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Measuring and Reducing Exposure to the Pollutants in House Dust

House dust contains environmental pollutants that may accumulate indoors from both internal and external sources over long periods of time. In addition to the many indoor sources of pollution, outdoor pollutants may be tracked in on shoes or brought in on clothing or by household pets. Once inside, these pollutants can become associated with house dust and can accumulate on household surfaces and in carpets, upholstered furniture, and draperies, where they may persist for years.[1] Consequently, concentrations of pesticides and other organic pollutants used outdoors are often higher in house dust than in the yard soil that surrounds the house, even on farms.[1-4]

Exposure to house dust may increase the potential health risks to all humans, but especially to infants and toddlers, who often crawl or lie on the floor and mouth their hands and other objects. For small children, house dust appears be a primary route of exposure to pesticides, lead, and allergens.[1,5,6]

It has been difficult to conduct epidemiological studies of exposure to house dust, to compare one study with another, or to set exposure limits because standardized sampling methods are lacking. Specifically, the need has been for a reproducible method to collect sufficient quantities of house dust from carpeted and bare floors for chemical analysis. To meet this need, the US Environmental Protection Agency developed a high-volume sampler and validated its use for determining both the household dust levels of lead, pesticides, polycyclic aromatic hydrocarbons (PAHs), and polychlorinated biphenyls (PCBs),[1,4,7] and the allergen and microbiological content of carpeted and noncarpeted floors.[8] Known as the HVS3, this sampler is now the basis of an American Society for Testing and Materials standard.[9]

For infants and toddlers, carpet loadings of lead (in mass-per-unit area) in rooms where children spend the most time have been reported to be the best predictors of blood lead levels.[10] Dust also appears to be a potentially important pathway for in-home exposure to pesticides. Chlordane, for example, was found at median and maximum levels of 6.3 and 98.6 μg/g, respectively, in house dust in nine Florida homes, along with μg/g levels of 12 other pesticides (many discontinued) that could not be detected in the indoor air.[2] Pesticide concentrations in house dust from nine middle-class households in North Carolina were found to exceed those in entryway soil and yard soil even when the pesticides were used exclusively outdoors.[1] In recent studies conducted in nine homes each in Seattle, Wash, and Columbus, Ohio, concentrations of potentially carcinogenic PAHs in carpet dust were found to range from 3 to 290 μg/g; of lead, from 250 to 2250 μg/g; and of PCBs, from 379 to 804 ng/g. Dust collected from the upholstery of 10 Seattle sofas by using a specially designed wand and nozzle attached to the HVS3 cyclone averaged 16.3, 37.2, and 229 μg/g for mite allergen, cat allergen, and lead, respectively.

Low-cost methods are available for reducing track-in and exposure to house dust. These methods, which have been tested, include removal of shoes at the entryway, use of well-designed doormats, efficient vacuum cleaning, and proper use of air filters. The potential benefits that could be derived from reducing indoor exposure to house dust, especially for small children, are clear and may be achieved with greater public awareness. □

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