Meet the Director

Linda S. Birnbaum, Ph.D., D.A.B.T., A.T.S.
Director
National Institute of Environmental Health Sciences
National Toxicology Program

Society of Toxicology Annual Meeting
Wednesday, March 9, 2011
National Institute of Environmental Health Sciences

- NOT in Bethesda area
  - Research Triangle Park, NC

- Wide variety of programs supporting our mission of environmental health:
  - National Toxicology Program
  - Intramural laboratories
  - Extramural funding programs

- Funding from 3 Congressional Committees
  - Health – Regular NIH appropriation
  - Interior - Superfund Research Program and Worker Training
  - Energy - Worker Training Program
## FY 2008 – FY 2012 Appropriations
### Dollars in Thousands

<table>
<thead>
<tr>
<th></th>
<th>FY 2008</th>
<th>Stimulus FY 2009</th>
<th>FY09 10</th>
<th>HR 1 FY2010</th>
<th>Request FY2011*</th>
<th>President’s FY2012</th>
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<tbody>
<tr>
<td><strong>NIEHS</strong></td>
<td>$645,669</td>
<td>$662,820</td>
<td>$168,057</td>
<td>$689,781</td>
<td>$663,646</td>
<td>$700,537</td>
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<td><strong>NIH</strong></td>
<td>$29,529,524</td>
<td>$30,317,024</td>
<td>$10,380,703</td>
<td>$31,008,788</td>
<td>$29,379,525</td>
<td>$31,747,915</td>
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<td><strong>Superfund</strong></td>
<td>$77,546</td>
<td>$78,074</td>
<td>$19,297</td>
<td>$79,212</td>
<td>$77,546</td>
<td>$81,085</td>
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<tr>
<td><strong>NIEHS/DOE Training</strong></td>
<td>$10,000</td>
<td>$10,000</td>
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<td>$10,000</td>
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* 2011 Full Year Continuing Appropriations Act passed by the House February 19, 2011.
Congressional Testimony

• Feb 2010 – Senate Subcommittee Superfund, Toxics and Environmental Health. Topic: Exposure Assessment


• Mar 2010 – Senate Interior. Topic: Superfund research


• May 2010 – Senate Veterans Affairs. Topic: Dioxin and ischemic heart disease.

Congressional Testimony

- Sept 2010 – Senate Committee on Veteran’s Affairs. Topic: VA Disability Compensation: Presumptive Disability Decision Making

- Sep 2010 – Senate Breakfast Briefing on Endocrine Disruptors hosted by:
  - Sen. Frank Lautenberg (D-NJ), chairman of the Senate Committee on Environment and Public Works Subcommittee on Superfund, Toxics and Environmental Health
  - Rep. Henry Waxman (D-Calif.), chairman of House Committee on Energy and Commerce

- Feb 2011 – Senate Committee on Environment and Public Works hearing on Drinking Water Contaminants (especially perchlorate, CrVI and TCE)
Staff Updates:

• **New NIEHS Deputy Director**
  Dr. Richard Woychik assumed the role of Deputy Director, NIEHS in January.

• **Permanent Director of the Division of External Research and Training**
  Dr. Gwen Collman was appointed permanent Director of the Division of Extramural Research and Training in December.

• Searches are underway for Scientific Director, Clinical Director, and Associate Director for Management
National Toxicology Program

• Interagency program
  – Established in 1978 to coordinate toxicology research across the Department of Health and Human Services (DHHS)
  – Headquartered at NIEHS

• Research on “nominations”
  – Thousands of agents evaluated in comprehensive toxicology studies
  – Results communicated through technical reports, scientific publications and the web

• Analysis activities
  – Report on Carcinogens (RoC)
  – Center for the Evaluation of Risks to Human Reproduction (CERHR)
  – NTP Interagency Center for the Evaluation of Alternative Toxicological Methods (NICEATM)
New and Renewed Areas of Emphasis for NTP

• Better coordination across the Federal government
• Develop new methods for efficient, thorough toxicological assessments
• Increase understanding of exposure-response relationships and issues of dosimetry
• Integrate results from new “data rich” techniques (i.e. genomics, high throughput screening) with traditional toxicology data to provide public health context
• Toxicity for the 21st Century or “Tox21”
  – MOU between NTP, EPA and NHGRI
  – High throughput, robotic testing of toxic compounds in cell and molecular assays
  – Using knowledge of biological response to identify toxicity pathways
  – Prioritization for further testing
Superfund Research and Worker Training Program

**Research**

- Detect hazardous substances in the environment
- Evaluate the risk of hazardous substances on human health
- Develop basic biological, chemical, and physical methods to reduce the toxicity of hazardous substances

**NIEHS**

Use environmental sciences to understand human biology and human disease

**EPA**

Regulate to protect human health and the environment

**ATSDR**

Prevent harmful exposures and diseases related to toxic substances
NIEHS Worker Education and Training Program Makes Awards for 2010-2011

- **Hazardous Waste Worker Training Program** – $20.6 million to 20 organizations

- **Nuclear Weapons Cleanup Training Program** – $9.6 million to eight organizations

- **Minority Worker Training Program** – $3.5 million to four organizations

- **Hazmat Disaster Preparedness Training Program** – $2.3 million to 10 organizations
Institute Oil Spill Work Continues

- **Worker Education and Training** – safety training for 140,000 oil spill clean up workers

- **Toxicology Research** – NTP studies on oil and dispersants

- **Research Consortia Funding** – grants for researcher-community partnerships

- **NIEHS Grants** – research on the health effects of oil spill on gulf communities and special populations

- **NIH GuLF STUDY** – research on the long-term health effects of the oil spill on clean up workers.

http://www.niehs.nih.gov/about/od/programs/gulfspill/index.cfm
Congressional Testimony on Oil Spill

- **June 15, 2010:** Senate Committee on Health, Education, Labor, and Pensions
  - HHS actions to identify and address health effects of the BP Oil Spill

- **June 16, 2010:** House Subcommittee on Health, Committee on Energy and Commerce – June 16, 2010
  - Evaluating the Health Impacts of the Gulf of Mexico Oil Spill

- **Sept 15, 2010:** House Committee on Transportation and Infrastructure
  - Enbridge Pipeline Oil Spill in Marshall, Michigan
### NIEHS Clinical Research Unit

#### Cumulative CRU Visits

![Cumulative CRU Visits Graph](image)

<table>
<thead>
<tr>
<th>Month</th>
<th>Tissue Type</th>
<th>Research Description</th>
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</thead>
<tbody>
<tr>
<td>Jul-09</td>
<td>punch biopsy of skin</td>
<td>generation of inducible pluripotent stemm cells from skin fibroblasts</td>
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<tr>
<td>Aug-09</td>
<td>blood cells</td>
<td>response of inflammatory cells to oxidative injury</td>
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<tr>
<td>Sep-09</td>
<td>alveolar macrophages</td>
<td>modulators of mRNA stability in the regulation of innate immunity</td>
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<tr>
<td>Oct-09</td>
<td>serum</td>
<td>BPA biomonitoring study in cashiers</td>
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<tr>
<td>Nov-09</td>
<td>serum, blood cells</td>
<td>glucocorticoid receptor SNP effects of steroid responsiveness (EPR and other)</td>
</tr>
<tr>
<td>Dec-09</td>
<td>serum</td>
<td>role of NAG-1 in inflammatory bowel disease</td>
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<tr>
<td>Jan-10</td>
<td>blood cells</td>
<td>oxidative injury markers</td>
</tr>
<tr>
<td>Feb-10</td>
<td>serum</td>
<td>role of NAG-1 in inflammatory bowel disease</td>
</tr>
<tr>
<td>Mar-10</td>
<td>blood cells</td>
<td>calcium channel effects on immune cell function</td>
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<tr>
<td>Apr-10</td>
<td>serum</td>
<td>Gene/environment factors in the pathogenesis of autoimmune myositis (satellite site)</td>
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<tr>
<td>May-10</td>
<td>blood cells</td>
<td>p53-inducible innate immune genes (EPR and other)</td>
</tr>
<tr>
<td>Jun-10</td>
<td>blood cells, alveolar macrophages</td>
<td>calcium channel effects on immune cell function</td>
</tr>
<tr>
<td>Jul-10</td>
<td>blood cells</td>
<td>Role of eicosanoids in T cell function in asthma</td>
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<tr>
<td>Aug-10</td>
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<td>Sep-10</td>
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<td>Jan-11</td>
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Institute Workshops, Meetings, Conferences

• Expert Panel Workshop to Examine the Role of the Environment in the Development of Autoimmune Disease

• Inaugural meeting of the Interagency Breast Cancer and Environmental Research Coordinating Committee (IBCERCC)

• Global Alliance for Clean Cookstoves Launch

• Health Consequences from Xenobiotic – Gut Microbiome–Host Interactions
Institute Workshops, Meetings, Conferences

• Autism and the Environment: New Ideas for Advancing the Science

• Worker Education and Training Fall Awardee and Technical Meeting

• NIEHS Centers for Nanotechnology Health Implications Research (NCNHIR) Consortium Meeting

• DISCOVER: Translation and Beyond

• NIEHS Workshop on Air Pollution and Brain Health
Institute NTP Meetings and Workshops

ICCVAM Workshops on Best Practices for Regulatory Safety Testing:

• Assessing the Potential for Chemically Induced Eye Injuries
  – January 19, 2011

• Chemically Induced Allergic Contact Dermatitis
  – January 20, 2011
NTP Workshop: Role of Environmental Chemicals in the Development of Diabetes and Obesity

January 11-13, 2011

- Brought together experts on diseases, toxicology, epidemiology and HTS/bioinformatics

- Identified toxicity pathways (AhR, PPAR, CAR, PXR, others) associated with diabetes and obesity in studies of arsenic, phthalates, organotins, nicotine, etc

- Identified disease pathways (insulin signaling, adipocyte differentiation, feeding behavior etc.) associated with diabetes and obesity

- Identified some critical future HTS targets to better understand associations between environmental exposures and these diseases.
Institute Highlights – Translation

• Superfund Film: “In Small Doses: Arsenic”

• Climate Change and Human Health white paper is basis for research agenda

• PEPH Metrics Manual Launched for Comment – can be downloaded from PEPH website under Materials
Recent Science Advances

• Environmental Alterations to Genetic Networks
  – Rewiring of genetic networks in response to DNA damage.  
    *Bandyopadhyay et al., Science. 2010 Dec 3;330(6009):1385-9*

• Epigenetic Silencing in Lung Cancer
  – Re-expression of CXCL14, a common target for epigenetic silencing in lung cancer, induces tumor necrosis.  
    *Tessema et al., Oncogene. 2010 Sep 16;29(37):5159-70*

• Mitochondrial Dysfunction in Autism
  – Mitochondrial dysfunction in autism.  
    *Giulivi et al., JAMA. 2010 Dec 1;304(21):2389-2396.*
Recent Science Advances

• Profiling DNA Methylation and Identification of Monoallelic Epigenetic Modifications

• New Exposure Paradigm

• Mechanistic Basis of Resistance to PCBs in Atlantic Tomcod from the Hudson River
  – Isaac Wirgin, Nirmal K. Roy, Matthew Loftus, R. Christopher Chambers, Diana G. Franks, and Mark E. Hahn. Published Online 17 Feb 2011 Science DOI: 10.1126/science.1197296

Atlantic Tomcod from Hudson River
Photo by Mark Mattson of Normandeau Associates, Inc.
NIH Roadmap - Epigenomics of Human Health & Disease

• **Goal:** to investigate the role of epigenetic changes in a wide range of human diseases
  - 23 grants funded by different NIH institutes and centers
  - Variety of diseases and conditions, including Alzheimer’s, pregnancy outcomes, mental health disorders, asthma, lupus, atherosclerosis and hypertension

• **NIEHS-funded grants:**
  - Investigating prenatal exposures and epigenetic changes in development of autism (Fallin and Feinberg)
  - Exposure to BPA and the development of breast cancer (Huang)

• **Recent re-release of RFA-ES-10-002 currently under review**
NIH Genes, Environment and Health Initiative
Exposure Biology Program

Nearing Completion

• ‘Prototypes’ in hand for ALL funded projects including:
  – 8 ‘Wearable’ sensors for measuring airborne chemical exposures
  – 7 Tools for assessing diet and/or physical activity
  – 5 Tools for measuring psychosocial stress and the use of addictive substances
  – 8 Candidate biomarker panels for assessing the biological response to environmental stressors
  – 5 Technologies for measuring biomarkers in biological samples

• Notable Successes:
  – Testing of prototype chemical sensors in the CDC-HUD Green Housing Study, the National Children’s Study and the UK Biobank
  – Use of the ‘comet chip’ in measuring response to arsenic in Thailand
  – Numerous commentaries, editorials and news pieces on Exposure Biology

• Open Grantee Meeting:
  – April 14, 2011 at NIEHS, details on our home page
Future Activities

• Released solicitations:
  – Validation of the Prototypes (RFAs in review now)
  – Development of methods for GxE integration (PAR applications received)
  – Supplements on methods for Phenotyping (PhENX)

• Programs being considered:
  – Proof of Principle Studies
    – Adding genomic info to “E” studies
    – Adding new environmental measures to “G” studies
    – Secondary analysis of existing GWAS data
  – Functional analyses of candidate GxE interactions
  – Field-deployable tools for biomonitoring of environmental exposures
  – Coordination of existing efforts around a focused exposure
BPA Research

• NIEHS funds 39 grantees (12 ARRA)
• Developed working consortium
  – Integration and collaboration among projects and endpoints
  – Listserv
  – Yearly grantee meetings
  – Working groups via teleconference quarterly
    (obesity, neurobehavioral, cancer, reproductive, pharmacokinetics, low dose, gene expression)
  – Sharepoint site lists all publications/abstracts
  – Contract to assess success of this unique approach to integrate research and researchers across a focused area
• Developing consortium of grantees to add disease focused endpoints to an NTP/FDA guideline study of BPA toxicity
Nanotechnology Environmental Health & Safety Research Strategy

- Develop/identify relevant *in vitro* and *in vivo* assays to predict biological/toxicity responses
  - Nano Grand Opportunity Consortium (ARRA funds)

- Gain fundamental understanding on interaction of ENMs with biological systems as governed by their physical and chemical properties

- Utilize this knowledge to develop models (QSAR/PBPK) ENM health effects
  - NIEHS Centers for Nanotechnology Health Implications Research (NCNHIR) formed in 2010 through U19/UO1 mechanism

- Methods to quantify exposure to ENM in diverse matrices
Utilize diverse expertise from the leaders in the field to work together in addressing key issues using common library of ENMs

Investigate in multiple systems to gain comprehensive understanding

- Cellular, molecular, ADME, tissue/organ-specific findings

Assess and integrate salient features from diverse Risk Assessment frameworks to develop and validate robust model(s).
Environmental Health Research: Planning for the Future

The Challenge

• How do we come together to think strategically about the breadth, scope, participants, and goals for Environmental Health Research, a multi-science discipline primed for significant impact on human health in the 21st Century?

• How do we create an Environmental Health Research Strategy that provides the data and information needed by the multiple audiences who use EHS data?

• Do we have the right tools and methods to do Environmental Health Research in the 21st Century?

• How can we integrate better new methods and technologies into science policy?
NIEHS Visionary Ideas Website

http://strategicplan.niehs.nih.gov
NIEHS/NTP PROVIDING
LIVE UPDATES
at the Society of Toxicology
Annual Meeting in Washington, D.C.
March 6-10, 2011

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www.niehs.nih.gov/liveatsot

OR FOLLOW ALONG ON TWITTER:
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Thank you!