Healthy Homes Grantees in Region V, Midwest

Name of Grantee: University of Cincinnati Department of Environmental Health
Name of Project: Evaluation of a New Low-Cost Method for Identification and Assessment of Mold Problems in Housing
Amount Awarded: $ 448,789
Year of Grant: 2001
Contact Info: Sergey Grinshpun, 513-558-0504

Project Partners: City of Cincinnati Environmental Advisory Council, The Better Housing League and People Working Cooperatively

Summary of Project Activities:
Fungi, well-known indoor contaminants that grow on moist building materials in homes, produce spores, which become airborne if disseminated from surface sources. About 36% of residential houses in the US have been estimated to have mold and moisture problems. These are particularly severe in the Midwest (including the Ohio River Valley region) due to the humid climate and frequent flooding. Mold and moisture are particularly common health hazards in low-income housing. Although the health problems caused by exposure to fungal spores in moldy homes are significant, there is no adequate method available yet for measuring the source strength for spores, which could adequately identify and assess mold problems in housing.

The proposed research project, "Evaluation of a New Low-Cost Method for Identification and Assessment of Mold Problems in Housing," responds to the HHI-2001 research objective of improving existing methods and developing new methods to evaluate and control housing-based health hazards. The project is focused on further development of the co investigators' new cost-effective methodology for the measurement of fungal spore emissions in residential houses. It has been widely recognized that a reliable method is needed to directly assess sources of indoor molds that can aerosolize, and thus potentially cause health effects. The aerosolization of fungi from surfaces is a sporadic process. The conventional indoor air sampling often does not detect high levels of airborne molds, but residents, particularly children, develop severe health effects associated with exposure to fungal spores. In addition, field protocols require that the air sampling be performed for several intervals over a long time period; this increases the cost of hazard evaluation, but does not ensure that spores release from surfaces into indoor air are properly detected.

The newly-developed portable Fungal Spore Source Strength Tester (FSSST) consists of an inner cup, through which HEPA-filtered air is directed onto the contaminated surface, and an outer cap, through which the released spores are transported to the bioaerosol sampler. Airflow and heat/vibration stimulate spore emission from moldy surfaces to the sampler. The samples are then analyzed and the spores that may cause adverse health effects are identified and enumerated. The new FSSST estimates the maximum amount of spores that can become airborne under the most favorable conditions.
This method allows overcoming the limitations of conventional air sampling methods that cannot account for the fluctuative nature of fungal spore release, and, therefore, often give false negative results when used to sample moldy homes. The evaluation and field implementation of the new method and protocol will be conducted in homes of low-income families with children under 12. The research provides a unique tool for Assessing Methods for Reducing or Eliminating Housing-Related Hazards. The proposal addresses two key housing-related hazards identified by the HHI Program: (i) allergens and asthma and (ii) mold and moisture.

First, an in-depth study will be conducted on the factors controlling the spore emissions from different building materials. Second, the new method will be evaluated in the laboratory and in the field and then modified and optimized for general use in homes. Several sophisticated techniques for bioaerosol generation, measurement and microbial analyses will be employed in the laboratory evaluation phase. The detailed field-testing will be conducted in ten problem- and ten non-problem homes, selected from at least 200 housing units owned/rented by low-income families with children. This selection will be based on residents' responses to a survey addressing the housing conditions in these 200 homes and reported respiratory symptoms. Third, the new method will be utilized in ongoing housing intervention projects performed in moldy homes in the Ohio River Valley region. This part of the project will be conducted in collaboration with the City of Cincinnati Environmental Advisory Council and several local agencies, including the Better Housing League and People Working Cooperatively. The use of the newly-developed inexpensive and portable FSSST will allow inspectors, contractors and residents to adequately assess housing-related mold problems and the effectiveness of interventions in homes. An external Scientific Advisory Board composed of nationally- and internationally-recognized experts representing exposure assessment, microbial ecology, indoor air quality, building engineering, pulmonary medicine, allergology, and epidemiology will provide technical advice throughout the project.

**Product Outcomes/Outputs:**

First, an in-depth study will be conducted on the factors controlling the spore emissions from different building materials. Second, the new method will be evaluated in the laboratory and in the field and then modified and optimized for general use in homes. Several sophisticated techniques for bioaerosol generation, measurement and microbial analyses will be employed in the laboratory evaluation phase. The detailed field-testing will be conducted in ten problem- and ten non-problem homes, selected from at least 200 housing units owned/rented by low-income families with children. This selection will be based on residents' responses to a survey addressing the housing conditions in these 200 homes and reported respiratory symptoms. Third, the new method will be utilized in ongoing housing intervention projects performed in moldy homes in the Ohio River Valley region.