



# Health Risks and Environmental Issues

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## Hidden Dangers of Carpeting

Wall-to-wall carpeting complements the décor of a home or business, muffles noise in the classroom, adds comfort and warmth, and

provides a sense of security where young children crawl and play. However, there is more to carpeting than meets the eye. The dangers hide in what we cannot see.

Dyes, stain guards, moth-proofing, dust mites, heavy metals, pesticides, molds, toxic chemicals in the carpeting, padding and adhesives, VOCs from other sources collect in carpeting, and all add up to a veritable stew of contaminants. They are not removed by vacuuming – and shampooing can sometimes worsen conditions.<sup>1</sup>

Carpet chemicals can outgas for weeks after installation and in some cases for years. Formaldehyde, toluene, xylene, styrene, methyl methacrylate, ethylbenzene, hexamethylene triamine, 1-chloronaphthalene, 2-methylnaphthalene, and 1-phenylcyclopentanol are just a few of the chemicals given off by new carpeting.<sup>2</sup>

Carpet exposed to sunlight deteriorates more quickly and outgasses faster. Very little is known about the synergistic effects of the myriad chemicals associated with new carpeting and the installation process.

Synthetic carpets have become the most popular floor covering in North America. It has a short life span of only eight years indoors before being carted off to a landfill. Factoring in the long term cost for constant replacement plus landfill expenses and degradation to the environment, carpeting may be more costly than other floor treatments.

### Indoor Air Quality

Americans spend 80-90% of their time indoors at home, at school, the office, even "working out" is done indoors at a health center. What does this mean to our health? Indoor air is much more dangerous than was believed just a few years ago – and the trend is getting worse.

The US Environmental Protection Agency (EPA) regulates outdoor air quality, but has not been mandated to regulate indoor air quality. However, they do fund extensive research on indoor air quality issues and have a free booklet titled, *The Inside Story: A Guide to Indoor Air Quality*, available by calling 1-800-438-4318.

The EPA claims indoor air quality is a major cause of illness in the U.S. and can be ten times worse than air pollution in Los Angeles during rush hour. Tightly sealed buildings save energy, but concentrate contaminants from paint, carpet, and other building materials. This has given rise to a new malady – Sick Building Syndrome – often associated with headaches, sore throat, and respiratory discomfort.

Carpets are the most significant source of Volatile Organic Chemicals (VOCs) in new and remodeled buildings. More than a thousand different chemicals are used in the manufacture of carpeting materials. Cumulative and synergistic effects on human health have not yet been studied.<sup>3</sup>

The EPA has assembled an extensive bibliography of air quality reviews available in computerized database that contains data from all over the world. *The Indoor Reference Bibliography*, from the National Center for Environmental Assessment, Research Triangle Park, NC is available by calling 919-541-4165.<sup>4</sup>

### VOCs

Volatile Organic Compounds (VOCs) are common indoor air pollutants. Being volatile, they evaporate easily, and being organic, they contain carbon. Indoor air typically contains 30-100 different VOCs that are readily measurable, and others at low levels which are more difficult to measure. Some VOCs are harmless such as the smell of an orange. Others, such as odors given off by molds can trigger health problems in sensitive individuals.

The chemicals used in hundreds of manufactured products outgas, or give off VOCs. These might include benzene, xylene, toluene, formaldehyde, and ethanol to mention a few of the more familiar sounding ones.

Increased numbers of people are exhibiting symptoms related to their environment. Allergies are much more common today than 50 years ago. The rate and number of new chemicals being introduced into our environment far exceeds the evolutionary process which would allow humans and wildlife to properly adapt. Toxic, allergenic and carcinogenic materials used in construction and furnishing materials are a major cause. Tighter buildings designed for fuel conservation have aggravated an already serious problem.

### Formaldehyde

Formaldehyde is one of the most insidious of all indoor air pollutants and the most studied. Formaldehyde is cheap to produce. Consequently it is used in a wide range of applications from embalming fluid to permanent press fabrics, even plastics and shampoo. Formaldehyde is found in many building materials, including particleboard, plywood, insulation, paints and carpeting.<sup>5</sup>

Formaldehyde is colorless and has a pungent odor only at very high concentrations. It is often odorless at low concentrations even when outgassing indoors. Formaldehyde symptoms include burning eyes, headaches, tightness in chest, asthma attacks, depression, and even death.<sup>6</sup>

Symptoms typically begin at concentrations above 0.01 parts per million (ppm), while short-term exposures at 0.20 ppm can often be tolerated by healthy people. Once sensitized

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however, a person can react to extremely low level exposures. Acute symptoms have been observed in some people to as little as 0.01 ppm in as little as five minutes.<sup>7</sup>

Some researchers believe ten to 20% of the population could be susceptible to formaldehyde at low concentration. It is unlikely that the majority of physicians would consider this a possible cause for many patients' complaints of dizziness, slurred speech, forgetfulness, eye and respiratory tract irritation, chills, wheezing, cough, fever, joint pain, numbness, blurred vision, nausea, difficulty concentrating, memory problems, depression, multiple chemical sensitivity, and skin rashes. Children and pregnant women are particularly vulnerable to harmful effects of these fumes and should avoid them as much as possible.

In addition to the chronic irritating symptoms associated with formaldehyde, it has been shown to be carcinogenic and mutagenic in animal studies. The half-life of formaldehyde outgassing ranges up to six years and is greater during hot humid weather. Some sealants can be partially effective, as can air filters, and increased ventilation. The best method for controlling formaldehyde is removing the source.<sup>8</sup>

The carpet industry maintains that formaldehyde is not used in the manufacture process. Laboratory analysis, however, shows it can be released from carpeting, now suspected of absorbing VOCs from other sources.<sup>9</sup> If carpeting is in place during remodeling it will absorb fumes from paints, varnishes, waxes, and glues, outgassing them back into the air later on.<sup>10</sup>

### Styrene

Styrene is used in the plastics industry, and in the manufacture of fiberglass and resins. It is also found in rubber backing for carpets. Styrene has a pungent odor, is easily inhaled, and highly soluble in blood and tissues. It has a half-life of two to four days in adipose tissue and can be retained as long as 13 days following exposure.<sup>11</sup>

Uptake is affected by air concentrations and respiration rate, which increases dramatically with exercise.<sup>12</sup> Health-conscious individuals working out in carpeted gyms, and children cavorting around in carpeted play areas would be inhaling more toxic VOCs than if they were exercising or playing outdoors.

Elevated incidence of lymphoma and laryngeal cancer associated with styrene exposure was found among styrene workers in England.<sup>13</sup> The carcinogenic activity of styrene has not been fully established. The combined exposure of individuals to styrene and other environmental carcinogens would increase their cancer risk.<sup>14</sup>

### Pesticides

Pesticides are complex compounds that can release various gases over their life span. Consumers in the US purchase a whopping 285 million pounds of toxic pesticides every year. These chemical compounds can be neurotoxic and carcinogenic. They can cause respiratory problems, birth defects, genetic damage, injure wildlife, pollute the environment and drinking water.<sup>15</sup>

Pesticides used outdoors are tracked indoors and adhere to carpeting. Pesticides used indoors adhere to house dust, which settles on carpet fibers.<sup>16</sup>

### Biological Pollutants

Dust mites affect approximately 10% of the population. Mold spores, bacteria, and viruses are additional problems associated with carpeting. Dust mites live deep within carpet fibers and are not easily removed by vacuuming.<sup>17</sup> The deeper the pile the greater the reservoir for mites and other toxins to collect.

Damp or wet carpeting serves as perfect breeding ground for molds to grow. High humidity and moisture from leaks can add to the problem. Carpet on concrete floors can absorb moisture, and carpets that remain damp after shampooing can be particularly problematic to individuals who are sensitive to molds.<sup>18</sup>

### Asthma

People with asthma have very sensitive airways that react to a number of irritants, making breathing very difficult. In the US alone, 14.6 million people now suffer from asthma, with 4.4 million of them children under the age of eighteen.<sup>19</sup> The death rate from asthma continues to climb, pointing out the failure of conventional medicine to properly treat, and more importantly, prevent this disease from occurring in the first place.

It has now become common for children to bring their asthma medication with them to school. At the same time we see more wall-to-wall carpet being installed in the construction of new schools, and in the remodeling of older classrooms.

The National Asthma Education Program Expert Panel recommends removing carpeting from a child's room as a protective measure in managing asthma.<sup>20</sup> The same should apply to schools and daycare centers. Asthma is a serious and growing problem. As in all health matters, an ounce of prevention is worth a pound of cure. While it may not be possible to identify and eliminate all contaminants in the air we breathe, there are some simple solutions to reducing household exposures. Replacing old carpeting with alternative floor covering materials, or choosing least toxic carpet materials would be helpful.

"Consumer Protection Safety Commission" publications divert attention away from carpet chemicals as major players in asthma and related allergies. Instead, industry researchers blame pet dander, molds, rodents, and roaches for asthma-related problems.<sup>21</sup> Without denying their possible contribution to respiratory disease, pet dander, molds, rodents, and roaches existed long before asthma reached epidemic proportions. Shouldn't current research take this into consideration?

Environmental and health advocates believe industry funded research is not looking closely enough at chemical pollutants that may have depressed our immune systems, heightening our sensitivity to animal dander, molds, rodents, and roaches. This is yet another case of looking at the wrong end of the problem.

### Children

Children are at particular risk from carpet contaminants for several reasons. Their immune systems are not fully developed, therefore they are more vulnerable to toxic exposure. Infants, toddlers and children inhale more of the toxic emissions from crawling and playing on carpeted floors,



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and absorb more due to skin exposure. Even when standing up they inhale closer to the source than adults.

The extra time spent in contact with floor surfaces and normal hand-to-mouth contact increases a child's exposure to carpet dust. Lawn chemicals and other outdoor chemicals easily find their way indoors. Lead and combustion by-products are common components of house dust, which settle into carpets.

The amount of lead found in dust and carpet where a child plays has been found to be the best single predictor of the toddler's blood level of lead.<sup>22</sup>

One case study of a previously healthy ten-month-old boy on the West Coast who developed seizures and tremors five days after new carpeting was installed in his home, baffled doctors. A battery of tests ruled out multiple sclerosis, muscular dystrophy, and tumors. "Tremors of unknown origin" was the final diagnosis. The tremors lessened when the child spent time away from home. Steam cleaning and airing out the house did not help. After watching a CBS news program about Anderson Labs in Dedham, Massachusetts, which tests carpet samples, the parents sent a sample to be tested. They "were horrified" to learn that "the mice were rolling over and shaking" just like their son's reaction.<sup>23</sup>

Months after removing the carpet, padding, and adhesives, the tremors stopped. Follow-up tests indicate the child has immune system damage consistent with chemical exposure. His body's immune system has mistakenly identified its own tissues or cellular components as foreign and has directed antibodies against them to the myelin in his nervous system, a sign that nerve tissue damage has occurred.<sup>24</sup>

### Cleaning Can Add to the Problem

Carpet holds a tremendous amount of debris - much of it highly allergenic - which cannot be removed completely by routine cleaning.<sup>25</sup> Vacuum cleaners can sometimes do more harm than good because most residential models have inefficient filters which allow very fine dust particles to blow back into a room, posing serious problems for asthmatics and allergy-prone individuals. Even with more efficient units some gases that are not highly volatile and normally cling to carpeting can become airborne during vacuuming. A central vacuum system with an outdoor exhaust is the best solution for expelling fine dust and any gases from the interior space.<sup>26</sup>

Shampooing rugs often creates a damp environment fostering mold growth, mildew and dust mites, which proliferate in high humidity environments. Professional rug cleaners sometimes add insecticides and fungicides to the process, and some shampoos contain formaldehyde in addition to a host of other toxic compounds. Dr. Claire Dykewicz with the Center for Disease Control and Prevention (CDC) advises keeping young children away from newly shampooed carpets for at least several hours.<sup>27</sup>

Carpet cleaning has been associated with Kawasaki Syndrome in children, a systemic illness characterized by high fever. Symptoms often occur 16-25 days after cleaning. An increased incidence has been noted among higher socioeconomic classes. Reviewing a 1984-85 Colorado outbreak found that 62% of affected children had been exposed to carpet cleaning.<sup>28</sup>

Reducing the amount of outdoor pollutants tracked indoors can be accomplished by placing mats at each entrance. Removing shoes as often as possible is also recommended. Well-known health writer and TV personality, Gary Null makes it a practice to remove his shoes upon entering his home and requests that others do the same.<sup>29</sup> Recognizing that shoes pick up animal and other wastes in addition to lead, motor oil, soot, soil, and pesticides, the inconvenience of removing one's shoes appears to be worth the effort.

Next month this column will discuss carpet politics and alternative floor coverings. For more information about carpets the following contacts are provided. Bear in mind, the first three are biased towards industry while the rest are pro-consumer.

[www.carpet-rug.com](http://www.carpet-rug.com) - Carpet & Rug Institute, 1-800-882-8846

[www.cpsc.gov](http://www.cpsc.gov) - Consumer Product Safety Commission, 1-800-638-2072

[www.epa.gov/iaq](http://www.epa.gov/iaq) - US EPA (Indoor Air Quality), 1-800-438-4318

[www.lungusa.org](http://www.lungusa.org) - American Lung Association, 1-800-586-4872

[www.rachel.org](http://www.rachel.org) - Rachel's Health News Weekly

[www.citizen.org/hrg](http://www.citizen.org/hrg) - The Public Citizen Health Research Group

[www.garynull.com](http://www.garynull.com) - Gary Null's Health Line

[www.consumersunion.org](http://www.consumersunion.org) - Consumers' Union

[www.mssm.edu/cche.html](http://www.mssm.edu/cche.html) - Mount Sinai School of Medicine

[www.preventcancer.com](http://www.preventcancer.com) - The Cancer Prevention Coalition

[www.ucsusa.org](http://www.ucsusa.org) - Union of Concerned Scientists

[www.psrus.org](http://www.psrus.org) - Physicians for Social Responsibility

Citizens for Safe Carpet, PO Box 39344, Cincinnati, OH 45239; 513-385-1111

Glenn & Sharon Beebe provide support group and information exchange, and authored the *Toxic Carpet III*

Environmental Access Research Network (EARN); 315 West 7th Ave., Sisseton, SD 59645; Send \$1.00 and request "Carpet List" for related articles, studies, and reports.

EPA Union NFFE 2050, PO Box 76082, Wash. DC, 20013 202-260-2383 or 202-260-4683 (Bill Herzy)

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18. American Lung Association, 1-800-586-4872, phone inquiry, 3/26/01.
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28. Null, Gary, Ph.D., *Gary Null's Ultimate Anti-Aging Program*, Broadway Books, NY, 1999.