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Fact Sheet

EPA Special Report On Endocrine Disruption

In recent years, scientists have proposed that chemicals might be disrupting the endocrine (hormonal) systems of humans and wildlife. They have also hypothesized that endocrine disruption might result in cancer, harm to male and female reproductive systems, thyroid damage, or other adverse consequences. EPA is now issuing the *Special Report on Environmental Endocrine Disruption: an Effects Assessment and Analysis* to review the key scientific findings to date.

Scope of EPA's Report

This report was prepared under the auspices of EPA's Risk Assessment Forum, which brings together scientists from around the Agency to promote scientific consensus on risk assessment issues. The report provides an overview of the current state of the science for endocrine disruption, and can serve as a resource to EPA and others seeking to understand the issue. Its major components are an introduction to the endocrine system and the endocrine disruption hypothesis; a review of potential human health and ecological risks; and an analysis section, including an overview of research needs. In terms of human health, it focuses on general exposure to chemicals through the environment, rather than occupational or pharmaceutical (drug) exposure. The report represents an interim assessment pending a more extensive review expected to be issued by the National Academy of Sciences later in 1997.

Highlights of the Report

This section provides a brief summary of the principal discussions and findings of the report.

Background on the Endocrine System

The endocrine system helps guide development, growth, reproduction, behavior and other bodily functions of animals and humans. It is comprised of endocrine glands and hormones. Some of the major endocrine glands are the pituitary, thyroid, pancreas, adrenal,

and the male and female gonads (testes and ovaries). Endocrine glands produce hormones and secrete them directly into the bloodstream. Hormones act as chemical messengers, traveling through the blood to distant tissues and organs, where they can bind to specific cell sites called receptors. By binding to receptors, hormones trigger various responses in the tissues containing the receptors.

An endocrine disruptor is an external agent that interferes in some way with the role of natural hormones in the body. An agent might disrupt the endocrine system by affecting any of the various stages of hormone production and activity, such as by preventing the synthesis of hormones, by directly binding to hormone receptors, or by interfering with the natural breakdown of hormones.

Human Health Effects Findings

A variety of chemicals, including certain pesticides, have been found to cause endocrine disruption in laboratory animal studies. Observed effects have included disruption of female and male reproductive function (such as disruption of normal sexual differentiation, ovarian function, sperm production, and pregnancy) and effects on the thyroid gland (which helps maintain normal metabolism).

Some scientists have hypothesized that effects seen in laboratory studies may also occur in human beings. With few exceptions, however, a causal relationship between exposure to a specific environmental agent and an adverse health effect in humans operating via endocrine disruption has not been established, according to the report. (Exceptions have included incidents of chemical exposure in the workplace and exposure to the drug DES.) For example, conclusive evidence linking environmental exposure to endocrine disruptors with infertility or cancers of the breast or prostate is not available at this time. Further research is needed before such effects can be either demonstrated or ruled out.

Information is particularly needed about potential risks to developing young, where in theory small disturbances could lead to profound and lasting effects. Some studies, for instance, have reported an association between exposure to PCBs (such as from contaminated fish) and adverse effects to the developing nervous system. More information is needed about such potential effects and whether they could be occurring via endocrine disruption.

Ecological Effects Findings

The report finds that compelling evidence has accumulated that endocrine systems of certain fish and wildlife have been disturbed by chemicals that contaminate their habitats. Whether this endocrine disruption is confined to isolated areas or is representative of more widespread environmental conditions is not clear at present. Groups of organisms for which there is much evidence of endocrine disruption include snails, oysters, fish, alligators and other reptiles, and birds, such as gulls and eagles.

Although effects have been observed, generally it has been difficult to prove that a specific chemical caused a particular endocrine effect. Wild organisms are exposed to a variety of chemical and nonchemical stressors, complicating the identification of a definitive cause. In many cases, the chemicals associated with effects already have been identified as problem substances due to their toxicity and persistence and therefore are heavily regulated or banned from commercial use in the United States. Examples include DDT, PCBs, and certain heavy metals.

It is difficult to discern whether endocrine effects on individuals of a particular species have impacted populations of that organism or the community of which it is a part. The most credible examples illustrating significant population declines as a result of exposure to endocrine-disrupting chemicals have been reported for alligators in central Florida and some local populations of marine invertebrate species. Further research is needed to better understand population-level effects.

Implications of the Report for EPA

Based on the report, EPA is concerned about the possibility of impacts to human health and the environment due to exposure to endocrine disruptors. Given the current state of the science, the Agency does not consider endocrine disruption to be an adverse endpoint *per se*, but as a step that could lead to toxic outcomes, such as cancer or adverse reproductive effects. This perspective could change as additional data become available. EPA can use evidence of endocrine disruption in setting priorities for further testing to see if other effects are likely and if regulatory actions are necessary. EPA will continue current efforts to reduce risks from environmental chemicals and to investigate their potential to cause endocrine disruption in cooperation with other federal agencies and organizations, both domestic and international.

Information About Other Endocrine Disruption Activities

Detailed information about research needs is available through the Internet at www.epa.gov/endocrine or from Robert Kavlock of EPA's Office of Research and Development (ORD) at (919) 541-2771. ORD is preparing a draft research strategy that will be available later this year. EPA has also established a task force to develop screening and testing methods for use in evaluating chemicals for endocrine effects, as mandated by recent amendments to food safety and drinking water laws. Information about the work of the task force can be obtained through the Internet at www.epa.gov/opptintr/opptendo or by contacting Gary Timm (202-260-1859) or Tony Maciorowski (202-260-3048) of EPA's Office of Prevention, Pesticides, and Toxic Substances. EPA is also chairing a workgroup convened by the President's Office of Science and Technology Policy that is documenting and coordinating endocrine disruption research across the federal government. More information about the workgroup is available through the Internet sites listed above.

Obtaining Copies of the Report

An electronic version of the report is available through the Internet at the address www.epa.gov/ORD/whatsnew.htm. Printed copies, expected to be available in April 1997, can be obtained by calling the ORD Publications Office in Cincinnati at 513-569-7562. Scientific questions about the report should be directed to Thomas Crisp, Technical Panel Chair, National Center for Environmental Assessment, ORD, EPA at (202) 260-3860 or e-mail: crisp.thomas@epamail.epa.gov.