Building Awareness of the Built Environment

The built environment—the homes, schools, workplaces, parks, industrial areas, roads, highways, and waste disposal sites that are modified by people—is by far the most significant environment for modern humans, a species that is 80% urbanized and spends 90% of its time indoors. In sprawling communities, cars and trucks pollute with ground-level ozone and particulate matter, contributing to human health problems such as lung disease. Furthermore, America's poor endure dilapidated housing, overcrowding, and intensified pollution, which spawn their own health problems. Yet causal relationships between urban design and human health can often be difficult to prove.

These were the major themes of a conference, "Built Environment—Healthy Communities, Healthy Homes, Healthy People: Multilevel, Interdisciplinary Research Approaches," convened 15–16 July 2002 in Research Triangle Park, North Carolina. The conference was cosponsored by the NIEHS and the NIH Office of Behavioral and Social Sciences Research and Office of Rare Diseases. Speakers described the state of the science in social, environmental, and behavioral studies on the connections between the built environment and human health. The conference focused a great deal on the effects of the built environment on the poor. Scientists and public health officials at the conference also explored future directions in conducting research in this arena.

Lawrence Frank, an assistant professor of city and regional planning at Georgia Institute of Technology in Atlanta, said that Americans lack alternatives to the sprawling model of development. "We have assumed that people will 'vote with their feet' about where they want to live"—if they don't like a place, they'll simply leave. But the public actually has only a constrained set of housing choices, he said. Many people say they want to live in European-style, higher-density settings in which they can walk to work or the corner store, but only 0.5% of the land area of the Atlanta metropolitan area, for example, is built in such a design.

Building knowledge. A recent meeting focused on the links between environmental health and the environments we create.

A Modern Malaise?

The scientific community's view of environmental health has changed in recent years. Two decades ago, the study of environmental health focused almost exclusively on chemical toxicants and their relationship to cancer and other illnesses, according to Samuel Wilson, deputy director of the NIEHS. "Now our definition of environmental health is much broader, and we look at the effects on human health of housing, urban development, land use and transportation, industry, and agriculture," he said.

Speakers addressed the effects of land use and transportation on human health. In recent decades, U.S. cities have increasingly sprawled across the landscape, and most Americans have relied primarily on fossil fuel–burning cars and trucks for their transportation needs. Now transportation and energy generation are the major causes of air pollution impacts on human health, said George Thurston, an epidemiologist at the New York University School of Medicine Department of Environmental Medicine.

Some populations are particularly vulnerable to ambient air pollution, including older adults, persons with preexisting respiratory disease, children (especially infants and those with asthma), adults who work or exercise outdoors, and people with inadequate health care. "The human lung was not really evolved to deal with fossil fuel combustion particles, so they can bypass or defeat the body's defenses," Thurston said.

Nevertheless, data showing causal relationships between urban design and human illness are incomplete. "We need to do more work in quantifying the air quality benefits of better planning, [including] reducing urban sprawl," said Thurston. "People don't tend to look at urban sprawl as an air pollution problem."

Speakers discussed how communities could be better designed to sustain human health. Trevor Hancock, a physician and chairman of the board of the Canadian Association of Physicians for the Environment, offered one formula: "We have to stop urban sprawl, intensify existing urban areas, create mixed land use developments with walking-friendly design, and support public transit."

Problems among the Poor

Virginia Rauh, a perinatal epidemiologist and co–deputy director of the Center for Children's Environmental Health at

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Columbia University, described how inadequate housing is a good indicator that people are under harmful stress. This likely is one reason why the poor, who often live in inadequate housing, suffer from worse health than more prosperous people, including greater infant mortality, more birth defects, higher cancer rates, and a higher incidence of asthma, diabetes, and cardiovascular disease. Researchers have gathered increasing evidence that the poor endure a disproportionate share of exposure to lead, air pollutants, and other contaminants in the built environment.

Rauh studies social stressors, chronic social conditions that accumulate and potentially can damage health. "Housing is a basic need, and when it's dilapidated, that's a pretty powerful stressor," she said.

In addition, dilapidated housing is often associated with pests and the use of pesticides. The frequency of pest sightings, Rauh said, increases astronomically with disrepair of housing, including leaking pipes, cracks and holes in ceilings and walls, and peeling paint. In extremely deteriorated housing, enormous numbers of cockroaches and rodents swarm, particularly in kitchens. Yet "residents don't necessarily have a lot of control of the pest population," said Rauh. "This is an environmentally toxic condition that has to do with the disrepair of the housing"—toxic in the sense both of the toxicants used in attempts to control pests as well as the stress involved. According to Rauh, such extreme pest problems are neither caused nor controllable by residents. However, when residents do use dangerous pesticides to fight pests, they add another degree of physical stress on their health.

A study forthcoming in the *American Journal of Obstetrics and Gynecology* and coauthored by Rauh further argues that deteriorated housing is among important stressors that wear down female immune systems, indicated by higher rates of bacterial vaginosis (BV), a general vaginal infection that has been related to preterm birth. "BV is a good marker of immune system deregulation," said Rauh, who called BV a "stress infection."

Building Links between People, Disease

Despite their circumstances, low-income families and communities often have complex arrays of coping capabilities. "There is tremendous variability in the quality of life and material and social conditions within those groups," said Rauh. That is, a family can live in dilapidated housing, but its potentially harmful

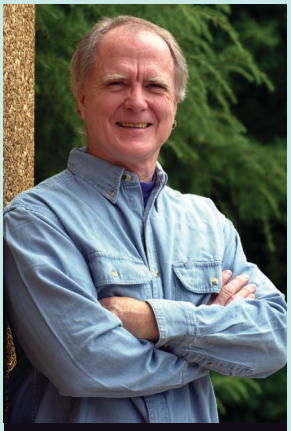
Steven R. McCaw/Image Associates, Inc.

Huff Selected for APHA's Rall Award

NIEHS toxicologist James Huff, an internationally recognized expert in chemical carcinogenesis, is the 2002 recipient of the David P. Rall Award for Advocacy in Public Health, given by the 50,000-member American Public Health Association (APHA). The annual award was created in memory of David P. Rall, who died in 1999. Rall was NIEHS director from 1971 to 1990, and founder and director of the National Toxicology Program (NTP).

The Rall Award recognizes individuals whose accomplishments have advanced health promotion and disease prevention through policy change. Nominees may include those working in government, academia, or nongovernmental organizations from any nation. In his letter to Huff announcing the award, APHA executive director Mohammad Akhter stated, "The Award Committee acknowledged your wealth of knowledge and experience in chemical carcinogenesis and toxicology . . . that have guided our nation's efforts at public health protection for more than twenty years."

Huff earned a bachelor's degree in pharmacy and a master's degree in pharmaceutics from the Philadelphia College of Pharmacy and Science in Pennsylvania. He earned a doctor of philosophy in bionucleonics from Purdue University in West Lafayette, Indiana. Following an 18-month postdoctoral appointment at the Federation of American Societies for Experimental Biology in Bethesda, Maryland, he joined the faculty of the University of Rochester Medical School in New York, where he worked with toxicologist Harold Hodge. While at the University of Rochester, Huff decided to discontinue his basic research efforts and concentrate instead on public health aspects, which he believed would be more meaningful and immediately useful from a global perspective.



James Huff

From the University of Rochester he joined Oak Ridge National Laboratory in Tennessee. While there he helped develop online TOXLINE databases with Henry Kissman at the National Library of Medicine. In 1977, he accepted the invitation of Lorenzo Tomatis to join the Lyon, France–based International Agency for Research on Cancer, where he was chief of its Monographs Programme on the Evaluation of Carcinogenic Risks to Humans, which evaluates carcinogenic risks posed to human health by chemical agents, mixtures, and other environmental and occupational exposure circumstances.

In 1980, at the behest of Rall, Huff joined the NIEHS, where Rall had recently established the NTP. Huff concentrated on the NTP carcinogenesis program to identify chemical carcinogens and on the congressionally mandated *Report on Carcinogens*. He established the levels of evidence of carcinogenicity used by the NTP for interpreting experimental chemical carcinogenesis bioassay findings. During his tenure with the NTP he led the effort and was involved in the publication of more than 200 carcinogenesis bioassay technical reports, and in helping establish the NTP *Report on Carcinogens*. Huff has published more than 300 scientific papers, indicating a penchant for both science and public health and the need for integration and interaction.

Huff says receiving the Rall Award is overwhelming and at the same time very humbling. He adds that there is no professional, scientific, or public health accolade he could receive that would mean more to him, because of his working with Rall and particularly the mentoring influence Rall had on him. "Dr. Rall was first and foremost and above all dedicated to public health, no compromise," Huff says. "He was a compassionate man who was both a brilliant scientist and caring physician. 'Do your best scientifically solid work,' Rall would say, 'and stand by it and use it for the protection of workers and the public.' That's what I learned from David."

The award was presented at the APHA annual meeting, held 9–13 November 2002 in Philadelphia (Huff's hometown). The Rall award announcement and recipient are profiled in the APHA publication *The Nation's Health*. The award consists of an engraved plaque, a travel allowance and complimentary meeting registration, and a $1,000 cash prize, which Huff donated to the David P. Rall Education Fund of the Collegium Ramazzini, located in Carpi, Italy. **–Erin E. Dooley**

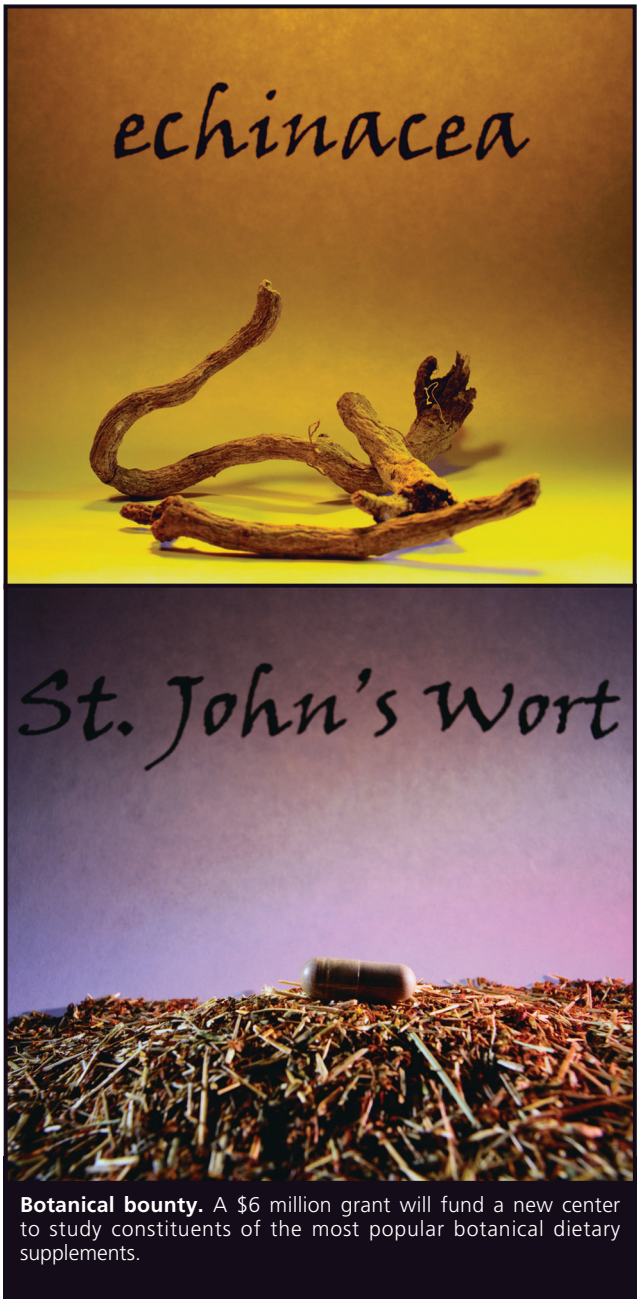
effects can be mitigated by healthy kinship and friendship connections, sharing of resources, stability in housing (length of time living in one place), relatively low levels of crime in a neighborhood, and other factors. "This belies the stereotype of low-income communities as homogeneous," Rauh added.

Health research on the built environment, speakers agreed, should take into account not only physical aspects of houses and cities but also social aspects of families and neighborhoods. A current study, for example, is expanding the definition of built environment beyond just the physical conditions in a home or neighborhood to address issues such as the capabilities of caregivers. Carolyn A. Berry, a community psychologist at New York University, and her collaborators, doctors Madeleine Shalowitz and Raoul Wolf, are examining psychological and social barriers that could inhibit access to health care for inner-city children. Past research shows that indigent nonwhites living in urban environments have higher rates of pediatric asthma prevalence and severity than other population groups, according to Berry. She and her colleagues are studying a combination of biological, environmental, social, and behavioral factors that lead to such disparities.

Berry and her team have conducted asthma screenings in 10 low-income Chicago elementary schools, revealing that overall 12% of children had previously been diagnosed with asthma, and 14% had symptoms consistent with asthma but no prior diagnosis. Researchers compared total asthma loads (previous diagnosis and signs of undiagnosed asthma) among three groups. Black non-Hispanic students had total asthma loads of 34%, Hispanic students had loads of 25%, and white non-Hispanic students had loads of 20%.

The research team will study 400 children from each ethnic/racial group, gathering information on each family's general physical health and use of health services, plus stresses on parents such as depression. "A stressed or passive parent may not have the ability to find as adequate disease management [for a child] as she would in other circumstances," said Berry. Dust samples from homes will be collected and analyzed for antigens common in inner cities. Later, caregivers will be interviewed about their health care decisions for their children. Caregivers will be asked about the children's health care providers and the perceived quality of that health care.

Researchers have increasingly collaborated with families and communities in studying the built environment. Now scientists must find better ways of gaining community participation in this area, said Wilson. "Most of the communities we deal with don't realize that their health problems are related to environmental factors. We have to [get] communities more involved." **–John Tibbetts**



Botanical bounty. A $6 million grant will fund a new center to study constituents of the most popular botanical dietary supplements.

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Supplemental Income: New Center to Study Herbs

The two top-selling botanical dietary supplement ingredients, echinacea (*Echinacea* spp.) and St. John's wort (*Hypericum perforatum*), will be the subjects of study at a new multidisciplinary research center to be established by the NIEHS and the NIH Office of Dietary Supplements. The new center will be created through a five-year, $6 million grant, the NIEHS announced on 25 July 2002. The center will bring together more than 20 researchers from Iowa State University in Ames, the University of Iowa in Iowa City, and Louisiana State University in Baton Rouge in fields including toxicology, pharmacology, epidemiology, and biochemistry. The center will be housed at Iowa State, and will be headed by Diane Birt, who is chair of that university's Department of Food Science and Human Nutrition.

The new NIEHS Center for Dietary Supplement Research joins the National Toxicology Program, a second NIEHS Center for Botanical Research at the University of Missouri, and four other NIH centers already working to establish a broad base of scientific knowledge on botanicals and to scientifically determine their effectiveness, safety, and chemical properties. State-of-the-art technology at Iowa State's Metabolomics Research Laboratory will assist researchers at the new center by determining the bioactive constituents of these plants. Studies will also look at genetic factors that influence bioactivity as well as farm environment conditions related to planting and harvesting that may affect the plants' production of bioactive compounds. Research into the relationship between plant genetics and bioactivity could also help identify related plants with useful medicinal and nutritive attributes, said Birt in a 24 July 2002 Iowa State press release announcing the center. University of Iowa

scientists will perform epidemiological studies to determine the characteristics of human populations most likely to benefit or be harmed by using botanicals.

Echinacea, a member of the daisy family, was first used by Native Americans as a treatment for wounds, burns, and snakebites. Today it is used mainly to treat colds and influenza and is, according to some news sources, the best-selling herbal remedy in the United States, with annual sales of almost $80 million.

St. John's wort is a yellow-flowering perennial native to Europe and introduced by early colonists to North America, where it now grows wild. It has been used for centuries in folk medicine to treat headaches, rheumatism, malaria, wounds, and insect bites. Now it is found in treatments for depression, anxiety, and sleep disorders, and is widely prescribed in Europe as an antidepressant.

Since the late 1990s the National Toxicology Program has conducted safety studies on a number of plants and botanical compounds, including echinacea, *Aloe vera* gel, *Ginkgo biloba*, ginseng (*Panax quinquefolius*), and kava kava (*Piper methysticum*), with nominations for more studies still coming in. The program's work focuses closely on the potential for interaction between different botanicals and between botanicals and pharmaceuticals. Researchers are especially interested in possible effects on particularly vulnerable subpopulations including pregnant women, the very young, and the elderly. **–Erin E. Dooley**

NIEHS Launches Major PD Initiative

Parkinson's disease (PD) is the world's second most common neurodegenerative disorder after Alzheimer disease, affecting at least 500,000 people in the United States alone, with 50,000 new cases reported each year. A chronic and progressive brain disorder primarily affecting motor function, PD can also impair thinking and emotional function. It strikes mainly people over age 50 and is slightly more common in men. The incidence and prevalence of PD increase with age, and it is expected to affect even more people as life expectancies rise worldwide. PD appears to arise from the interaction of inherited genetic susceptibility with chronic environmental exposures, such as occupational exposure to metals.

Although there are no tests that can predict PD or methods to prevent it, PD is known to result from a loss of brain cells that produce dopamine, a neurotransmitter involved in movement control. A number of currently available drugs can provide relief from its debilitating symptoms, but many of them lose their effectiveness over time.

To provide a science-based foundation for future research on the prevention and treatment of PD, and to identify its environmental triggers, the NIEHS has launched a five-year, $20 million, three-center effort, the institute announced on 26 August 2002. Although these centers will conduct research independently, they will also function as a consortium to share data and resources, and to plan and conduct collaborative studies. Each center will support several multidisciplinary research projects that build on currently funded PD research.

The first center will be located at The Parkinson's Institute in Sunnyvale, California, and headed by J. William Langston, who is also the founder of The Parkinson's Institute. This center will focus on researching PD risks associated with exposure to pesticides and heavy metals, understanding the possible protective effects of tobacco and caffeine, and determining the underlying mechanisms of dopamine cell death and genetically determined susceptibility traits for PD.

The second center will be located at Emory University in Atlanta, Georgia, and headed by J. Timothy Greenamyre, a neuropharmacologist and codirector of the Emory Neurodegenerative Disease Center. This center will concentrate on developing new cellular and animal models to study PD, and will also study how pesticides interact with proteins that package dopamine within nerves and the cellular machinery that degrades abnormal proteins.

The third center will be located at the University of California at Los Angeles (UCLA) and headed by Marie-Françoise Chesselet, a professor of neurology and associate director for education at the UCLA Brain Research Institute. The UCLA center will study how variations in the genes that regulate dopamine levels within neurons may be linked with increased risk of PD associated with pesticide exposures.

The effort to understand. A major initiative is pitting scientists and research dollars against the problem of understanding the factors—including environmental ones—that contribute to PD.

PD activists attending the meeting at The Parkinson's Institute to launch the centers praised the new initiative. Deborah Brooks, executive director of the Michael J. Fox Foundation for Parkinson's Research, commented, "The NIEHS and Director [Kenneth] Olden have designed a creative approach to targeting this exciting area of Parkinson's research," while Joan Samuelson, founder of the Parkinson's Action Network, added that finding a cure for PD will be accelerated by "this tremendous commitment of funding and focused effort." **–Erin E. Dooley**

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