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ABSTRACT

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Dampness, Biological Factors and Sick House Syndrome

Nippon Eiseigaku Zasshi, 64, 665–671 (2009)
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Sick house syndrome is caused by not only chemicals but also dampness and biological factors. Many European and North American studies have shown that dampness associated with condensation, visible mold, moldy odor, and water-induced damage among others affects residents' health. Recent Japanese studies have also shown a similar significant relationship. Mold can cause infection and allergy, and can produce chemicals such as microbial volatile organic compounds (MVOCs) and (1 → 3)-β-D-glucan. Mold exposure can be analyzed using culture-based (colony forming unit count) enumeration techniques. More recently, other nonculture-based methods of measuring mold concentrations in indoor environments have been described, which may provide more valid measures of exposure. These are based on measurement of specific mold markers in dust or air, such as ergosterol, genus-specific extracellular polysaccharides or (1 → 3)-β-D-glucan. Mites are major indoor allergens. The gold standard for measuring exposure to mite allergens is enzyme-linked immunosorbent assay (ELISA), but it is relatively expensive and requires specialized techniques. Several simple semiquantitative dust mites allergen test have b available in Japan.

Potential Risk of Indoor Semivolatile Organic Compounds Indoors to Human Health

Nippon Eiseigaku Zasshi, 64, 672–682 (2009)
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The concerns on indoor contamination by semivolatile organic compounds (SVOCs) are increasing. Because of the high boiling points in the range of 260–380°C, SVOCs are considered to vaporize poorly under living conditions. However, a wide variety of SVOCs were detected in indoor air and house dust in previous studies. Indeed, we found SVOCs frequently in both air and dusts of residential dwellings in Sapporo city in 2006. Among SVOCs, there are a number of findings indicating that phthalates and pesticides use associated with allergy or bronchial obstruction. The adjuvant effect of phthalates, particularly monoesters, was shown in animal experiments and the association between allergy prevalence and exposure to phthalates or indoor materials containing plasticizers was observed in previous epidemiological studies. Regarding pesticides involving organophosphates and pyrethroids among others, the association of pesticide use with asthma or chronic bronchitis was observed in commercial pesticide applicators or farmers. Because SVOCs were often found in air and house dust of residential dwellings, the risk of SVOC exposure should be assessed in the Japanese general population.

Indoor Air Pollution of Volatile Organic Compounds: Indoor/Outdoor Concentrations, Sources and Exposures

Nippon Eiseigaku Zasshi, 64, 683–688 (2009)
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In this review, we discussed about volatile organic compounds (VOC) concentrations, sources of VOC, exposures, and effects of VOC in indoor air on health in Japan. Because the ratios of indoor concentration (I) to outdoor concentration (O) (I/O ratios) were larger than 1 for nearly all compounds, it is clear that indoor contaminations occur in Japan. However, the concentrations of basic compounds such as formaldehyde and toluene were decreased by regulation of guideline indoor values. Moreover, when the sources of indoor contaminations were investigated, we found that the sources were strongly affected by to outdoor air pollutions such as automobile exhaust gas. Since people live different lifestyles, individual exposures have been investigated in several studies. Individual exposures strongly depended on indoor concentrations in houses. However, outdoor air pollution cannot be disregarded as the sources of VOC. As an example of the effect of VOC on health, it has been indicated that there is a possibility of exceeding a permissible cancer risk level owing to exposure to VOC over a lifetime.

Risk Factor for Lifestyle and Way of Living for Symptoms of Sick Building Syndrome: Epidemiological Survey in Japan

Nippon Eiseigaku Zasshi, 64, 689–698 (2009)
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Objectives: To investigate the association among symptoms of sick building syndrome (SBS). Self-reported questionnaire and indoor environmental surveys of newly build dwellings in Japan were conducted.
Materials and methods: The questionnaire included items on symptoms of SBS and lifestyle, and an indoor environmental survey [i.e., mold, mites, and volatile organic compounds (VOC)] was conducted in family rooms of dwellings in Japan (Sapporo, Fukushima, Nagoya, Osaka, Okayama, and Kitakyusyu), from 2004 to 2007.
Results: Data from Osaka in 2004 indicated significant odds ratios for symptoms of SBS for questionnaire items on renovation, air freshener, carpet, use of benzin, use of thinner, use of coating materials, moldiness, smell of house, and feeling of having insufficient sleeping hours. Significant odds ratios were noted for total CFU, *Auerbasidum* genus, *Alternaria alternata*, *Aspergillus* sp., *Aureobasidium pullulans*, *Cladosporium cladosporioides*, *Fusarium* sp., *Penicillium* sp., *Rhodotorula minuta*, and *Wallemia sebi*. Concerning concentrations of VOCs, TVOC, limonene, *o*,*m*-tolualdehyde, 2-pentanone, tetrachloroethylene, *n*-decane, and *n*-heptane are significantly higher in those who have symptoms of SBS. Significant odds ratios were indicated for questionnaire items on smell of house, stuffiness, moldiness, fustiness, dampness, water leakage, and feeling of having insufficient sleeping hours from data of six areas in Japan in 2004. Continuous data analysis of Osaka from 2004 to 2006 suggested that improvement of symptoms of SBS might be due to lifestyle modification.
Conclusion: Mites, molds, VOCs, renovation, moldiness, stuffiness, feeling of having insufficient sleeping hours, carpet use, benzin, thinner, and coating materials, increase the risk of developing symptoms of SBS, whereas modification of lifestyle and ways of living factors might alleviate them.

Sick House Syndrome: Governmental Actions and Challenges

Nippon Eiseigaku Zasshi, 64, 699–703 (2009)
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Since the 1980s, sick house syndrome has become one of the major challenges in environmental health. In Japan in 1980, first governmental measures were taken to limit formaldehyde release from building materials. In 2003, the Building Standards Law and the Community Health Law were revised, and these laws clarified the responsibility of building companies, local governments and health officers in preventing sick house syndrome. Telephone survey results demonstrated the decrease in the prevalence of sick house syndrome between 2002 and 2006 in Tokyo and Sapporo. Knowledge about sick house syndrome enabling patients to better deal with the syndrome and stricter regulations seem to have contributed to the decrease in the prevalence of the syndrome. Questionnaire surveys carried out through regional health centers demonstrated that the number of possible sick house syndrome patients visiting regional health centers varied, possibly reflecting different local prevalences and needs. Most of the regional health centers had staff members who were able to measure in-house environments, but their ability to discuss on health-related issues was limited, and cooperation between the centers and healthcare organizations was not sufficient. Information about healthcare organizations that can treat patients with sick house syndrome and simple self-diagnostic tools were among the most often cited useful support needs. Establishment of a hub regional health center to construct a comprehensive consultation and referral system that can meet local needs in dealing with sick house syndrome is recommended.

Effect of Asbestos-Containing Products with Harmless Treatment on the Lungs

Nippon Eiseigaku Zasshi, 64, 704–709 (2009)
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The amount of industrial wastes with asbestos such as dismantled construction materials has increased. We have reviewed the effect of asbestos-containing products subjected to harmless treatment on the lungs. Usually, the harmless treatment of asbestos is confirmed by the disappearance of fibrous materials and crystal structures by electron microscopy and X-ray diffraction. However, it is very important to perform animal studies and in vitro studies in order to examine the effect of the treated asbestos-containing products on the lungs. From previous treatments of asbestos using acids or high temperature, almost treated materials tended to show decreased toxicity in vitro and in vivo studies. There are some reports of the adverse effects of the treatment. If new harmless treatments of asbestos are developed, it is necessary to perform animal studies and in vitro studies of asbestos-containing products using new harmless treatments.