

## What is Environmental Health?

**Environmental Health** is the field of science that studies how the environment influences human health and disease.

“Environment,” in this context, means things in the natural environment like air, water and soil, and also all the physical, chemical, biological and social features of our surroundings.

The man-made, or “built,” environment includes physical structures where people live and work such as homes, offices, schools, farms and factories, as well as community systems such as roads and transportation systems, land use practices and waste management. Consequences of human alteration to the natural environment, such as air pollution, are also parts of the man-made environment.

The social environment encompasses lifestyle factors like diet and exercise, socioeconomic status, and other societal influences that may affect health.

### How Can Environmental Factors Affect Health?

The interaction of the environment with a person’s genetic make-up can shift the balance between health and disease. Scientists have learned that while genetics plays a big role, often something in the environment is the trigger for a disease to develop. Age and gender also affect this interaction between genetics and the environment.

For example, several genes are associated with Parkinson’s disease. NIEHS-supported research shows



**Environment = Natural Environment + Man-made Environment + Social Environment**

that the effect of the environment is more significant among older adults who develop the disease after age 50. Studies of twins suggest that something in the environment triggers Parkinson’s in people who are genetically susceptible to the disease. In one study of 14,000 twins, 325 pairs had one twin with signs of Parkinson’s disease, while only 7 pairs had both twins with the disease.<sup>1</sup>

As part of its research initiative in children’s health, the NIEHS supported a long-term study on how air pollution affects lung function development in children. Researchers conducted annual lung function tests in 1,759 southern California children as they grew from 10 to 18 years old. They compared levels of air pollutants between neighborhoods. Children



from highly polluted areas had reduced lung function compared to children from less polluted communities. Children with underdeveloped lungs may be predisposed to lung disease in later life.<sup>2</sup>

### **How Does the NIEHS Promote Human Health and Prevent Disease?**

The NIEHS identifies research needs in environmental health and conducts studies to understand how environmental and genetic factors interact to cause human disease.

The NIEHS is also home to the National Toxicology Program, an interagency group that conducts research to identify toxic agents in the environment and evaluate their health effects.

### **What Are Some NIEHS Research Initiatives In Environmental Health?**

The NIEHS has targeted a number of specific environmental health challenges for further research:

#### **Health Disparities and Environmental Justice<sup>3</sup>**

Disadvantaged populations are at increased risk for a number of conditions or diseases with strong environmental components including cancer, diabetes, asthma, cardiovascular disease, low birth weight and increased infant mortality. The NIEHS funds research, community outreach and education programs to help identify and rectify environmental causes of these health disparities. For example, a recent NIEHS-funded study found that asthma symptoms among inner city children dropped dramatically when family members received education on ways to control



allergens in their homes and when they took some simple steps like using allergen-impermeable bedding covers and air purifiers.

#### **The Sister Study Breast Cancer Research**

Sisters and daughters of women with breast cancer are twice as likely to develop the disease as the average woman. In 2004, the NIEHS began a nationwide 10-year study that will follow 50,000 women who have a sister with breast cancer, but who have not yet developed the disease themselves. These women will provide samples of blood, urine, toenails and household dust, as well as detailed histories, including work environments and life activities, to help scientists discover what genetic and environmental factors may cause the disease.

#### **Parkinson's, Alzheimer's, and Other Neurodegenerative Diseases<sup>4</sup>**

The NIEHS conducts and funds research on the link between long-term exposure to environmental agents and degenerative brain disorders.

For example, researchers recently discovered a protein called transthyretin, which protects brain cells from the toxic effects of beta-amyloid, a protein that damages neurons in Alzheimer's disease. This research may lead to better therapies for treating, and perhaps even preventing, this devastating disease.

#### **Development of Cutting-Edge Research Tools:**

RNA interference (RNAi) is a research method that allows scientists to "turn off" selected genes to better understand how a gene functions in individual cells. The NIEHS funded the creation of an RNAi library that will help researchers evaluate how the pathways and effects of environmental compounds affect particular genes.

The new NIEHS Center for Rodent Genetics is mapping all the genes of the 16 mouse strains most commonly used in laboratory studies. Because most human genes have corresponding genes in mice, precise knowledge of how mouse genes are organized will help scientists understand how substances in the environment interact with genes to produce disease in humans.

For more information on NIEHS programs, including these and other research initiatives, go to our website at:  
[www.niehs.nih.gov](http://www.niehs.nih.gov).

<sup>1</sup> Citation: Wirdefeldt, et al. (2004) No evidence for heritability of Parkinson disease in Swedish twins. *Neurology* 63(2):305-11.

<sup>2</sup> Citation: Gauderman et al. (2004) The effect of air pollution on lung development from 10 to 18 years of age. *The New England Journal of Medicine* 351(11):1057-67.

<sup>3</sup> Citation: Morgan et al. (2004) Results of a home-based environmental intervention in urban children with asthma, *The Inner City Asthma Study*. *The New England Journal of Medicine* 351(11):1068-80.

<sup>4</sup> Citation: Stein et al. (2004) Neutralization of transthyretin reverses the neuroprotective effects of secreted amyloid precursor protein (APP) in APPSW mice resulting in tau phosphorylation and loss of hippocampal neurons: support for the amyloid hypothesis. *Journal of Neuroscience* 24(35):7707-17.