

**UNDERSTANDING ENVIRONMENTAL CONTAMINANTS AND HUMAN FERTILITY:  
SCIENCE AND STRATEGY**

*A workshop convened jointly by*

**Women's Health @ Stanford & the Collaborative on Health and the Environment\***  
**February 27 – March 1, 2005 Vallombrosa Center, Menlo Park, CA**

**Objective**

The objective of our workshop is to gather 25-30 invitees in a retreat-like atmosphere to achieve the following goals:

- Outline steps towards building a network of scientists, policy makers and affected communities who will support and advocate for enhanced research agendas and funding to further elucidate environmental factors in in/subfertility.
- Identify the following key components for developing a coherent research agenda to better characterize impacts of environmental contaminants on human fertility:
  - o Major findings to date
  - o Critical certainties v. research gaps
  - o Other critical issues or questions that arise in discussion
- Clarify what such an agenda must contain for it to be endorsed by infertility health care professionals, infertility patient groups, and women's health and reproductive advocacy organizations.
- Discuss strategies that could be adopted to help fill research gaps.
- Summarize conclusions of this workshop in a synopsis document that can be disseminated to interested lay and professional communities.

It is our intention that this workshop also lay groundwork and help shape the agenda for a subsequent larger Stanford campus-based "Summit on Reproductive Health, Fertility and the Environment" (with a more public aspect) geared toward medical professionals.

**Background**

There is a growing body of scientific evidence linking environmental contaminants with compromised fertility. Striking evidence came first from an array of observations of wildlife over recent decades, amply described in the groundbreaking 1996 book *Our Stolen Future*. Hundreds of studies strongly link manmade endocrine disrupting chemicals with a host of reproductive abnormalities and reproductive rate declines in a wide range of bird, reptile, fish and mammalian species. Numerous studies in laboratories around the world confirm that synthetic chemicals in our environment can cause reproductive damage in animals. More recently, a smaller number of human studies has demonstrated associations between environmental toxicants and parameters known to affect human reproduction and fertility. Such parameters range from

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\* *Additional funding for this event has been generously provided by the Compton and Mitchell Kapor Foundations*

increases in medical conditions or anatomic defects associated with infertility to reduced sperm count and quality; sperm DNA damage; alterations in ovarian function and menstruation; oocyte quality and cytogenetic damage; longer time to pregnancy; altered embryonic development to increased rates of spontaneous miscarriage, pre-term birth and stillbirth.

But achieving scientific certainty about human health effects is likely to take decades, because controlled experimentation with human fertility and reproductive health is unethical, and because of the enormous costs and complexities involved in meaningful epidemiological studies, as well as time lags between cause and reproductive maturity and/or intergenerational reproductive effects.

Meanwhile, researchers looking at questions related to human infertility prevalence/incidence, national birth rate declines, teen pregnancy rates, obesity and anovulation, and geographical and temporal variations in reproductive health related conditions such as cryptorchidism and hypospadias are increasingly asking whether there are significant identifiable environmental contributors to some or all of these observations.

So critical questions at this moment are: What does the science allow us to conclude about environmental contaminants and human fertility at this point? What are the critical research gaps? What might be a coherent research agenda to fill those gaps? Who can and would add their voices, lend support and pursue advocacy for increased research/funding to fill the gaps? From where will funding derive for achieving the necessary research?

These are the kinds of questions and answers that have been pursued successfully by those concerned about adverse effects from human exposure to the synthetic estrogen diethylstilbestrol (DES). In addition to identifying a link between DES as a culprit in vaginal and reproductive tract disorders, patient advocacy involvement by organizations of affected women (DES Action and DES Cancer Network) resulted in what was ultimately a very successful campaign to get expanded federal funding for DES research and education, working tirelessly with the support of interested (and affected) legislative representatives.

Environmental health has recently been added as an emerging issues agenda item within infertility patient resource groups. They are increasingly facing constituency queries about environmental risk factors for the disease and its related aspects and conditions. Reproductive medicine and other physicians confirm pressure from patients for answers about, and advice to reduce, environmental risk factors. They also express uncertainty about how and where to access reliable, organized knowledge to help doctors and other health professionals respond to patients' environmental risk questions.

It is a potentially propitious time for infertility patient and reproductive health groups; reproductive biology, epidemiology, toxicology, and medicine experts; reproductive health clinicians; and environmental science researchers and advocates to convene to strategize the pursuit of answers where environmental health and human fertility are concerned, and build a community of those who have a stake in knowing and sharing answers.

### **Invitees**

Key scientists in reproductive biology, epidemiology, toxicology and eco-toxicology from academia and government; Clinical researchers in reproductive medicine; Directors from US national infertility patient organizations; American Society of Reproductive Medicine, Society for the Study of Reproduction environment CoRE committee, selected other professional societies, and Physicians for Social Responsibility; Environmental health funders; Women's health and reproductive advocacy organization representatives; Jerrold Heindel, NIEHS; Richard Jackson, CA DHS; Philip R. Lee; Representatives from the offices of US Congresswomen Nancy Pelosi and Anna Eshoo.

## Logistics

- Location:* Vallombrosa Retreat Center, Menlo Park, CA (just off Stanford campus and approx. midway between San Francisco and San Jose airports).
- Dates:* **February 27, 2005 evening -March 1, 2005 noon.**
- Co-Chairs:* Drs. Linda C. Giudice and Shanna H. Swan
- Coordinator:* Alison Carlson
- Planning Comm:* Drs. Linda Giudice, Shanna Swan, Pete Myers; Edith T. Eddy, Alison Carlson
- Advisory Comm:* Drs. Michael Lerner, Philip R. Lee, Ted Schettler, Louis J. Guillette; Steve Heilig

## Program

### **Sunday 2/27: Introductions, Context and Science**

- 7:00 - 7:10pm Welcome and Purpose  
– *Drs Linda C. Giudice, Shanna H. Swan*
- 7:10 - 7:50 Introductions – *All participants* take one minute to state name, affiliation, topic involvement, interest in attending
- 7:50 – 8:00 Infertility Economics: Direct and Indirect Costs of Infertility to Society and Individuals  
– *guest speaker Dr Kate Bundorf, Dept of Health Research and Policy, Stanford University*
- 8:00 - 8:30 Environment and Infertility: What We Don't Know, Why Not, and Why We Are Poised to Learn More  
– *Dr Pete Myers*
- 8:30 - 9:00 Lessons from Wildlife and Ecotoxicology  
– *Dr Louis J. Guillette*
- 9:00 - 9:15 *Q&A/Discussion*

### **Monday 2/28: More Science and...Issues, Challenges, Gaps**

- 8:00 - 8:05 Introduction to the Morning  
– *Drs Linda C. Giudice, Shanna H Swan*
- 8:10 - 8:50 What We Know ♂: An Overview of Environmental Contaminant Effects on Male Fertility Factors and Reproductive Tract Function and Development (30 mins + 10 min Q&A)  
– *Dr Russ Hauser*
- 8:50 - 9:30 What We Know ♀: An Overview of Environmental Contaminant Effects on Female Fertility Factors and Reproductive Tract Function and Development (30 min + 10 min Q&A)

– *Dr Germaine Buck Louis*

9:30 - 10:10 Fetal Origins of Adult Reproductive Disease (30 min + 10 min Q&A)  
– *Dr Jerrold Heindel*

10:10-10:30 **BREAK**

10:30-11:10 The Medical Context: What Are the Clinical Issues in Infertility/Subfertility Explored in Reference to the Environment (30 min + 10 min Q&A)  
– *Drs David Keefe, Linda C. Giudice*

11:10-11:50 Reproductive Epidemiology: Perspective and Challenges in Investigating the Impact of Environmental Agents on Fertility (30 min + 10 min Q&A)  
– *Dr Shanna H. Swan*

(11:50-12:00 Reflecting on the Morning: Other Comments and Questions)

12:00- 1:00 **LUNCH** provided in Vallombrosa Dining Hall for all participants

1:00 - 1:10 Setting the Context for the Afternoon  
– *Drs Michael Lerner, Pete Myers*

1:10 – 3:10 IDENTIFYING RESEARCH GAPS AND ISSUES: HIERARCHIES OF CERTAINTY  
Researcher “respondents” and group discussion using hierarchy of certainty framing and questions.  
*Facilitators: Drs Shanna H. Swan, Linda C. Giudice*

3:10 – 3:25 **BREAK**

3:25 - 4:20 INTERESTS, CONCERNS, NEEDS OF REPRODUCTIVE HEALTH & PROFESSIONAL ASSOCIATIONS: Infertility patient, women’s health and reproductive advocacy, and professional group perspectives. (5 minutes or fewer per group)  
*Facilitators: Michael Lerner, Alison Carlson*

4:20 – 5:00 SO WHAT CAN WE SAY ABOUT PRECAUTION: ADVICE IN THE FACE OF UNCERTAINTY?  
*Commentators/facilitators: Drs David Keefe, Louis J. Guillette, with group*

5:00 - 5:25 ENVIRONMENTAL HEALTH POLICY and FUNDERS PERSPECTIVES: Remarks by Dr Philip R Lee, Ms Catherine Dodd, Dr Pete Myers, Dr Jerrold Heindel, Ms Edith Eddy  
*Moderator: Dr Michael Lerner*

5:25 - 5:30 Wrap up – *Drs Linda C. Giudice, Michael Lerner*

**Tuesday 3/1:** *Strategic planning in re critical research gaps and issues; reproductive patient and physician groups roles; funding challenges; and a collaborative “Summit” at Stanford*

8:00 - 8:10 Introduction to the Morning – *Dr Michael Lerner, Alison Carlson*

8:10 - 8:20 The DES Research Advocacy Example – *Ms Margaret Braun*

8:20 - 8:30 The Endometriosis Research Advocacy Example – *Ms Mary Lou Ballweg*

- 8:30 - 8:40 *Discussion:* How might these examples inform research advocacy regarding environmental impacts and infertility? How might they not?
- 8:40- 10:15 STRATEGIC PLANNING GROUP DISCUSSION I  
*Facilitators: Dr Shanna H. Swan*
- 10:15-10:30 **BREAK**
- 10:30-11:45 STRATEGIC PLANNING GROUP DISCUSSION II: Stanford and collaborators “Summit on Reproduction and the Environment.”  
*Facilitator: Dr Linda C. Giudice*
- 11:45-12:00 Wrap Up: What Happens Next...

### **Hosts/Organizers**

**Women’s Health @ Stanford (WH@S):** Infertility and disorders in the reproductive tracts and hormonal profiles of men and women are increasingly being recognized in reproductive medicine settings. Surgery and assisted reproductive technologies are commonly used to correct these disorders. Women’s Health @ Stanford has a major interest in gender medicine and the health and well being of all individuals. In this workshop WH @ S is committed to facilitating a critical review of the science and laying groundwork for a larger, campus-based symposium on the same topic for a professional and lay audience - and to promote program building at the Stanford University School of Medicine, the Institutes of Medicine, and within campus-wide programs, such as the Institute for the Environment, WH @ S and the Institute for Research on Women and Gender. This subsequent symposium would serve to build networks of individuals, organizations, professionals, faculty, and students to pursue research, education and public awareness on infertility and environmental contaminants.

**Collaborative on Health and the Environment (CHE):** The overarching mission of CHE ([www.cheforhealth.org](http://www.cheforhealth.org)) is to increase the level of scientific and public dialogue about links between environment and human health, and to bridge disparate stakeholders and potential collaborators in environmental health and sciences. Efforts on behalf of environmental health are often fragmented. Research, medical, health-affected, public health, environmental health and justice groups have not always worked together toward common goals. So CHE, housed administratively out of Commonwealth Institute in Bolinas, California, serves as a national network of over 1,200 individuals and organizations (scientists; doctors; policymakers; funders; activists; environment, health and rights NGO representatives, and others) interested in increasing the level and degree of scientific, public and collaborative dialogue in support of the larger goal of improving human health by reducing dangerous environmental exposures. In the case of environmental influences on fertility/reproductive capacity, CHE’s baseline aim through its *Fertility/Early Pregnancy Compromise Working Group* is to facilitate access to scientific expertise for all stakeholders, especially infertility patient organizations – and to encourage careful, accurate stakeholder treatment of the topic. The Working Group convenes by quarterly teleconferences and a listserv – and supports targeted collaborative efforts, such as this proposed workshop.