National Institute of Environmental Health Sciences
Your Environment. Your Health.

FY 2010 NIEHS Director's Statement

Department of Health and Human Services

National Institutes of Health

FY 2010 Budget Request

Subcommittee on Labor-HHS-Education Appropriations:

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National Institute of Environmental Health Sciences
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Mr. Chairman and Members of the Committee:

I am pleased to present the President's FY 2010 Budget request for the National Institute of Environmental Health Sciences (NIEHS) of the National Institutes of Health (NIH). The FY 2010 budget includes $684,257,000, which is $21,437,000 more than the FY 2009 appropriation of $662,820,000.

Introduction

NIEHS works at the forefront of public health to meet the challenges the field of environmental health sciences faces in the 21st Century. Meeting these numerous and demanding challenges is vital to reducing and preventing disease burden across the Nation. As biological sciences generate a deeper understanding of the working of organisms at the molecular and systems levels, opportunities open to advance our knowledge of the effects of environmental exposures -- not just the clear and obvious effects, but also the subtle, complex ways human health is affected by the environment. Tackling scientific questions with this level of complexity requires an ongoing evaluation of our ideas and approaches, and an emphasis on integration across disciplines – from computational and molecular, to clinical and public health, and everything in between. Our discoveries translate into improvements in environmental regulation, public health, and clinical practice.

To improve our Nation's health, and to increase the benefits of our health care system, the use of medical interventions must go hand in hand with the adoption of behaviors aimed at disease prevention and wellness promotion. The goal of environmental health

sciences is to remove human exposures to deleterious agents before disease processes and dysfunction begins. By advancing our understanding of the interactions of the environment with human health, and opening the door to new ways to prevent disease, NIEHS's investments serve to undergird a recovering economy and to support improvement of the health of our citizens, as well as our health care system. NIEHS budget request and research projects are also consistent with the President's multi-year commitment for Cancer, Autism and Nanotechnology.

Neurological Disorders and the Environment

There is continued concern that neurological disorders such as autism, attention deficit hyperactivity disorder (ADHD), and adult onset diseases such as Parkinson's and Alzheimer's may be rooted in early exposures to environmental toxicants. NIEHS supports basic research to determine the mechanisms and pathways by which toxicants may bring about neural damage to the developing brain. Some of the key neurotoxicants being studied are metals such as lead, mercury, and manganese; pesticides; tobacco smoke; and polychlorinated biphenyls (PCBs) and polybromated diphenyl ethers (PBDEs) used to make insulating and fire retardant products.

With NIEHS support, the Children's Center at the University of California Davis is conducting the first large-scale human population study of children with autism. These researchers are looking at a wide range of environmental exposures and their effects on early development in more than 1,000 California children. NIEHS researchers are also developing new and improved animal and cellular models for ADHD and autism -- models that will help determine how neurotoxic substances may impact brain development and behavior, and may be useful in testing therapies.

Environmental Health and Safety of Nanomaterials

Engineered nanoscale materials display novel physical, chemical, and biological properties that contribute to new technologies useful for drug delivery systems, tissue engineering, biological and environmental sensor technology, and environmental remediation. By 2015, the global nanotechnology market is projected to exceed $15 billion. Nanotechnology, like all emerging technologies, should create innovation while minimizing risk of adverse health effects, and health effects of exposure should be assessed prior to extensive use. Safety assessment is challenging due to the diversity of materials used to synthesize nanoparticles, as well as the wide range of physical and chemical properties that emerge at the nanoscale. NIEHS and the National Toxicology Program (NTP), which is headquartered at NIEHS, support research on the impact of size

and size-dependent properties of nanomaterials on biological response at the systemic, cellular, and molecular levels. This research has begun to demonstrate trends in the relationship of physical and chemical properties to biological response. NIEHS and NTP will continue to support research that increases the understanding of potential health impacts of these novel materials, as well as help to guide development of nano-enabled products to reduce adverse health impacts in our increasingly exposed population.

Environmental Disruptors of Endocrine Systems

Chemicals can mimic the hormones of our endocrine system and disrupt its functions, with potentially adverse effects on health and development. A consensus statement expressing concerns about the possible health effects of one such chemical, Bisphenol A (BPA), was issued by an expert panel as a result of a meeting organized by NIEHS in November 2006.

NTP also recently completed an evaluation of BPA. BPA was selected for evaluation because of the volume produced, widespread human exposure, extensive animal data on reproductive and developmental effects, and growing public concern. BPA is used in plastic water bottles and containers, in some medical tubing, and in the plastic coating inside of food cans, among other uses. Data from CDC showed BPA in 93% of 2,517 urine samples from people six years and older. The NTP evaluation graded various health concerns on a six level scale: serious concern for adverse effects; concern; some concern; minimal concern; and negligible concern. NTP concluded there is "some concern" for effects on the development of the brain and behavior, and prostate gland development, in fetuses, infants, and children at current exposures, and "minimal concern" for effects on mammary gland and earlier age of female puberty in fetuses, infants and children at current levels of exposure. As a result of NTP’s work, scientists at the Food and Drug Administration are reviewing their policies on BPA.

In separate NIEHS-supported studies in rats, BPA exposure induced changes in the mammary gland that were time and dose specific, so that, for example, high dose exposure resulted in architectural modifications in the number of undifferentiated epithelial structures of the breast tissue. High dose exposures induced changes in genes related to cell differentiation suggesting alterations in the normal development of the gland. These studies are part of the larger NIEHS-National Cancer Institute program of Breast Cancer and Environmental Research Centers; NIEHS expects that these and other research findings will shed light on the ways in which environmental exposures can influence the risk of breast cancer in women.

Hexavalent Chromium and Health

Chromium compounds, such as hexavalent chromium, are widely used in electroplating, stainless steel production, leather tanning, textile manufacturing and wood preservation. The U.S. is one of the world's leading producers of chromium compounds. Hexavalent chromium compounds have been shown to cause lung cancer in humans when inhaled, but it was not known whether these compounds could also cause cancer when ingested; hence they were nominated for NTP toxicity and carcinogenicity testing because of concerns over its presence in drinking water, its potential health effects, and the lack of adequate cancer studies on ingested hexavalent chromium.

NTP studies showed that sodium dichromate dehydrate, a compound containing hexavalent chromium, causes cancer in laboratory animals following oral ingestion. Male and female rats developed malignant tumors in the oral cavity. In mice, the studies showed dose-related increases in the number of benign and malignant tumors in the small intestine. This is the first and only lifetime study that clearly demonstrates the carcinogenicity of hexavalent chromium in rodents after oral exposure.

The results of these studies were closely monitored by many groups, including the affected industries and numerous national and international public health and regulatory agencies. The data will most certainly be used as the basis to develop state and federal drinking water and soil cleanup standards, and will have significant public health impact on thousands of people exposed to hexavalent chromium in contaminated drinking water and soil.

Conclusion

These examples highlight important NIEHS and NTP research on the environmental connection to human disease and stand in for other vital research supported by the Institute. Research, such as the Sister Study, an epidemiological study following a cohort of 50,000 sisters of women diagnosed with breast cancer, promises to produce ground breaking information on the environment's role in the causation of breast cancer.

The field of environmental health sciences is beginning a new chapter of scientific progress, with new and better tools at our disposal, an expanding understanding of the human genome and its relationship with the environment, and young scientists coming into the field who are well-prepared and eager to apply these tools and knowledge to our current scientific challenges. I am honored, as Director of NIEHS and NTP, to facilitate the challenges and opportunities ahead to alleviate suffering and improve human health.

Linda S. Birnbaum, Ph.D., D.A.B.T., A.T.S.

On January 18, 2009 noted toxicologist Linda S. Birnbaum, Ph.D., D.A.B.T., A.T.S., began her tenure as director of the National Institute of Environmental Health Sciences (NIEHS) and the National Toxicology Program (NTP). NIEHS is located in Research Triangle Park, North Carolina, and is a component of the National Institutes of Health (NIH).

As director, Dr. Birnbaum oversees multidisciplinary biomedical research programs to discover the environmental causes of disease. The research program is focused on prevention, and includes intervention efforts that encompass training, education, technology transfer and community outreach.

Prior to her appointment as the NIEHS Director, Dr. Birnbaum was a senior advisor at the Environmental Protection Agency (EPA), where she has served for 16 years as director of the Experimental Toxicology Division. She has worked as a federal scientist for nearly 30 years.

A native of New Jersey, Dr. Birnbaum earned her M.S. and Ph.D. in microbiology from the University of Illinois, Urbana.

She is a board certified toxicologist, and was president-elect of the International Union of Toxicology, the umbrella organization for toxicology societies in more than 50 countries; former president of the Society of Toxicology, the largest professional organization of toxicologists in the world; former chair of the Division of Toxicology at the American Society of Pharmacology and Therapeutics; and former vice president of the American Aging Association.

Dr. Birnbaum has received numerous awards, including the Women in Toxicology Elsevier Mentoring Award, the Society of Toxicology Public Communications Award, EPA's Health Science Achievement Award and Diversity Leadership Award, and 12 Science and Technology Achievement Awards, which reflect the recommendations of EPA's external Science Advisory Board, for specific publications.

The author of more than 700 peer-reviewed publications, book chapters, abstracts and reports, Dr. Birnbaum's research focuses on the pharmacokinetic behavior of environmental chemicals; mechanisms of actions of toxicants, including endocrine disruption; and linking of real-world exposures to effects. She is also an adjunct professor in the School of Public Health, the Toxicology Curriculum, and the Department of Environmental Sciences and Engineering at the University of North Carolina, Chapel Hill, as well as in the Integrated Toxicology Program at Duke University.