It is increasingly evident that stressors in utero, such as malnutrition or chemical exposures, may cause permanent changes in physiology and metabolism that influence the development of, or susceptibility to, disease in adults. Multiple animal models are available to investigate in utero perturbations in gene expression, tissue function, and other developmental pathways that may be linked to later life effects. However, many of these models are quite expensive and time-consuming to develop and use, and their relevance to humans remains to be determined. The ability to use human tissues, short-term animal studies, or rapid in vitro assays to predict adult health risks could rapidly advance our understanding of this topic. Examples include directly measuring biologically-significant concentrations of environmental toxicants in placenta or cord blood, and linking such exposures to gene expression, tissue function, or other developmental changes associated with an adult disease outcome. Thus, major scientific effort is currently being devoted to developing short-term animal studies and human biomarkers of effect that could be used to investigate associations between in utero exposures and diseases later in life.

This forum will provide a brief background on traditional testing strategies and current approaches used to detect later-life effects following in utero or early post-natal stressor exposures. The emerging science in this area will be further explored using two case studies. The first case study is end-point driven and will examine developmental origins of obesity, insulin resistance, and hypertension. The second will explore in utero or post-natal exposure to arsenic and potential early indicators that could predict later-life effects. Finally, the meeting will conclude with discussions on the use of this emerging science for risk assessment or decision-making purposes. Some questions that will be used to guide the meeting include the following:

- What is the range of adult disease states that have developmental origins?
- What are the possible mechanisms for persistent, adult-onset effects associated with developmental exposures?
- What early life biomarkers are available to predict later life disease?
- How good are current animal tests in detecting associations between early life exposures and later life effects?
- Are there shorter-term animal tests or mode-of-action-based in vitro/human biomarker tests that detect early life events and are predictive of later life effects?
- Is our scientific understanding of these processes sufficient to inform weight-of-evidence-based risk assessments and regulatory practices?

* On Friday, October 15, the committee and liaisons will meet following the forum.
Emerging Science: In utero and post-natal indicators that predict diseases caused by arsenic exposure

3:00 Fetal Arsenic Exposure and Adulthood Cancer in Mice—Michael Waalkes, National Institute of Environmental Health Sciences

3:30 Hepatic Gene Expression Changes Associated with In Utero Arsenic Exposure: Accelerated Atherosclerosis in the ApoE-Knockout Mouse—J. Christopher States, University of Louisville

4:00 Consequences of Pre- and Post-natal Arsenic Exposure in Bangladesh—Joseph Graziano, Columbia University

4:30 Panel Discussion—Moderator: Kim Boekelheide†, Brown University School of Medicine
Panel Participants: Kristina Thayer, National Institute of Environmental Health Sciences; Session 2 Speakers

5:30 Adjourn for the Day

FRIDAY, OCTOBER 15, 2010

Session 3: Implications for Using Early Indicators to Predict Health Outcomes Later in Life

8:30 When and in what areas is the emerging science ready for use in risk assessment?—Robert Chapin, Pfizer

9:20 What difficulties do we face in using this new science for risk assessment purposes?—Ila Cote, U.S. Environmental Protection Agency

10:10 Break

10:30 Panel Discussion—Moderator: Lauren Zeise†, California Environmental Protection Agency
Panel Participants: Stan Barone, U.S. Environmental Protection Agency; Bob Benson, U.S. Environmental Protection Agency; Deborah Hansen, U.S. Food and Drug Administration; Sarah Janssen, Natural Resources Defense Council; Reza Rasoulpour, Dow Chemical Company; Session 3 Speakers

12:00 Adjourn

12:30 Committee and Liaison Meeting—Lunch provided in the Lewis-Eakin Room

2:00 Adjourn Committee and Liaison Meeting, Committee to meet alone

3:00 Adjourn Committee Meeting

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

LOCATION: PRESIDENT’S BALLROOM
THE WASHINGTON CLUB, 15 DUPONT CIRCLE, NW, WASHINGTON, DC

EMERGING SCIENCE FOR ENVIRONMENTAL HEALTH DECISIONS