Challenged Conceptions:
Impact of Environmental Contaminants
On Reproductive Health and Fertility[1]

Background

Recent studies suggest not only that toxins in the environment are damaging the reproductive capacities of men and women, but also that these effects can be triggered by lower levels of exposure than previously understood. We believe it is incumbent upon policy makers to gather new and forthcoming research on infertility in order to give better information to patients about what they can do to reduce their risk of exposure or harm and preserve their fertility.

According to the Centers for Disease Control and Prevention, the number of couples in the United States with an impaired ability to become pregnant has grown from 6.1 million in 1995 to 7.3 million in 2002, or more than one in every eight couples of childbearing age. Although some of this increase may be attributed to more individuals and couples beginning families later in life, recent data suggests that the fastest growing segment of the infertile community is women under the age of 25.

What is contributing to this alarming trend? Exposure to ubiquitous dioxins such as cigarette smoke, lead and mercury, and some agricultural pesticides are known to be direct threats to a couple's ability to conceive or a healthy pregnancy. Troubling new research suggests that a broader range of chemicals – including many that are associated with everyday products such as household cleansers, personal care and beauty aids, and even plastic water bottles – could have a much more complex and far-reaching impact on men's and women's fertility.

In response to this emerging research, the Fertility/Early Pregnancy Compromise Work Group of the Collaborative on Health and the Environment (CHE) and the Department of Women's Health at Stanford University School of Medicine hosted *Understanding Environmental Contaminants and Human Fertility Compromise: Science and Strategy* in February 2005. The gathering was the first time women's health, infertility and reproductive rights advocates met with researchers in reproductive epidemiology, biology, toxicology and clinical medicine to assess what we know, what we think we know, and what we need to know when it comes to protecting men's and women's fertility, healthy pregnancies, and future generations. The news is not reassuring.

Alarming Trends in Fertility and Health

Multiple interacting factors, including age, heredity, lifestyle, underlying disease, reproductive tract infections and nutritional status are known to contribute to biological fertility challenges for both men and women. In recent years, scientists have increasingly reported evidence that certain pollutants in the environment may also play an important role, contributing at least in some cases to underlying causes of fertility problems in both males and females.

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[1] This executive summary is drawn from ***Challenged Conceptions: Environmental Chemicals and Fertility*** (an overview for the lay reader) and **Vallombrosa Consensus Statement** (a technical review) both available at http://www.healthandenvironment.org/articles/wg_fertility_news/220 .

The data from laboratory animal and wildlife studies is very compelling; the data from humans is less conclusive. Still, consider:

- Hundreds of studies strongly link manmade endocrine disrupting chemicals to a host of reproductive abnormalities and reproductive rate declines in a wide range of wildlife.
- Numerous studies in laboratories around the world confirm that synthetic chemicals in our environment can damage animal fertility.
- A smaller number of studies – some in animals; many in humans – have demonstrated associations between environmental toxicants and human fertility, including:
    - Increases in medical conditions or anatomic defects associated with infertility such as reduced sperm count and quality
    - Sperm DNA damage
    - Alterations in ovarian function and menstruation
    - Chromosomal damage to oocytes
    - Longer time to pregnancy
    - Altered embryonic development and increased rates of spontaneous miscarriage, pre-term birth and stillbirth.
- In July 2005, the Centers for Disease Control, *National Report on Human Exposure to Environmental Chemicals)*, reported that over 90 percent of Americans have a mixture of pesticides in their bodies.

Traditionally, environmental impact has been evaluated in terms of quantity; an increase in dose or exposure correlated with an increase in problems. However, we now know:

- Even very low doses of some biologically active contaminants can alter gene expression important to reproductive function.
- Exposures during fetal development can adversely affect health of the individual in adulthood, including reproductive health.
- Humans are exposed to complex mixtures of chemicals that can interact to cause increased effects.
- People differ in susceptibility to exposures. Not identifying and studying susceptible subgroups can result in failure to detect even very high risk.

In other words, not only are these contaminants ubiquitous, but they may pose a threat to the reproductive organs and function of the individual exposed, as well as the reproductive health and organs of that individual's children and their children's children.

We need to know more. Physicians, patients, and advocacy organizations supporting those facing fertility challenges agree that taking a precautionary approach toward potential environmental chemical threats to reproductive health is preferable to treating disorders after the fact, especially as options for treating infertility are expensive and many questions as to efficacy, health and wellbeing remain unanswered. But because much of the science on this question is relatively new and complex, doctors, patients, and support groups are left with a host of unanswered questions about what risks exist, what the "threat levels" are, and what precautions are warranted to protect fertility. As a first step, the federal government, a leader in science and public health promotion, needs to gather an expert panel to survey and organize what research is already under way, and put forth an integrated research agenda to answer the most pressing questions.