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Healthy Indoor Environment First Step in Managing Allergic Diseases

DALLAS – Taking steps to reduce indoor air pollution and maintain a healthy home or office is the best defense against allergic diseases according to experts at the ACAAI Annual Meeting of allergists-immunologists.

“Avoidance of offending triggers, whether allergens or irritants, is a critical first step in the management of many diseases treated by board-certified allergists, including chronic rhinosinusitis and asthma,” said James L Sublett MD, FACAAL., co-chair of the Healthy Indoor Environment Conference.

Americans spend about 90 percent of their time indoors, encountering a broad range of air pollutants as they travel through a variety of indoor environments in the course of their daily activities.

“Indoor levels of pollutants may be 2-to-5 times higher than outside, and occasionally 100 times or higher,” said Howard Brightman, Sc.D, P.E., C.I.H., Environmental Health & Engineering, Inc., Newton, Ma. “High levels of pollutants may increase the risk of irritation, allergic sensitization, acute and chronic respiratory disorders, as well as other subtle neurological and behavioral effects.”

Indoor contaminant exposures and their causes include:

- Biological contaminants: dust mites, pet dander, cockroaches, rodents and microbial agents, such as molds and bacteria, and their by-products.
- Chemical and particle exposures: formaldehyde, ozone, radon, VOCs, respirable particles, plastics and plasticizers, carbon monoxide, nitrogen oxides and cleaning chemicals
- Occupant activities: personal habits and activities of building occupants, including tobacco smoke, perfume, cosmetics, pesticides, room deodorizers, cooking and indoor stoves.

The major sources of indoor allergens responsible for IgE-mediated respiratory illness in the United States are house dust mites, domestic pets (cats and dogs), cockroaches and fungi.

House dust mites are small, microscopic, eight-legged arachnids related to ticks, spiders and scabies mites that live in the dust especially in bedding.

“Sensitization to dust mite allergen is strongly associated with increased airway responsiveness and asthma,” said Jeffrey C. May, M.A., principal scientist of May Indoor Air Investigations LLC, Tyngsborough, Mass. “There are about a dozen other types of mites that live in damp, indoor environments for which allergy testing is rarely conducted. These include mold-eating mites, so people exposed to those mite-fecal pellets are exposed simultaneously to both mold and mite allergens.”

When surfaces containing biological growth are disturbed, by-products of this growth become airborne and then settle into carpets, cushions, exposed fiberglass insulation, and the surfaces of an HVAC (heating, ventilation and air conditioning) system he said. Particles greater than 100 microns in size take only seconds to settle, but sub-micron particles remain airborne for hours and can be inhaled deeply into the lung.

Managing Indoor Allergens

May offers the following advice on what works to minimize the presence of allergens, and what doesn't work.

- Boric acid and benzyl benzoate kill mites, but do not eliminate residual allergens.
- Tannic acid is effective in destroying some protein allergens, but only affects a small percentage of the total amount of protein in a cushion according to May.
- HEPA air purifiers, though useful in cleaning the air, cannot prevent mite allergens in a pillow or mattress from affecting a sleeper.
- A dehumidifier in a basement can help control mold growth as long as the relative humidity is kept under 50 percent. However, in a bedroom, a dehumidifier will not prevent body moisture under a sleeper from raising the relative humidity in a mattress to 80 percent (a level conducive to mite infestations if sustained, and even to mold growth).
- It is always best to control allergens by eliminating their sources. "For example, allergen-control encasing with solid urethane-backed covers on mattresses and pillows eliminates primary bedroom exposures to mite allergens," May said. "Then the dust on curtains will no longer be allergenic and therefore curtains need not be avoided."

May is author of *My House is Killing Me! The Home Guide for Families with Allergies and Asthma*; *The Mold Survival Guide: For Your Home and for Your Health*; *My Office is Killing Me! The Sick Building Survival Guide*; and *Jeff May's Healthy Home Tips* (at press), all published by Johns Hopkins University Press. His books offer guidance on controls of indoor mold, mites, volatile organic compounds, and other contaminants, as well as recommendations on which products (like air purifiers) are and are not effective in improving indoor air quality.

Pets can cause problems to allergic patients in several ways. Their dander, or skin flakes, as well as their saliva and urine, can cause an allergic reaction. The animal hair is not considered to be a very significant allergen. However, the hair or fur can collect pollen, dust, mold and other allergens.

In a national sample of 831 homes, more than 45 percent of homes had a dog or cat. "In the United States, virtually all persons are frequently exposed to detectable levels of cat and dog allergens," said Dennis R. Ownby, M.D., professor of pediatrics, Allergy and Immunology Section at the Medical College of Georgia. "Immunotherapy can provide modest relief of symptoms in cat allergic individuals. Air filters have not been shown to be consistently effective in reducing symptoms in cat allergic individuals. The only consistently effective method of reducing symptoms from pet exposure is to remove the pet from the home," he said.

Contaminants in the Work Environment

In the work environment, investigators have uncovered a variety of illnesses that are attributable to buildings. According to the World Health Organization, diagnosis of “Sick Building Syndrome” requires demonstration of an elevated complaint or symptom prevalence that is associated with a particular building, and that symptom patterns do not match other clinically recognized syndromes.

Dr. Brighton said no one cause of Sick Building Syndrome has been found to date. “More recent studies look at the complex interplay between the workspace, environmental conditions, occupants, and building-related symptoms and lost productivity. While individual and psychosocial characteristics may actually play a large role in determining lost productivity and symptoms prevalence, there are many ways to improve building characteristics to benefit the occupants,” he said.

Building environments may improve by eliminating sources of pollutants, increasing ventilation and cleaning, and using new technologies to achieve individual control. Ventilation – which has been reduced by the institution of energy conservation measures – decreases the concentration of and exposure time to environmental pollutants, and reduces the opportunity for indoor chemical reactions.

The first step in identifying building related health effects is to locate the source of contaminants. “A detailed environmental history should determine if symptoms are worse indoors or outdoors, during different seasons, or in a particular location,” said James M. Seltzer, M.D., clinical professor of medicine at the University of California, Irvine School of Medicine. “Clues from the condition of the building may include factors such as housekeeping, structural material, design material and ventilation.”

Patient information on allergic diseases is available by calling the ACAAI toll free number at (800) 842-7777 or visiting its Web site at www.acaai.org.

About the American College of Allergy, Asthma and Immunology

The ACAAI is a professional medical organization headquartered in Arlington Heights, Ill., that promotes excellence in the practice of the subspecialty of allergy and immunology. The College, comprising more than 5,000 allergists-immunologists and related health care professionals, fosters a culture of collaboration and congeniality in which its members work together and with others toward the common goals of patient care, education, advocacy and research.

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