes or floods is a potential concern. In general, persons with impaired host defenses (especially if impaired because of cell-mediated immunity or neutropenia) suffer the most severe types of fungal infections (6,52,53) (Table 4). However, invasive fungal infections also can occur in persons with normal host defenses and, in certain situations, can be life threatening (52,53) (Table 5). Persons at greatest risk for invasive fungal infection from heavy fungal contamination after major hurricanes or floods are those with impaired host defenses (6,52,53) (Table 4). Any impairment in cell-mediated immunity or neutropenia (e.g., human immunodeficiency virus [HIV] infection, leukemia, lymphoma, and diabetes mellitus) increases risk for many types of invasive fungal infections (52,53). Severely immunosuppressed persons, such as solid-organ or stem-cell transplant recipients or those receiving cancer chemotherapy agents, corticosteroids, or other agents inhibiting immune function, are at much higher risk for locally invasive infections of the lungs, sinuses, or skin and systemic infections (52,53). Aspergillus spp., zygomycetes, and Fusarium spp. are particularly important problems (52,53,56). These serious infections are often fatal, even with aggressive antifungal therapy (52,53,56).

Protective measures, such as HEPA filtration, implemented during periods of extreme susceptibility to invasive fungal infections are well established and effective in hospitals (79). However, preventive measures outside the hospital are less well established. Current guidelines emphasize the importance of avoiding areas of high dust (e.g., excavation sites, building construction or renovation sites, chicken coops, and caves) and factors associated with fungal infections (e.g., foods that increase a person's risk for fungal exposure) (80).

Obstructive pulmonary diseases such as asthma, cystic fibrosis, and COPD, might predispose persons to airway colonization with Aspergillus spp. (6,17,45,47--49). Inflammatory host responses to colonization can lead to ABPA (6,17,45,47--49,52). Aspergillus spp. also can cause invasive or semi-invasive infection in persons with COPD, especially in those being treated with corticosteroids. Chronic necrotizing pulmonary aspergillosis is an indolent condition observed in persons with underlying lung disease (53).

Colonization of lung cavities (e.g., tuberculosis cavities or emphysematous blebs) by Aspergillus spp. can cause pulmonary aspergillomas (fungus balls) (6,52), which are conglomerations of Aspergillus spp. hyphae matted together with fibrin, mucus, and cellular debris. These often do not cause symptoms, but they can be associated with hemoptysis (52,53). An exposure-response relation has never been established linking levels of exposure to Aspergillus spp. with development of any of these conditions. Therefore, to what degree exposure to fungal contamination after major hurricanes or floods would increase any risk is unclear. However, despite unknown benefit, persons with clinically significant obstructive pulmonary diseases (e.g., asthma, cystic fibrosis, COPD), and persons with cavitary lung disease from conditions such as tuberculosis should avoid airborne exposure to materials that have become heavily

contaminated with fungal growth in the wake of major hurricanes or floods.

Persons with normal host defenses also are subject to fungal infections (52,53) (Table 5), and persons with impaired host defenses can acquire any of these, often with greater severity. Ocular, skin, and superficial infections occur in those with normal host defenses and range from the relatively common (e.g., ringworm, athlete's foot) to the relatively rare (e.g., sporotrichosis) (52,53). Of particular relevance in areas with fungal contamination after major hurricanes or floods are organisms that cause localized skin and superficial infections following traumatic inoculation with soil and plant saprophytes, which are found in air, soil, and plant materials. For example, Scedosporium apiospermum (Pseudallescheria boydii) can be recovered from polluted water, sewage, swamps, and poultry or cattle manure (52,53,55,58). Although rare in the United States, this organism can cause a soft tissue infection called Madura foot, a mycetoma in which the draining sinuses show white grains containing fungal elements. This organism also can produce septic arthritis or osteomyelitis after penetrating trauma. Sporothrix schenckii is a dimorphic fungus that produces soft tissue infections after traumatic inoculation from a contaminated environmental source (52,53), such as sphagnum moss, roses, plant seedlings, and other vegetation. Lymphocutaneous lesions are the hallmark of sporotrichosis, as the organisms spread through the local lymphatics after primary inoculation. A high degree of clinical suspicion is needed to diagnose the less common, locally invasive fungal infections. Diagnosis is made by histopathology and culture after biopsy of the affected lesion. Histopathology must be performed to verify that a recovered isolate is the cause of disease and not an environmental contaminant. Culture must be performed to identify the agent correctly. Fungal isolates are identified in a clinical mycology laboratory.

Exposures that result in invasive pulmonary mycoses in persons with normal host defenses are generally thought to occur outdoors where active disturbance of a reservoir has occurred (52,53). The mode of transmission is inhalation of fungal spores. Person-to-person transmission of pulmonary mycoses does not occur (53). Diseases relevant to flood prone areas such as the Gulf Coast states include histoplasmosis and blastomycosis. Histoplasmosis is unlikely to be increased as a result of fungal contamination after major hurricanes or floods. The condition is caused by Histoplasma capsulatum, a dimorphic fungus found in soil enriched with the droppings of birds and bats (52,53). Areas with endemic disease in the United States include the Mississippi and Ohio River valleys, but cases have occurred in other parts of the United States. Many persons develop no symptoms when exposed to H. capsulatum in an endemic setting...

Fungal brain abscesses are uncommon in healthy persons (52,53,57). The primary infection results from inhalation of infectious conidia from the environment; the route of infection appears to be hematogenous dissemination from the lungs (52,53,57). Of particular interest after major hurricanes or floods is S. apiospermum (P. boydii) (52,53,57). Many case reports document patients with focal neurologic defects caused by multiple brain abscesses weeks or months after nearly drowning. The organism apparently spreads hematogenously after initial aspiration of sewage-laden water (from floods, lagoons, or bayous) into the lungs. Near drowning presumptively results in a massive inoculation of mold into the lungs.

Preventing Adverse Health Effects From Environmental Fungal Contamination After Major Hurricanes or Floods

Persons should reduce their exposure to molds as much as possible (with the realization that fungi are ubiquitous). Persons with underlying or induced immunosuppressed conditions or diseases caused by immune sensitization to fungal constituents present in mold growth should be especially careful to reduce exposure. If exposure to heavily mold-contaminated materials is unavoidable, persons should use appropriate administrative, engineering, and personal protection controls. Because a person's likelihood of developing adverse health effects from mold exposure depends on the type of exposure and on individual susceptibility, precautionary measures need to be customized. Recommended measures are based on professional judgment because of lack of available scientific evidence. For example, no research studies have evaluated the effectiveness of personal protective equipment in preventing illness from mold exposure. Total avoidance of heavily contaminated buildings or other high exposure situations is suggested for persons with specific underlying conditions such as profound immunosuppression. Respiratory protection, dermal protection, and occlusive eye protection recommendations are customized to various populations and exposure-associated activities. Repeated or prolonged exposure probably poses a greater health risk than do exposures of a similar intensity, but short duration. Preventive precautions are especially important for persons who expect to be highly exposed for a long time." http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5508a1.htm

EPA:

"Inhalation exposure to mold indoors can cause health effects in some people. Molds produce allergens (substances that

can cause allergic reactions), irritants, and, in some cases, potentially toxic substances or chemicals (mycotoxins). Inhaling or touching mold or mold spores may cause allergic reactions in sensitive individuals. Mold does not have to be alive to cause an allergic reaction. Dead or alive, mold can cause allergic reactions in some people." http://www.epa.gov/mold/moldcourse/chapter1/lesson3.html

EPA Indoor Environments Division, Indoor Air Quality Tools for Schools: Actions to Improve IAQ (September 1999)

Poor IAQ can cause:

1. illness-requiring absence from school
2. acute health symptoms
3. decreased performance in school
4. problems performing specific mental tasks requiring concentration, calculation, or memory.

(EPA, Indoor Air Quality, School Design, Impact on Learning, http://www.epa.gov/iaq/schooldesign/impactonlearning.html)

NIOSH (National Institute of Occupational Safety and Health):

“Mold and other common pollutants are stealth enemies in schools. There’s a documented link between poor indoor air quality and student health and learning, including increased asthma and absenteeism rates. It’s a problem that requires immediate attention.” (NIOSH NY-NJ Education and Research Center Director Molene, AACSE Panel, March 2006)

NIOSH study: "Using floor dust measures...We found significantly increased odds for lower respiratory symptoms [wheeze, chest tightness, attacks of shortness of breath, and attacks of cough: odds ratios (OR) = 1.7 (95% confidence interval (CI): 1.02-2.77) to 2.4 (95% CI: 1.29-4.59)], throat irritation [OR = 1.7, (95% CI: 1.06-2.82)], and rash/itchy skin [OR = 3.0, (95% CI: 1.47-6.19)] in the highest fungal exposure group compared to the lowest, with generally linear exposure-response relationships. (Fungal and endotoxin measurements in dust associated with respiratory symptoms in a water-damaged office building." Park et al, 2006)

OSHA:

"Poor indoor air quality is one of the most important health issues we face today ... Molds and fungi produce and release millions of spores small enough to be air-, water-, or insect-borne. They can also produce toxic agents known as mycotoxins. Spores and mycotoxins can have negative effects on human health including allergic reactions, asthma and other respiratory problems." http://osha.gov/SLTC/molds/index.html

Molds and Fungi, Hazard Recognition:

"Mold growth is encouraged by warm and humid conditions. It is likely to grow and become a problem where there is water damage, high humidity, or dampness. It is estimated that about 50 to l00 common indoor mold types have the potential for creating health problems. Exposure to molds can cause symptoms such as nasal stuffiness, eye irritation, or wheezing. Some people, such as those with serious allergies to molds, may have more severe reactions." (http://osha.gov/SLTC/molds/recognition.html)

Minister of Health, Canada:

"MOULDS

Physical and chemical properties

The word "mould" is a common term referring to fungi that can grow on building materials in homes or other buildings. Mould growth can influence air quality because both spores and mycelial fragments are dispersed into the air and can be inhaled. Their penetration into the bronchial tree depends on their size. The smaller particles penetrate deeper into the lungs.

Three features of mould biochemistry are of special interest in terms of human health:

Mould cell walls contain (1->3)-ß-D-glucan, a compound with inflammatory properties;

Mould spores and mycelial fragments contain allergens; and

The spores of some species contain low molecular weight chemicals that are cytotoxic or have other toxic properties (e.g. satratoxins and atranones produced by Stachybotrys chartarum)."

http://www.schoolmoldhelp.org/content/view/287/46/

World Health Organization:

"Indoor pollutants or mould cause asthma, allergies or respiratory diseases. Use of the proper building materials and construction might prevent these diseases." http://www.euro.who.int/Housing

World Health Organization (2007-2009)

Development of WHO Guidelines for Indoor Air Quality: Dampness and Mold

Report of a Working Group on Mold (published 2008)

This very significant document provides an overview of the known risks from mold exposure, and what should be done about them (recommendations). As the United States was not part of this European workgroup, it is interesting to note the difference in what the CDC is telling us and what this esteemed workgroup from the European Union found to be true. We find this document to accurately begin to describe the problem of mold in damp buildings - and in the case of the United States, this describes most schools (SMH).

ABSTRACT

Microbial pollution is one of the key constituents of indoor air pollution. It consists of hundredsof species of bacteria and fungi, and in particular filamentous fungi (moulds) growing indoorswhen sufficient moisture is available. Health problems associated with moisture and biologicalagents include increased prevalence of respiratory symptoms, allergies, and asthma as well asperturbation of the immunological system. Based on the extensive review of the scientificevidence, this WHO working group identified the main health risks due to excess moisture,associated with microbial growth and contamination of indoor spaces. It also formulated WHO guidelines for protecting public health, recommending that persistent dampness and microbial growth on interior surfaces and in building structures should be prevented (or minimized) as they may lead to adverse health effects.

click below for full document:

Development of WHO Guidelines for Indoor Air Quality: Dampness and Mold

Conclusions:

Summary of the health risk evaluation

1. Sufficient epidemiological evidence from studies conducted in different countries and climatic conditions shows that occupants of damp or mouldy buildings, both homes and public buildings, are at increased risk of experiencing respiratory symptoms, respiratory infections and exacerbations of asthma. Some evidence suggests an increased risk of developing allergic rhinitis and asthma. Although not many intervention studies are available, their results show that remediation of dampness problems leads to a reduction in adverse health outcomes.

2. There is clinical evidence that exposures to moulds and other dampness-related microbial agents increase the risk of rare conditions, such as hypersensitivity pneumonitis/allergic alveolitis, chronic rhinosinusitis and allergic fungal sinusitis.

3. Toxicological evidence in vivo and in vitro supports these findings by showing diverse inflammatory and toxic responses after exposure to specific microorganisms isolated from damp buildings, including their spores, metabolites and components.

4. While groups such as atopic and allergic individuals are particularly susceptible to exposures to biological and chemical agents in damp indoor environments, adverse health effects have also been widely demonstrated in non-atopic populations.

5. The increased prevalence of asthma and allergies in many countries increases the number of people susceptible to the effects of dampness and mould in buildings.

6. The prevalence of indoor dampness ranges widely within and among countries, continents and climate zones. It is estimated to be in the order of 10–50% of the indoor environments in Europe and North America, as well as in Australia, India and Japan. In some specific settings, such as river valleys or coastal areas, conditions of dampness are substantially higher than national averages.

7. The amount of water available on/in materials is the most important factor triggering the growth of microorganisms, including fungi, actinomycetes and other bacteria.

8. Microorganisms in general are ubiquitous in all general environments. Microbes propagate rapidly whenever water is available. The dust and dirt normally present in most indoor spaces provide sufficient nutrients to support extensive microbial growth. While mould growth is possible on all materials, appropriate material selection is nevertheless important to prevent dirt accumulation, moisture penetration and mould growth.

9. Microbial growth may result in elevated levels of spores, cell fragments, allergens,

mycotoxins, endotoxins, ß-glucans, and microbial volatile organic compounds (MVOCs) in indoor air. The causative agents of adverse health effects have not been conclusively identified, but excessive levels of any of these in the indoor environment indicates a potential health hazard.

10. Microbial interactions and moisture-related physical and chemical emissions from building materials may also play a role in dampness-related health issues.

11. Building standards and regulations on comfort and health do not sufficiently emphasize requirements to prevent and control excess moisture and dampness.

12. Besides occasional events – such as water leaks, excess rain, floods, etc. – most moisture enters buildings through incoming air, including that infiltrating though the envelope, or is due to occupants' activities.

13. Allowing surfaces to become cooler than the surrounding air may result in unwanted condensation. Thermal bridges (such as metal window frames), inadequate insulation and unplanned air pathways, or cold water plumbing and cool parts of air conditioning units can result in surface temperatures below the dew point of the air that contribute to dampness problems.

14. The problem of excess moisture and dampness can be tackled by controlling the quality of the building envelope regarding air infiltration, exfiltration, and pathways of water intrusion, by ensuring adequate thermal insulation and by avoiding condensation indoors through the control of moisture sources and of temperature, humidity and velocity of the air in the proximity of the surfaces.

Recommendations

1. Persistent dampness and microbial growth on interior surfaces and in building structures should be avoided or minimized, as they may lead to adverse health effects.

2. Indicators of dampness and microbial growth include the presence of condensation on surfaces or in structures, visible mould, perceived mould odour and a history of water damage, leakage or penetration. Thorough inspection and – if needed – appropriate measurements may be used to confirm indoor problems related to moisture and microbial growth.

3. Currently, the relationship between dampness, microbial exposure and health effects cannot be precisely quantified, so no quantitative health-based guideline values or thresholds can be recommended for acceptable levels of specific microorganism contamination. Instead, it is recommended that dampness and mould-related problems be prevented. When they occur, they should be remediated because of the increased risk of hazardous microbial and chemical exposures.

4. Well-designed, -constructed and -maintained building envelopes are critical to the prevention and control of excess moisture and microbial growth by avoiding thermal bridges and preventing intrusion by liquid or vapour-phase water. Management of moisture requires proper control of temperatures and ventilation to avoid high humidity, condensation on surfaces and excess moisture in materials. Ventilation should be distributed effectively in spaces, and stagnant air zones should be avoided.

5. Building owners are responsible for providing a healthful workplaces or living environments free of excessive moisture and mould problems by ensuring proper building construction and maintenance. Occupants are responsible for managing water use, heating, ventilation, appliances, etc. in a proper manner that does not lead to dampness and mould growth.

6. Local recommendations in different climatic regions should be updated to control dampness-mediated microbial growth in buildings and to ensure the achievement of desirable indoor air quality.Dampness and mould may be

particularly prevalent in poorly maintained housing for low income people. Remediation of conditions related to adverse exposures should be given priority to prevent additional contributions to poor health in populations already living with an increased burden of disease.

Development of WHO Guidelines

for Indoor Air Quality

Report on a Working Group Meeting

Bonn, Germany

23-24 October 2006

"Biological agents. "Biological factors of health relevance exhibit enormous heterogeneity, ranging from spores emitted outdoors to fungal growth indoors and across a wide variety of microbes and allergens spreading from person to person. Due to this heterogeneity and the

difficulty of accurately estimating exposure levels, it is difficult or impossible to attribute the burden of disease to single factors like species of microbes. However, microbial growth in indoor environment is dependent on the availability of moisture and on temperature. Therefore the use of correct building design and ventilation procedures to remove dampness from surfaces has been shown to be both the most efficient technique reducing the health risk associated with biological factors, and the moisture is the best indicator of the increased risk."
http://www.euro.who.int/Document/AIQ/IAQ_mtgrep_Bonn_Oct06.pdf

"Children are particularly susceptible to the health effects of damp, which include respiratory disorders such as irritation of the respiratory tract, allergies and exacerbation of asthma."
http://www.euro.who.int/Document/EHI/ENHIS_Factsheet_3_5.pdf

"Mould and damp are important risk factors for a variety of illnesses, particularly those of the respiratory and immune systems. Generally, there are four kinds of health problems: allergic illness, irritation of the respiratory tract, infection and toxicological effects. For people that are sensitive to moulds, symptoms such as nasal irritation or congestion, dry or productive cough, wheezing, skin rashes or burning, watery or reddened eyes may occur. Sufferers of severe allergies to moulds may have more serious reactions, such as hay-fever-like symptoms or shortness of breath. Moulds can also trigger asthma attacks in persons with asthma. Individuals with chronic illnesses or those with immune deficiencies are more likely to develop infections from certain moulds. WHO has concluded that the strongest evidence exists for the association of damp with cough, wheeze and asthma (2)....

According to the currently available evidence, 13% of childhood asthma in the developed countries could be attributable to dampness (3). Other illnesses associated with exposure to indoor damp include bronchial obstruction, bronchitis, persistent allergic rhinitis and

eczema (4–7).

It has been suggested that damp is associated with mental health problems and other types of illness. Depression and the presence of general symptoms such as fatigue, headache, dizziness and difficulty concentrating have been linked to damp, mouldy living conditions

(8). However, damp, especially mould, can have considerable effects on health and contribute to the development of chronic health problems. Children are more susceptible than adults to exposure to indoor air pollution, including moulds and bacteria which are increased by

excessive damp (14,15). Good evidence to support this is available from a number of studies in Finland, Germany, Italy and Sweden which have focused on asthma and allergic symptoms among small children and their

parents (16–18)."

http://www.euro.who.int/Document/EHI/ENHIS_Factsheet_3_5.pdf

The Right to Healthy Indoor Air (WHO, 2006) http://www.euro.who.int/document/e69828.pdf

WHO Guidelines for Dampness and Mould (Mold), published July, 2009

This World Health Organization report, published July 16, 2009, verifies that which suffering millions and The Center for School Mold Help have been reporting, which the United States Centers for Disease Control, health departments, and most US physicians have downplayed and denied - that mold and dampness cause serious health problems, including respiratory and immunological. The WHO emphasizes that mold should be avoided as a major health risk, explains how to prevent and address indoor mold, and points out that building owners have the responsibility to provide healthy indoor air. This document will begin the changes needed to rescue the world population from the devastating impact of indoor mold (mould) and dampness, especially within our schools and homes. We salute the World Health Organization for its accomplishment in producing this groundbreaking report and expect that the United States Centers for Disease Control will quickly follow with a position on mold and dampness, in step with the WHO. There is no more doubt - mold and dampness harms and can kill. We cannot tolerate this in our schools and buildings. (SMH)

"The authors conclude that occupants of damp or mouldy buildings, both private and public, have up to a 75% greater risk of respiratory symptoms and asthma. The guidelines recommend the prevention or remediation of dampness- and mould-related problems to significantly reduce harm to health...In damp conditions, hundreds of species of bacteria and fungi grow indoors and emit spores, cell fragments and chemicals into the air. Exposure to these contaminants is associated with the incidence or worsening of respiratory symptoms, allergies, asthma and immunological reactions. Children are particularly susceptible. " (WHO Press Release, 7/16/09)

Summary When sufficient moisture is available, hundreds of species of bacteria and fungi - particularly mould - pollute indoor air. The most important effects of exposure to these pollutants are the increased prevalence of respiratory symptoms, allergies and asthma, as well as disturbance of the immune system. Preventing (or minimizing) persistent dampness and microbial growth on interior surfaces and building structures is the most important means of avoiding harmful effects on health.

This book provides a comprehensive overview of the scientific evidence on the health problems associated with this ubiquitous pollution and provides WHO guidelines to protect public health. It also describes the conditions that determine the presence of mould and provides measures to control its growth indoors." (WHO, 2009)

Damp and mould: health risks, prevention and remedial actions [pdf, 137KB] Brochure for the public

Air quality and health WHO/Europe

WHO guidelines for indoor air quality: dampness and mould

SMH Note: The word school is mentioned 51 times in this report, with approx. 50 studies listed related to school mold and dampness.

These august bodies conclude, therefore, that building molds and their mycotoxins are a threat to health (see Mold Research for more info).

Incredibly, some still claim that (building) "molds cannot harm health", that "mold is ubiquitous (or everywhere) and has been, since the beginning of time". These comments, sprinkled throughout the controversy about mold and health, are now heard mainly within certain contexts, usually where liability (ie. money) is in question. These comments are outdated and in some cases, outright fabrications, or legal arguments by defense interests, in order to help deny culpability when it comes to financial obligations related to exposing the public to dampness and mold in buildings.

Our answer to the statement that "mold is everywhere and always has been" is that mold has NOT always been growing in our buildings and making people sick. In fact, it is due to recent problems with the building practices of the past half century, that we see such a proliferation of building mold problems. When mold was found in buildings, occasionally, in the past, going back thousands of years to Leviticus (in the Bible), we see the recommendations that reflect the basis for good remediation standards today. The prescription for mold in buildings was not to ignore it, but to get rid of the contaminated materials, or the building, permanently. Today's legal defense interests are busy, vigorously denying that mold can harm humans, reminiscent of "Big Tobacco" denials, and recent 9/11 toxic exposure injury controversies. For more information regarding conflicts of interest, read the Wall Street Journal article called Court of Opinion: Amid Suits Over Mold, Experts Wear Two Hats, Authors of Science Paper Often Cited by Defense Also Help in Litigation.

How does this impact damp or moldy school (or other building) occupants?

A battle is being waged, behind the scenes, to avoid fixing buildings - many of them, government buildings - and in American courtrooms, to avoid the cost and liability for the numbers of damp, moldy buildings that have appeared on a grand scale. These have appeared, especially, with the advent of the use of air conditioning, central heating and air conditioning, the use of cellulose (wood products) including engineered wood products, softer woods, and paper-lined insulation and sheetrock, combined with increased energy efficiency-promoting, "tight" buildings that trap moisture and chemicals, and defective building practices. Government buildings are notoriously poorly built and maintained, with school buildings being the worst of these.

Meanwhile, increasingly, new types of medical conditions related to dampness and "sick buildings" are emerging, with many millions sickened. The explosive growth of respiratory (asthma, included) and auto-immune diseases, for instance, have been associated with with damp buildings in numerous studies. Cancers are reported in many of these buildings, as well, with the carcinogenic qualities of numerous building mold mycotoxins well documented (if ingested), though hotly denied, at present, related to airborne exposures. It is hard to imagine that carcinogens, if inhaled and entering the

bloodstream (as in the case of aerosolized mycotoxins), would be any less toxic. Some of these agents (mycotoxins) are used in biological warfare, they are so potent. The research that is needed in these areas is not being funded, except for private and therefore, limited, sources. Why? Being controversial really seems to mean, for the CDC, "we don't want to know, we are satisfied with the status quo". Otherwise, they would be doing the research that has been called for, for two decades.

People ill from mold often find it difficult to obtain medical help, in part, because physicians have received little or no training on toxic exposures in medical school; vigorous attacks on physicians treating mold patients by insurance companies; denial by public health officials who are often, woefully, decades behind the research in their information, and lack of support for dispensing the broad range of information available on this topic by medical associations, with some adopting position statements that may lead some physicians to think that it is impossible to become ill from mold in anything but an agricultural setting.

To establish a document to help American physicians, the EPA has funded the development of a guide called Guidance for Clinicians on the Recognition and Management of Health Effects Related to Mold Exposure and Moisture Indoors (published by the Center for Indoor Environments and Health at University of Connecticut Health Center, 2004) and have established an online Mold Course for health professionals and others. These are not complete, in our opinion, as they don't cover all the possible effects of mold on health, but they are a beginning. However, it is unlikely that most physicians have ever seen even these rudimentary resources. The controversy is what most physicians know about, with little to no help readily available for those unfortunate enough to beome sick due to working, attending school, or living in a moldy or damp building.

People ill from mold are dealing with an illness that attacks the immune and multi-organ systems, according to researchers, often producing scores of unusual, uncomfortable, frightening, and life-threatening symptoms. At the same time, they often lose their ability to work, to be educated, to be productive, to be social - sometimes losing their homes and all they had in them. Mold-related illness can produce homelessness, disability, and even, deaths. People ill from mold in the workplace do not often find satisfactory outcomes that provide them with medical help and financial stability. Many find themselves bankrupt. The illnesses are not well understood and many may find that professionals, friends and family cannot accept their conditions and thus, often become isolated and cast-out from the social groups they once had. The very nature of the illness, which includes hypersensitivities to molds and chemicals may cause them to become isolated, while being totally disabled, as well. The controversy, therefore, leads to lack of support, even more disability, and financial problems. The economic and social cost for the individuals, their families, their employers, and society as a whole, is great, and cannot be understated.

The Center for School Mold Help has established a repository of Mold Research on our site, in order to expand knowledge about this developing cause of multi-system illnesses, with some being described as at epidemic proportions, such as asthma. Emerging studies and reports expand this body of knowledge, on a near-daily basis.

Meanwhile, avoiding moldy, damp buildings is a prudent practice, as is learning all you can to protect yourself, your family and loved ones, and your community from environmental illnesses.

See The Center for School Mold Help FAQ, Sick Building Symptoms, Mold Research and Internet Links pages for more information on Mold and Health.

For an excellent book on the topic of biotoxin illness caused by mold, Mold Warriors, by Dr. Richard Shoemaker, visit www.moldwarriors.com.

We hope that The Center for School Mold Help website will assist you in this endeavor and ask for your support to help us continue to provide this information to the public.