

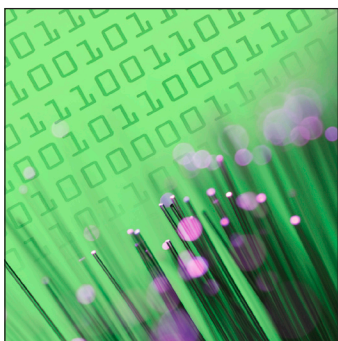
## Respiratory Disease and the Environment

Respiratory diseases such as asthma, pneumonia, influenza and chronic obstructive pulmonary disease (COPD) are complex disorders that involve multiple components. Intrinsic factors that contribute to disease pathogenesis include gender, age, and genetic background. However, it is important to note that respiratory diseases involve extrinsic factors—exposure to environmental stimuli or triggers such as allergens, molds, air pollutants and tobacco smoke.



**The National Institute of Environmental Health Sciences** sees respiratory disease as environmental disease. Through a combination of in-house and grant-supported programs, NIEHS spent more than \$113 million to support research on the environment and respiratory disease in 2007.

## Stepping into the Future



If resources permit, NIEHS will press forward in the new and promising area of **Exposure Measurement** technology, which will emerge as a cornerstone of biomedical research. Current approaches to exposure measurement

are evolving rapidly as a result of programs such as the NIEHS Exposure Biology Program, part of the NIH Genes, Environment and Health Initiative (GEI). In order to advance our understanding of how

environmental factors influence human health and disease, it is critical that NIEHS be able to support important research that yields:

- Environmental Sensors for Personal Exposure Assessment
- Tools to Measure Exposure to Psychosocial Stress and Addictive Substances
- Improved Measures of Diet and Physical Activity
- Biological Response Indicators of Environmental Stress



## Answers on Allergens and Asthma

Despite improvements in diagnosis and management, the prevalence of asthma has increased in the past 15 years. In the U.S. alone, 20.5 million people—6.7% of adults and 8.5% of children—have been diagnosed with asthma.



Research shows that asthma runs in families. However, environmental factors also contribute. Allergies and asthma are closely intertwined, and allergy-causing substances called **allergens** in the environment are a major cause of asthma. Studies show that indoor allergens from house dust mites, cockroaches, dogs, cats,



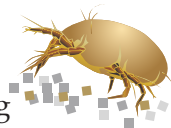
rodents, molds and fungi are among the most important asthma triggers.

NIEHS scientists, along with researchers from the Department of Housing and Urban Development, conducted the National Survey of Lead and Allergens in Housing, which showed that more than 46 percent of the homes surveyed had levels of dust mite allergens high enough to produce allergic reactions, and nearly a quarter had levels high enough to trigger asthma symptoms in genetically susceptible people.

The survey also showed that nearly two-thirds of U.S. homes have detectable levels of cockroach allergens, with higher levels in high-rise apartments, urban settings, older homes and homes of low-income households. About 10 percent had cockroach allergen levels above the threshold for triggering asthma symptoms.

One of the most surprising findings from the national survey was that 100 percent of homes had detectable levels of dog and cat allergen, even though dogs were present in only 32 percent of the surveyed homes, and cat ownership was reported in only 24 percent.

Additional research showed that some simple steps—washing the bedding in hot water, putting allergen-impermeable covers on the pillows, box springs and mattresses, and vacuuming and steam-cleaning the carpets and upholstered furniture—can significantly reduce dust mite allergen levels.



## Research Centers for Children's Environmental Health

Centers for Children's Environmental Health and Disease Prevention conduct research on the effects of environmental exposures on children's health, including pulmonary health. These research Centers translate and communicate their findings to clinical and public health professionals and policy makers to alleviate the burden of environmentally induced diseases in children. The National Institute of Environmental Health Sciences (NIEHS), in partnership with the U.S. Environmental Protection Agency (EPA), has supported this program since 1998.



### SPOTLIGHT

#### Air Pollution and Lung Development in Children

NIEHS-funded research at the University of Southern California (USC) found that exposure to air pollution has long-term effects on lung development in children. An eight year study of 1,759 children in 12 southern California communities showed that significant deficits in forced expiratory volume (FEV) were associated with a wide range of exposures to ozone, nitrogen dioxide, acid aerosols, particulate matter and elemental carbon. In another study, children living within 500 meters of a freeway in California had reduced lung function when compared to children living at least 1,500 meters away. The research pointed to diesel exhaust, which contains particulate matter that is readily inhaled deep into the respiratory system and can cause extensive bronchial wall inflammation and oxidative stress. This research finding is important because it shows that certain communities are at higher risk for health problems related to air pollution. It also raises awareness that environmental justice is a community issue.