EMERGING SCIENCE FOR ENVIRONMENTAL HEALTH DECISIONS

PRELIMINARY AGENDA

Biological Factors that Underlie Individual Susceptibility to Environmental Stressors, and Their Implications for Decision-Making

APRIL 18–19*, 2012 ■ WEDNESDAY 8:30–5:00, THURSDAY 8:30–NOON
KECK BUILDING, 500 FIFTH STREET NW, WASHINGTON, DC

IT IS WELL KNOWN THAT THERE IS A RANGE OF HUMAN SUSCEPTIBILITY to effects of given environmental exposures. This range is due in part to endogenous factors such as genetics and epigenetics, physiology, lifestage, and other biological differences. Variability in individual exposures also contributes significantly to variability in human susceptibility, but this workshop focuses on the endogenous/biological factors.

The 2010 National Research Council report Science and Decisions: Advancing Risk Assessment notes that it is difficult to estimate an average population risk without understanding how the risk varies among individuals in the population. However, the default approach in risk assessment to account for individual variability is to assume that a ten-fold decrease in allowable exposure will protect the most sensitive subpopulations, even though seldom it is known whether such approach may be overprotective or insufficient.

EMERGING MOLECULAR TECHNIQUES, such as next generation sequencing, are advancing scientists' ability to characterize how individuals differ inherently (genetically and otherwise). Such information can also be used to predict how such individual differences may affect one's susceptibility to a given exposure. While it may not be feasible to determine susceptibility of each individual to each potential exposure, clearly we can characterize the range and a distribution of biological variability in humans at a more granular level than assuming a ten-fold uncertainty factor.

THIS WORKSHOP WILL EXPLORE NEW AND INNOVATIVE APPROACHES to characterizing individual variability arising from endogenous/biological factors and its impact on susceptibility to risks from environmental exposures. Discussions will also delve into how to bring new data collection and analytic approaches to bear and layer them with conventional data on variability. Topics will span a range of approaches, from molecular analyses to the use of human cells and animal models as experimental systems, and how these approaches can be used to better characterize individual variability linked to endogenous factors in toxicity, epidemiology, and genome-wide-association studies.

THE WORKSHOP WILL ALSO CONSIDER THE IMPLICATIONS OF EMERGING APPROACHES TO POLICIES designed to address susceptibility in public health and risk assessment. Workshop participants will address approaches for and challenges to describing the relationships among individual variability, disease susceptibility, and public health.

Some questions that will be used to guide the workshop discussions include the following:

- What are the current and emerging technologies that can better inform us about the distribution of individual variability within a population that are due to endogenous/biological factors?
- How does such individual variability help us understand general population variability, sensitive subpopulations and related risks?
- What does the public need to understand about the implications of such individual variability, and how could/should the public health and risk assessment community start addressing this need?

* The committee and liaisons will meet the afternoon of April 19 and April 20 until 3pm.

Register at
http://nas-sites.org/emergingscience/workshops/individual-variability/

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

WEDNESDAY, APRIL 18, 2012 (8:30AM-5PM)

Session 1 Workshop Introduction

8:30 Opening Remarks—to be determined, *National Institute of Environmental Health Sciences*

8:35 Introduction to the Standing Committee and Framing of Workshop—William Farland†, *Colorado State University*

9:00 Human Variability in Chemical Susceptibility (Intolerance/Sensitivity), Research Findings to Date and Their Implications for Future Study Design—Claudia S. Miller, *University of Texas*

9:25 Characterization of the Problem: What Do We Know About Individual Variability and Its Contribution to Disease? —Nathaniel Rothman, *National Cancer Institute*

9:50 Technologies to Capture Biological Differences Among Individuals—Eric Schadt, *Pacific Biosciences and Mount Sinai School of Medicine*

10:15 *Break*

Session 2 Study Designs to Understand the Impact of Biological Variability Among Individuals in Response to Environmental Agents

10:30 Quantitative High-Throughput Screening for Chemical Toxicity in Population-Based In Vitro Models—Fred Wright, *University of North Carolina*

10:55 Using In Vivo Animal Models to Explore Individual Variability in Toxicity—Jeff French, *National Toxicology Program*

11:20 Human Studies to Explore Individual Biological Variability and Susceptibility to Environmental Stressors and Disease--to be determined

11:45 Modeling Populations from Data on Individuals—Harvey Clewell, *Hamner Institute*

12:10 What Can We Learn About Population Variability in Sensitivity to Environmental Exposures from Epidemiologic Studies and How Can We Use This Information in Risk Assessment?—Duncan Thomas, *University of Southern California*

12:35 *Lunch*

1:30 **Panel Discussion**

For more information and to subscribe for updates, please visit http://dels.nas.edu/envirohealth

Emerging Science workshops are free and open to the public.

† indicates a member of the Standing Committee on Use of Emerging Science for Environmental Health Decisions.

Session 3 Using Information on Biological Variability Among Individuals for Public Health Decisions

2:20 How Findings from Population-Based Studies May Inform Public Health Decisions on the Individual Level—James Kaput, *Nestlé*

2:45 Individualized Drug Therapy Options Based on Knowledge of Biological Variability in the Population—Peter Shaw, *Merck*

3:10 *Break*

Session 4 Using New Information on Individual Biological Variability for Environmental Regulatory Decisions

3:25 How Individual Variability Is Currently Factored into Risk Assessment/Regulation/Decision Making—Michael Dourson, *Toxicology Excellence for Risk Assessment (TERA)*

3:50 How the New Data May Be Used in Decision Making Contexts as We Look Towards the Future—Weihsueh Chiu, *Environmental Protection Agency*

4:15 Panel Discussion—Panel Members *to be determined*

5:15 Adjourn

THURSDAY, APRIL 19, 2012 (8:30 AM-NOON)

Session 5 Community Perspectives on Bridging the New Science with Decision Making, Including Individual Decision Making

8:30 Talk Title *to be determined*—Nicholas Ashford, *Massachusetts Institute of Technology*

9:00 **Panel Discussion**—Panel Members *to be determined*

9:45 *Break*

Session 6 Opportunities for New Approaches: Implications of New Data to Inform Risk Assessment and Regulatory Decision

10:00 **Panel Discussion**—Panel Members *to be determined*

Session 7 What Research Is Needed to Move Forward in this Area?

11:15 Panel Discussion—Panel Members *to be determined*

12:00 Adjourn

Committee and Liaisons meet the afternoon of April 19 and April 20 until 3:00pm.

Please note that this meeting will be webcast and recorded. Please visit our website for webcast details.