

## Bridging the Gap in Border Health

Deep in the heart of Texas—as well as in Arizona, New Mexico, California, and the six Mexican states that lie just across the border—rapid industrialization and the accompanying population growth have spawned a family of environmental problems that have developed into a full-fledged environmental and public health crisis. In an effort to address these problems, the NIEHS is working to establish the Binational Border Research in Disease and Geospatial Research (BRIDGE) Program.

The U.S.–Mexico border region stretches about 100 kilometers out from either side of the boundary. Populations throughout this zone vary widely, from densely crowded sister cities such as San Diego–Tijuana and El Paso–Ciudad Juárez, which straddle the border, to uninhabited stretches of desert. Different combinations of diverse geographical features, climatic variations, and pollutant sources create an assortment of environmental health problems along the border. For instance, rapid industrial growth along the Texas–Mexico border has caused tremendous increases in air pollution and a rise in resultant diseases such as asthma. Heavily urbanized areas are also the home of *colonias*, shantytowns that often lack basic necessities such as clean water and sewage treatment for their citizens. In Arizona, where copper mining is a major source of revenue, smelters and mine tailings contribute to air and groundwater pollution. In California, infectious diseases such as bacterial infections migrate north in coastal waters. Busy crossing sites where diesel trucks sit at the border for up to eight hours with their engines running waiting to get across experience serious particulate pollution, which can contribute to respiratory problems, asthma, and possibly lung cancer, says Scott Burchiel, deputy director of the NIEHS Environmental Health Sciences Developmental Center at the University of New Mexico at Albuquerque.

One problem in tackling border health issues is the lack of trained environmental health science professionals in Mexico. “Many smaller institutions don’t have Ph.D. programs or research funding, and salaries are low,” says Dean Carter, a professor of pharmacology and toxicology at the University of Arizona in Tucson. “Also, most Mexican research universities are located in Mexico City. Those universities get the majority of research funding for the country; border universities get much less money.” Another problem is political disruption. Each time a new administration is elected in Mexico, the entire government turns over, and the process

of educating decision makers must start over, often from scratch. Finally, there is the problem of perception: to many Mexicans, there are much bigger problems than the border. Indeed, the border region is considered rich and clean compared to the poor and heavily polluted interior regions of the country.

The BRIDGE Program, planned for implementation in Fiscal Year 2002, is the NIEHS’s attempt to answer these challenges. According to William Suk, deputy director of the NIEHS Office of Program Development, the program is envisaged as a blend of multidisciplinary biomedical and nonbiomedical research, community outreach, technology transfer, strong partnering with other federal health and environmental agencies, and preventive research.

### BRIDGE over Troubled Borders

Suk sees the BRIDGE Program as having a threefold focus. First is the area of environmental health, dealing with outcomes of environmental exposures such as cancer and infectious disease. Second is environmental science, disciplines such as the geosciences, engineering, and epidemiology that study environmental agents, how they affect humans, and the ways they move through the environment. Third is the area of prevention and remediation, which aims to stop problems before they begin—or before they get any worse. “It will

be challenging to develop a cohesive program that includes everything,” says Suk.

Several Southwest universities already have very strong border programs in place, says Suk. “Each institution plays to its strengths; we’re asking them to establish additional interactions in order to make it more interdisciplinary without diluting the quality of the science,” he says. “The question is, is there a way of pulling this together to allow for a certain amount of synergy and complementation among the institutions that really capitalizes on the entire enterprise? We’ve found in the past that the best way is to lay out a program with research needs, not prescribe what the researchers should do but let them come in and be creative—get the best minds to focus on a particular issue.”

Suk says the program must necessarily be a partnership, involving other federal agencies, state and local health departments, and community organizations. Louis A. Chiodo, assistant director for science at The Institute of Environmental and Human

Health in Lubbock, Texas, agrees. "These problems are multifaceted," he says. "It's going to have to involve research, civic leaders, religious leaders, government bodies. To work in the *colonias*, we have to become part of the community—they don't want someone showing up just to do research." Even more important is that the program be a true binational cooperation between the United States and Mexico, says Suk. "It's got to be a real partnership," he says, "not just the United States saying, 'This has to happen.'"

According to Suk, the NIEHS already funds several projects on topics applicable to border health problems, which may be enfolded into the BRIDGE Program. For example, the School of Rural Public Health at Texas A&M University in College Station is using Spanish-language materials to translate the research conducted at the university's Center for Environmental and Rural Health and Superfund Center into useful public health information for affected populations on topics such as osteoporosis. The Superfund Center at the University of Arizona has launched several projects addressing remediation of hazardous waste sites in the border

region including collaborations with entities such as the Universidad Nacional Autónoma de México, the Rocky Mountain Poison and Drug Center, and Precision Lysimeters. Much farther away, a program at Harvard is looking at bone lead stores and reproductive toxicity in Mexican couples. Through its Superfund Basic Research Program, the NIEHS has been involved in border issues for nearly a decade, says Suk, sponsoring workshops in cities ranging from Mexico City to Santiago to Tucson to address issues including hazardous waste disposal and sustainable development. "What we're trying to do," he says, "is develop a more cohesive program to let things happen in a more timely way. These problems aren't going to go away."

As a first step toward establishing a consortium to address border issues, the NIEHS cosponsored a conference titled Border Health: Making a Difference, held 11–15 March 2000 in San Antonio, Texas. The conference gathered state and federal government representatives, politicians, academicians, and health care providers from both sides of the border to discuss issues of concern. Burchiel, who cochaired a session at the meeting, says, "We're all working together because, through our centers programs, we're all working on environmental health issues. Because we're border states, we know there are special needs and interests and environmental issues along the borders." Chiodo adds, "More knowledge is what is needed. You can't just throw money at this problem. At the March meeting, we asked, 'What is our role?' and realized we as academicians didn't know the answer. We wanted to hear from federal policy makers, local and state U.S. and Mexican health officials, city officials from Mexico and the United States, and academicians, representatives from industry and business, and environmental remediation companies—and not just on science but on perceived issues."

A second, similar meeting was held

June  
12–13  
in San  
Diego.

"The idea is how can we connect into a border coalition of universities," says Palmer Taylor, chairman of the Department of Pharmacology at the University of California at San Diego and an organizer of the June meeting. "We want institutions to start to network together in the exchange of information so that each university isn't operating independently, because we have common problems." Palmer stresses that the network should be a cooperative, bilateral effort among government and civic leaders, academicians, and industry leaders from both Mexico and the United States. "It may not be a 50/50 split," he says, "but wherever we can get participation, that will be helpful."

The border is a big area with big problems, problems that are complex in nature and must be addressed in a well-thought-out manner by both of the affected nations. With time, money, and lots of hard work, the NIEHS may just help Mexican and U.S. stakeholders make the border



# NIEHS Strategic Plan 2000

In keeping with the NIEHS philosophy that it is better to prevent disease than to treat it and that controlling environmental exposures is one of the best disease-prevention strategies, the NIEHS Strategic Plan 2000, released in March 2000, sets forth a framework of goals in nine areas that represent the institute's plan for furthering the field of the environmental health sciences over the next five years. These goals reflect the institute's mission to define how environmental exposures affect health, how individuals differ in their susceptibility to exposures, and how susceptibilities can change over time.

The plan covers a five-year period and itemizes both ongoing research initiatives as well as areas for which the NIEHS hopes to develop new initiatives. Many of the projects are collaborations with other organizations, as noted throughout the document.

The plan is available on the Strategic Plan 2000 Web site at <http://www.niehs.nih.gov/external/plan2000/home.htm>.

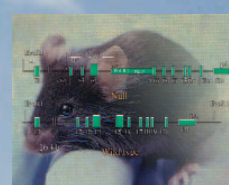
**Goal 1**—Provide a sound, rational scientific foundation to support public environmental health policy in the areas of:

- Children's environmental health
- Women's health
- Health disparities among different groups
- Asthma
- Parkinson disease and other neurodegenerative disorders
- Autoimmune diseases
- Herbal medicine
- Exposure assessment of the levels of important environmental toxicants or their metabolites among the general U.S. population
- Validation and regulatory acceptance of novel test methods
- Complex mixtures of environmental agents
- The molecular basis for environmentally induced diseases



**Goal 2**—Find new ways to provide timely, relevant environmental health data that can be extrapolated to the human condition through:

- High throughput technologies such as transgenic animal models, which allow quicker evaluation of chemical effects
- Computational biology, which uses mathematical models to study how environmental agents alter critical biological systems and cause disease
- Surrogate markers of safety, which would speed the pharmaceutical evaluation process by detecting adverse drug effects earlier in the drug development process
- Mouse Genomics Centers, where scientists will develop or refine mouse models of environmentally relevant human diseases, provide a comprehensive analysis of mouse model phenotypes and genotypes, and validate model usefulness for a variety of investigations



**Goal 3**—Identify the environmental component of human diseases by strengthening existing databases and registries and creating new ones that track and monitor exposures and diseases, including:

- A National Twin Registry, which would allow scientists to study the relative importance of genetic and environmental factors in major disease conditions
- Birth registries to assist in long-term epidemiologic studies that follow a child through the mother's pregnancy and into the later years of the child's life



**Goal 4**—Study and define factors for individual susceptibility to environmental exposures including:



- Variants (polymorphisms) of environmental disease susceptibility genes in the U.S. population, identified through the Environmental

Genome Project and studied using animal models of disease susceptibility

- Gender-related differences in susceptibility
- The role of nutrition

**Goal 5**—Define the environmental and genetic components of many human diseases by establishing long-term, prospective studies, including:

- A study of cleft palate among Norwegian children and maternal environmental exposures
- The Agricultural Health Study, which examines how agricultural exposures



- affect cancer risk in farmers and their families
- A study of breast cancer among 50,000 sisters of women who have the disease

**Goal 6**—Ensure that the NIEHS and its research remains responsive to community needs and to newly emerging environmental health problems through:

- National Town Meetings, regional public forums for local residents to share their environmental health concerns with the NIEHS director and his staff
- Community Outreach and Education Programs at institute-supported centers across the country
- The Center for Evaluation of Risks to Human Reproduction, a forum for the expert evaluation of current literature on the reproductive and developmental effects of compounds
- A Phototoxicity Center to study cosmetic chemicals and additives, sunblock additives, tanning enhancers, skin colorants, and tattoo inks



**Goal 7**—Ensure a well-trained, diverse workforce in the environmental health sciences through:

- Expanded physician and nurse training in the environmental health sciences
- Minority training and support of minority-based institutions to develop a cadre of



- scientists with special ties to and understanding of communities at greater risk of exposure to adverse environmental agents
- Identification of crucial career transition points and development of programs to help talented scientists navigate them

**Goal 8**—Enhance the understanding of the environmental health sciences and their importance to human health through:

- Communication with the scientific community
- Communication with the general public
- Communication with growing Spanish-speaking and minority communities
- Communication of basic environmental science to young students



**Goal 9**—Ensure responsible stewardship of the NIEHS research enterprise through:

- Program evaluation by external groups
- Updated systems and tools for more efficient, responsible property management
- Health and safety reviews to ensure employee health, safety, and environmental compliance