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## Translational Research



National Institute of Environmental Health Sciences,  
National Institutes of Health

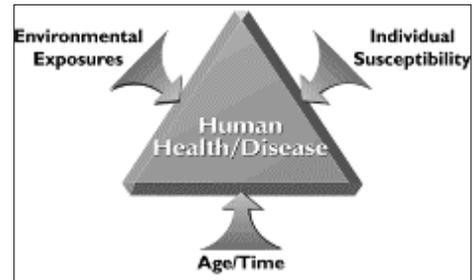
Research Triangle Park, NC



## Introduction to Translational Research

### The NIEHS Mission

Human health and human disease result from three interactive elements: environmental exposures, genetic/individual susceptibility, and age/time. The mission of the National Institute of Environmental Health Sciences (NIEHS) is to reduce the burden of human illness and dysfunction from environmental causes by further understanding each of these elements and how they interrelate. Environmental health comprises those aspects of human health, including quality of life, that are determined by physical, chemical, biological, social and psychosocial factors in the environment.



Unique within the National Institutes of Health (NIH), the NIEHS focuses on the prevention of disease rather than the pursuit of ways to treat illnesses already affecting people. The Institute accomplishes this task through a holistic approach to human health and a preventive approach to medicine.

The NIEHS achieves its mission through multi-disciplinary biomedical research programs, prevention and intervention efforts, and communication strategies that encompass training, education, technology transfer, and community outreach. The ultimate goal of these NIEHS activities is to define and understand the mechanism of action of physical and social environmental agents on human health and to transfer this knowledge to the public.

### Public Health and Translational Research

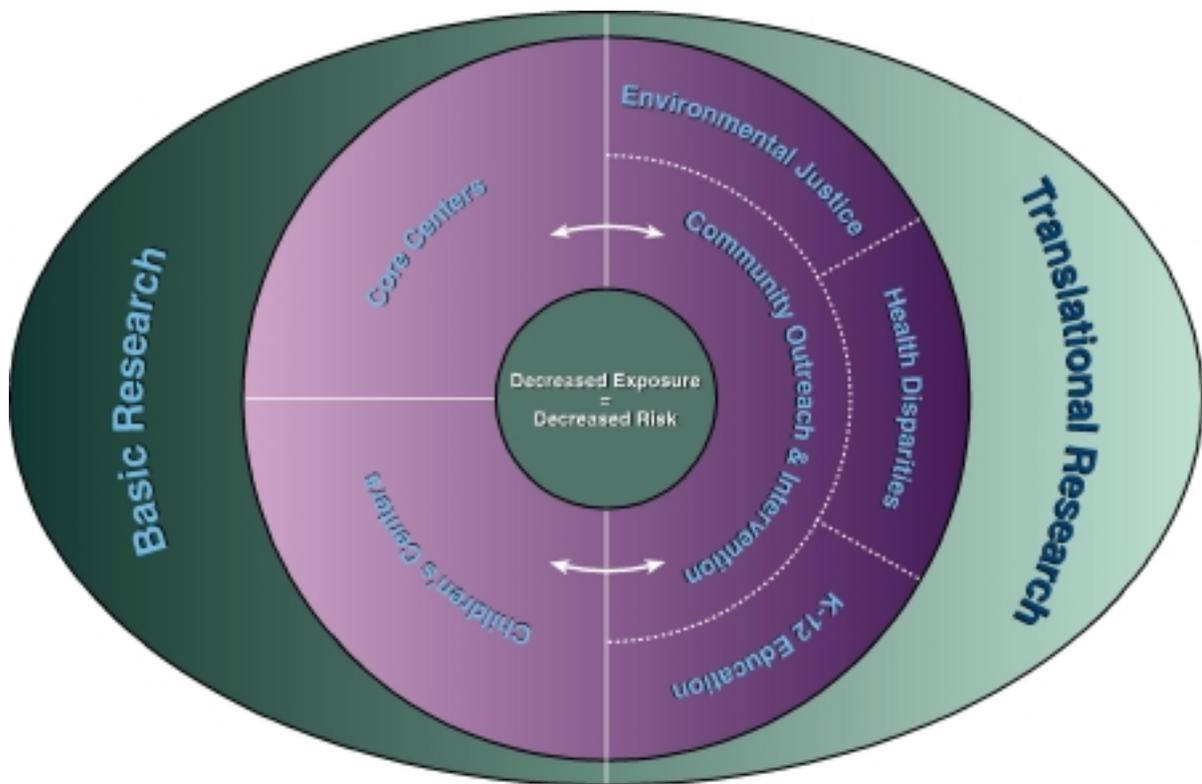
Responding to the expressed desire of communities to better understand the effects and risks to human health from exposure to physical and social environmental agents, the NIEHS assumed an increasingly important role in numerous public health issues. Communities are challenged daily to make decisions on the risk and benefits of agents that permeate their environment; however, there have been few programs designed to help prepare the public to face these tasks. Minimizing and preventing adverse health effects from environmental exposures requires some form of public outreach and education coupled with innovative research to develop solutions, train scientists and health care providers, and create new opportunities for careers in environmental health sciences. Consequently, there exists a critical need to establish sustainable mechanisms for educating the public about environmental health issues and for supporting individual and community involvement in the identification and investigation of environmental health concerns.

Recognizing this gap, the NIEHS developed and supports a series of translational research programs that share the following three objectives:

1. Improve the understanding of how physical and social environmental factors affect human health.
2. Develop better means of preventing environmentally related health problems.
3. Promote partnerships among scientists, health care providers, and community members.

The NIEHS defines translational research as the conversion of findings from basic, clinical or epidemiological environmental health science research into information, resources, or tools that can be applied by health care providers and community residents to improve public health outcomes in at-risk neighborhoods. In addition, the NIEHS gives special attention to insure that the information is culturally relevant and understandable.

The following diagram illustrates the inter-relationship between the wide array of basic and translational research programs at the NIEHS. Together, they aim to demonstrate that decreased exposure equals decreased risk.



## Translational Research Programs<sup>1</sup>

NIEHS supported Translational Research Programs can be classified into those that address (1) Community-Based Participatory Research<sup>2</sup> and (2) Health Disparities. The following table delineates the programs that fit within the rubric of Translational Research at NIEHS.

<b>1. Environmental Justice: Partnership for Communications</b>	Initiated in 1993 this program seeks to foster and strengthen relationships between researchers, providers, and communities.
<b>2. Community-Based Participatory Research (CBPR)</b>	Initiated in 1995 this program places greater emphasis on research and intervention. Projects build upon a functional relationship between researchers and community members. In 2000, the program was expanded to include etiology and exposure assessment. The Request for Applications (RFA) was released in November 2000.
<b>3. Health Disparities Research</b>	Initiated in 2000, this program seeks to elucidate the mechanisms by which physical and social environmental exposures impact human health. It fosters collaboration between biomedical researchers and social or behavioral scientists. Projects have a community outreach and education component.
<b>4. K-12 Education</b>	Initiated in 1993, this program serves two important functions. It raises student awareness about environmental hazards, and it fosters an interest in environmental health sciences.
<b>5. NIEHS Core Centers: Community Outreach and Education Program</b>	Developed in 1996, COEPs serve as a bridge between Center researchers and the community served. COEPs translate research findings into useful public health knowledge.
<b>6. NIEHS Developmental Centers</b>	These interdisciplinary Centers conduct research that addresses the needs of underserved communities as they establish the necessary facilities to become a Core Center.
<b>7. Centers for Children's Environmental Health and Disease Prevention Research</b>	Established through collaborative effort by the NIEHS, EPA and CDC in 1999, these Centers combine basic and applied research. Centers possess both laboratory research projects as well as a community-based intervention project.
<b>8. Advanced Research Cooperation in Environmental Health</b>	Developed in 1999 this program strengthens the capacity of researchers at minority serving institutions (MSI) to compete for NIH research program grants. This goal is achieved by pairing the MSI with a research-intensive university.
<b>9. Superfund Outreach</b>	Established in 1992 this program communicates research findings from Superfund projects to impacted communities, EPA regulatory makers and industry.

<sup>1</sup> For more information on other NIEHS Translational Research Programs, please visit the Translational Web Site at <http://www.niehs.nih.gov/dert/programs/translat/home.htm>.

<sup>2</sup> *Community-Based Participatory Research (CBPR)*, is a methodology that promotes active community involvement in the processes that shape research and intervention strategies, as well as in the conduct of research studies.

## Health Disparities Program Description

Throughout 1999, the NIEHS sponsored three regional workshops, a National Institutes of Health (NIH) concept forum, and a New York Academy of Science conference, each of which was devoted to developing a research agenda to address health disparities. As a result of this input from scientists, health care providers, policy makers, and community representatives, the NIEHS issued a Request for Applications (RFA) entitled, "Health Disparities: Linking Biological and Behavioral Mechanisms with Social and Physical Environments."

The purpose of this trans-NIH research program is to foster multidisciplinary research that will elucidate underlying mechanisms by which the interaction of physical exposures and the social environment leads to health disparities. Physical exposures include physical agents (eg., radiation), chemical agents (eg., pesticides) and biological agents (eg, pathogens). The social environment includes socioeconomic status (SES), residential factors, education, cultural variables, institutional and political forces, familial factors, and media influences. The ultimate goal of this research is to understand the sources of disparities in health among the U.S. population, especially between lower SES groups and higher SES groups. Via this initiative, the National Institutes of Health (NIH) seeks to clarify biological, social, and behavioral processes that lead to health disparities stemming from the interaction of social and physical environments as a basis for ultimately developing intervention strategies. Awards possess collaborative efforts between social/behavioral scientists and biomedical scientists and are not limited by disease end points.

## Current & Future Programs with an HD focus

*Advanced Cooperation in Environmental Health Research (ARCH)* – This program was initiated recently to strengthen research capacity at minority serving institutions by building partnerships with research intensive universities (RIUs). ARCH is a mechanism for support of a broadly-based research program, that has a well-defined central research focus, involving investigators at Historically Black Colleges and Universities (HBCUs) and established investigators at RIUs. It is intended to facilitate sharing of knowledge and common resources. The goal of the ARCH grant is to establish a group of investigators at HBCUs that can successfully compete for NIH/NIEHS Research Project Grant (RPG) support.

*Environmental Justice: Partnerships for Communication* – The NIEHS developed this program in 1993. The purpose is to institute mechanisms to bridge a crucial communication gap between researchers, health care providers and community residents so that communities have a demonstrable role in identifying and defining problems and risks related to environmental health and in shaping future research approaches to environmental health problems they face. These environmental justice projects are committed to enhancing minority participation in research studies and to facilitating communication among environmental health researchers, community health care providers and community members.

*Community-Based Participatory Research (CBPR)* – This program aims to implement culturally relevant prevention/intervention activities in economically disadvantaged and/or underserved populations adversely impacted by an environmental contaminant. It is intended to foster refinement of scientifically valid intervention methods and to strengthen the participation of affected communities in this effort. Community-based prevention/intervention research thus seeks to expand our knowledge and understanding of the potential causes and remedies of environmentally related disorders, while at the same time enhancing the capacity of communities to participate in the processes that shape research approaches and intervention strategies. The long-range goal of this program is to improve the knowledge and behavior of disadvantaged or underserved community members regarding prevention, detection, and treatment of environmentally related diseases and health conditions, and thereby reduce incidence and mortality rates of such diseases and conditions. In November 2000, the program was expanded to include etiology and exposure assessment research.

*Developmental Centers* – The NIEHS supports Developmental Centers, as part of the NIEHS Core Centers Program, to investigate environmental health problems in underserved populations. This program promotes development of community-based strategies aimed at prevention and intervention activities in underserved populations adversely affected by environmental toxicants. Consequently, as part of their program's research objectives, the NIEHS Developmental Centers disseminate their findings to surrounding communities in the form of disease prevention and intervention strategies. Currently, the NIEHS supports one Developmental Center at the University of New Mexico. Work at the Center focuses on radiation exposure to the Native American Populations in the region.

*Community Outreach and Education Programs (COEPs)* – The NIEHS developed this program in 1996 to enhance the NIEHS Core Centers Program. Each Center is required to support a COEP to work with a target community they define. COEPs serve as a bridge between Core Center researchers and the community served, and they translate research findings into useful public health knowledge. Activities include continuing professional education, disease prevention programs, education (primary, secondary, and/or college), information dissemination, community issue programs, and public awareness seminars.

*Centers for Children’s Environmental Health and Disease Prevention Research* – This collaborative Centers Program was initiated by the NIEHS, EPA, and CDC in 1999. The goal of this program is to promote translation of basic research findings into applied intervention and prevention methods. Designed around a central scientific theme, the Centers conduct multidisciplinary basic and applied research in combination with community-based prevention research projects to support studies on the causes and mechanisms of children's disorders having an environmental etiology, to identify relevant environmental exposures, to intervene to reduce hazardous exposures and their adverse health effects, and to eventually decrease the prevalence, morbidity and mortality of environmentally-related childhood diseases.

*Inner-City Asthma Study (ICAS)* – This cooperative, multicenter study seeks to reduce the disproportionate burden of asthma morbidity among underserved, inner-city children and adolescents from 4 to 12 years of age. The goal of this study is to design and evaluate an asthma intervention aimed at reducing asthma morbidity in a cost-effective manner by modifying potentially reversible factors, such as allergens and environmental tobacco smoke, shown to contribute to asthma morbidity. The NIEHS and NIAID collaborate on this program.

*Low Birth Weight and Minority Populations* – The National Institute of Nursing Research (NINR), the National Institute of Dental and Craniofacial Research (NIDCR), the NIEHS and the National Institute of Child Health and Human Development (NICHD) have solicited the submission of research grant applications relevant to low birth weight (LBW) in minority populations. This program announcement seeks research to expand our understanding of the underlying mechanisms that contribute to the ethnic variations in LBW and strategies for prevention. The goals of this program announcement are: (1) development of innovative strategies to prevent LBW in minority populations; (2) expanding our understanding of how psychosocial and environmental factors affect or interact with the biologic mechanisms that influence pregnancy outcomes.

*Socioeconomic Status and Health across the Life Course* – The National Heart, Lung, and Blood Institute (NHLBI), National Institute on Aging (NIA), National Institute of Child Health and Human Development (NICHD), NIEHS, and National Institute of Mental Health (NIMH) solicit research grant applications on the cumulative and contemporaneous relationships between socioeconomic status (SES) and physical and mental health and functioning over the life course and across generations. Potential applicants are encouraged to submit proposals relating to: (1) Appropriate conceptualization and measurement of SES over the life course, across generations, and in various population groups. (2) Specification of the processes through which SES influences cumulatively and contemporaneously physical and mental health, disability, morbidity, and mortality outcomes over the life course,

and how these outcomes, in turn, impact on SES. (3) The relationship between SES and physical and mental health, disability, morbidity, and mortality over the life course in various population groups.

## ***Future***

The following programs fulfill the NIEHS mission to address the causes and mechanisms underlying disparities in disease outcome and to support interventions to reduce those disparities. These aims are accomplished through new and expanded efforts in Research (Centers for HD Research and Intervention; and Fetal Origins of Disease), Infrastructure (ARCH), and Communication (COEP Resource Center).

*Centers for Health Disparities Research and Interventions* – The NIEHS anticipates development of a Centers Program that will focus solely on health disparities. These Centers will elucidate roles, contributions, and interactions of SES, social, and physical exposures to disparities in health outcomes and enable the implementation of interventions to alleviate such disparities.

*Fetal Origins of Disease* – This program will be developed in FY01 to determine the mechanisms by which the intrauterine environment predisposes individuals to chronic disease later in life and to determine whether these mechanisms may contribute to disparities in the prevalence of obesity, diabetes, hypertension, atherosclerosis, and asthma among various races and ethnic groups. The NICHD, NIA, NIEHS and the NIDDK seek to encourage research on the basic mechanisms that may explain the lifelong consequences of intrauterine growth retardation and/or exposure to deficient and/or stressful intrauterine environments.

*ARCH* – The expanded ARCH program will build upon the current program by supporting broadly based research programs with a well-defined central research focus or objective that involves investigators at Hispanic Serving Institutions (HSIs) and Tribal Colleges, in addition to Historically Black Colleges and Universities (HBCUs). Once again, researchers at the Minority Serving Institution (MSI) will partner with investigators at a research-intensive university (RIU). The goal of the ARCH grant remains the same: to establish a group of investigators at an MSI that can successfully compete for NIH/NIEHS Research Project Grant (RPG) support.

*COEP Resource Center* – The NIEHS is supporting the development of a resource center to facilitate the interaction of COEP directors at NIEHS Centers and sharing of outreach materials and information. When complete, this resource center will consist of a Library of materials and an Electronic Information Resource Center. These two foci will be intertwined via a resource center web site. In the future the resource center may accommodate materials produced through other NIEHS supported outreach programs.