

Implications

VOL. 03 ISSUE 4

www.informedesign.umn.edu

A Newsletter by Informedesign. A Web site for design and human behavior research.

Multiple Chemical Sensitivity

Everyone notices the smell of “new” materials in our built environment. Some people love the “new” smell while others become ill from the same “new” smell. These smells (or odors) originate from chemicals that affect our indoor air quality (IAQ) and threaten the health of an interior’s occupants. Multiple chemical sensitivity (MCS) is the result of poor IAQ and affects many individuals. MCS is defined by the EPA (2003) as “a condition in which a person reports sensitivity or intolerance . . . to a number of chemicals and other irritants at very low concentrations.” The number of people suffering from MCS is rapidly increasing. As this condition is related to IAQ, designers must be concerned about IAQ.

MCS is not a new illness. For over half a century, people have experienced health problems and become ill from poor IAQ. Since then, MCS has been a controversial topic within the medical community for various reasons. There has been a lack of agreement on a name and a definition for the condition. There also has been a lack of agreement on prevention, diagnosis, and treatment (Barrett & Gots, 1998).

Despite the controversy, a plethora of chemicals may trigger symptoms of MCS. This includes such chemicals as volatile organic compounds (VOC) and petrochemical fuels as well as formaldehyde, pesticides, and solvents that are used in production of many interior materials and may trigger symptoms (EPA, 1994, 2003).



Household products contain chemicals that may trigger symptoms of MCS.

Many products also contain chemicals that may trigger symptoms of MCS. A few of these household products include latex, tobacco smoke, personal care products, chemical dyes, flavors, and preservatives (EPA, 1994). The locations in which exposure may take place are poorly ventilated buildings, communities with high air or water pollution, or airtight buildings with poor IAQ. Frequently, designers are specifying materials that may emit chemicals within these airtight buildings.



IN THIS ISSUE

Multiple Chemical Sensitivity

Creating a Safe, Healthy Environment

Related Research Summaries



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Exposure can become a synergistic reaction, which means that one chemical mixing with another chemical creates a volatile reaction within the body (Pilatowicz, 1994). This is similar to dangerous mixing of alcohol and barbiturates or the combination tobacco smoke and radon gas (Bower, 2000). Designers must be cautious in choosing materials that emit chemicals in combination with other environmental factors that may trigger symptoms of MCS.

Product	Pollutant that may cause MCS			
	Formaldehyde	VOC	Lead	Molds/Mildew
Adhesives	✓	✓		
Aerosol Sprays		✓		
Air Fresheners		✓		
Carpet (Wet)				✓
Cleaners & Disinfectants		✓		
Decorations			✓	
Glue	✓			

Sample listing of products that relate to pollutants that may cause MCS.

The Controversy

Many physicians will not treat individuals with MCS because of the controversy mentioned earlier. Many physicians are also skeptical because MCS has been considered a psychological disorder. However, Caress, Steinemann, and Waddick (2002) found that MCS itself might cause psychological disorders. They found that only 1.4% of persons with symptoms of MCS had a prior history of psychological problems. Yet, after becoming ill with MCS, 37.7% of persons developed psychological problems due to their change in lifestyle.

MCS is not discriminatory. Though the majority of patients with MCS are women, it has been found among all races and socioeconomic backgrounds (Caress, et al., 2002). MCS has also been found among Persian Gulf veterans, industrial workers, occupants of “sick” buildings, and people living near contaminated sites (Gist, 1999).

Treatment for MCS has been difficult and a variety of methods have been used. According to Magill and Suruda (1998), an effective physician-patient relationship must be established first, and then overall achievement goals must be set. They might include goals such as returning to normal activities, treating the emotional distress, and controlling symptoms. Ultimately, minimizing further exposure to chemicals is crucial (Kerns, 2001) and may be accomplished through medications and/or avoidance. To know what chemicals to avoid, testing for pesticides and other chemicals in the body is recommended. Additionally, alternative treatments have been used such as detoxification programs and/or nutritional regimens (Thivierge, 1999).

The controversy in the medical community relates to research. The medical profession relies on data from research to diagnose and treat patients, and the lack of research has stymied progress toward acceptance by some medical professionals (Gist, 1999; Winterbauer, 1997).

The controversy in the legal community relates to that in the medical community, because of a lack of diagnostic criteria or testing methods in cases of MCS (McDonald, 2002; Winterbauer, 1997). The Americans With Disabilities Act (ADA) and state law are used to defend MCS suits. If the ADA is used as a defense, the case is less likely to be successful. The argument is that MCS affects an individual’s ability to work in certain buildings or around certain people; however, the person with MCS could work in other areas. On the other hand, if state law is used as a defense, the case has a greater chance for a successful outcome. The argument is based on limitation of life activity rather a substantial limitation (McDonald, 2002).

Going Forward

There is little controversy on MCS within the design community. Designers realize the importance of good IAQ, and many are active in the development of green or sustainable design and apply conservation principles. In fact, many designers use a holistic approach to various environmental issues, which includes energy efficiency and resource conservation, as well as good IAQ.

Green design is concerned with health, safety, and welfare of humans and the global community. Green products are characterized as nontoxic, energy efficient, resource efficient, recyclable, durable, and contain recycled content. These products are manufactured with minimum pollution and minimize the impact to the environment. However, “safe is not necessarily green and green is not necessarily safe” (Wasley, 2000, p. 213). For example, particleboard uses less wood but is traditionally formed with the use of formaldehyde resins. Thus, in this case, a green product is not safe for good IAQ.



Which wood should be selected? Laminated with a particle board base, pre-finished with a plywood base, solid wood finished on site or cork?

There are no blanket solutions for individuals with MCS; it must be an individual solution. For those with MCS, the best solution is to develop a method to determine individual reactions to specific chemicals

or other substances and then make choices about which products to use. The individual solution includes building or taking steps to create a healthy environment, which includes an oasis—a chemically free space within the environment.



Materials: make choices appropriate to the individual.

The controversy within the medical community affects the legal and design communities. The medical community, however, is making progress. One name (MCS) is coming to the forefront, and in 1999, a group of medical professionals developed six criteria to identify the conditions (Bartha, et al). These criteria include:

- a chronic condition,
- recurring symptoms,
- exposure to low levels of chemicals,
- exposure to multiple unrelated chemicals,
- symptoms improve or resolve when irritants are removed, and
- symptoms affect multiple organ systems.

Also, research is being conducted through professional foundations such as the American Environmental Health Foundation, and research has been published in professional journals such as the *Archives of Environmental Health*. However, more research is needed for full acceptance by the medical community.



Since our indoor air may be more highly polluted than outdoor air (EPA, 1995), it is important for designers to realize that interior finishes and furnishings in our built environments greatly impact public health. Thus, designers need to become better

educated on green or sustainable products and consistently specify products that enhance good IAQ.

Designers may choose to become advocates for individuals with MCS by lobbying for legislation regarding IAQ or testifying for clients with MCS. Designers may also educate other designers through presentations at professional meetings and the public through community education programs. Designers may also conduct research among clients with MCS or assist with MCS research that is being conducted by design educators, physicians, or medical researchers. As a community with little controversy regarding MCS, designers should take the lead to improve IAQ and quality of life for everyone.



Creating a Safe, Healthy Environment

The following hints may be obvious to some; however, they may not be to everyone. Strategies for assisting individuals with MCS are listed:

Design a safe, healthy environment

- Build with materials and products that are free of chemicals
- In old or existing interiors, finish out-gassing car-

pet with baking soda

- In old or existing interiors, remove newer toxic materials
- Remove or seal a wood burning stove or fireplace
- Remove or eliminate accessories
- Eliminate tobacco smoking
- Maintain a continuously clean environment

Create an oasis (a total chemically-free space) within a home or workplace

- Remove carpet
- Expose or install hard flooring
- Use nontoxic installation techniques
- Use area rugs with natural fibers and without stain resistant finishes
- Install an air filter on the furnace or seal ductwork into the room
- Filter air with a room air exchanger
- Remove all textiles made of man-made fibers
- Remove any natural textiles with applied chemical finishes
- Use only organic natural fibers free of chemicals
- Remove furniture made of plywood or particleboard
- Encapsulate composite wood products with plastic laminate
- Use solid wood furniture
- Use prefinished wood molding
- Remove all accessories

Spaces and products to avoid

- Newly installed materials and new products
- Stores during seasonal changes of merchandise
- Leather product stores
- Dry cleaning recommended clothing
- Persons wearing perfume or cologne
- Moist or damp spaces

Use/include natural products and elements

- Cleaning products
- Cosmetics
- Plants

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About the Author:

Linda L. Nussbaumer, Ph.D., CID, ASID, IDEC, is an associate professor of interior design at South Dakota State University. She received her BS and MS in interior design from Minnesota State University-Mankato and her doctorate from the



University of Minnesota. Dr. Nussbaumer has a special interest in designing for good indoor air quality (IAQ) within the built environment. Within the past ten years, she has interview individuals with multiple chemical sensitivity (MCS), researched articles on IAQ and MCS, and has taught students to design for good IAQ. She is presently working with the Avera Research Institute in Sioux Falls, South Dakota, to develop a MCS research project.

Additional Resources

The following are helpful educational information and resources (tools) to assist designers in selecting and specifying the appropriate materials throughout the design process. Books, journal articles, and Web sites are included.

- Carpet and Rug Institute: www.carpet-rug.org
—Green Blue: www.greenblue.org
—Green Guard: www.greenguard.org
—Green Seal: www.greenseal.org
—IDEC. www.idec.org/greendesign/home.html

- IDEC link to green/sustainable design materials:
www.idec.org/greendesign
- United States Department of the Interior: National Park Service. *Guiding principles of sustainable design: The concept of sustainability.* www.nps.gov/dsc/dsgncnstr/gpsd/ch1.html
- US Environmental Protection Agency (EPA). (1995). *The inside story: A guide to indoor air quality.* www.epa.gov/iaq/pubs/insidest.html
- US Environmental Protection Agency (EPA). (2001). *Why study human health indoors. Healthy Buildings, Healthy People: A Vision for the 21st Century.* www.epa.gov/iaq/hbhp/index.html
- US Green Building Council (USGBC): www.usgbc.org

Related Research Summaries

InformeDesign has many Research Summaries about indoor air quality, interior materials and finishes, and related, pertinent topics. This knowledge will be valuable to you as you consider your next design solution and worth sharing with your clients and collaborators.

“Lamination Process Affects Particleboard Quality”
—*Building and Environment*

“Particulate Exposure Among the Elderly”
—*Journal of Exposure Analysis and Environmental Epidemiology*

“Background Levels of Bacteria and Fungi in Office Buildings” —*Journal of Environmental Health*

“Sources of VOCs in New Houses”
—*Indoor Air*

“Fibromyalgia and Indoor Air Quality”
—*Journal of Environmental Health*

“Residential Air Change Rates and Indoor Air Quality” —*Journal of Exposure Analysis and Environmental Epidemiology*

“Indoor Air Quality and Carpet: More Information Needed” —*Housing and Society*

“Ventilation's Impact on Indoor Air Quality”
—*Indoor Air*

“Wood Products and Residential VOC Emissions”
—*Indoor Air*

“Residential Air Quality and Fungi” —*Journal of Exposure Analysis and Environmental Epidemiology*

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