Humans come into contact with EDCs in many different ways. It can be through contact with soil, water, or air contaminated by such chemicals. Food can be a source, even beyond phytoestrogens; for example, industrial chemicals can leach into soil and groundwater and then make their way into the food chain and build up in fish, animals, and people. EDCs are in consumer products such as plastics, household chemicals, fabrics treated with flame retardants, cosmetics, and antibacterial soaps. People who work with pesticides, fungicides, or industrial chemicals are exposed to EDCs in the workplace.

Infants can potentially be exposed through breastfeeding by mothers who have had a high level of contact with EDCs (such as those who work with industrial chemicals). This should not discourage most women from breastfeeding, however, since breast milk is still the best source of nutrition for a baby. Infants might also be exposed during formula feeding, through phytoestrogens in soy milk or plasticizers in formula-containing bottles or cans.

Although some medications can disturb endocrine functioning, they are not included among environmental EDCs and so are not discussed here.

Results of animal and human scientific studies support a link between EDCs and harm to human health, but the cause-and-effect relationship is not yet fully understood. Still, some environmental sources of EDCs are known to pose a threat to people who have excessive exposure to them.

Most EDCs are synthetic chemicals designed for use in a variety of industries. Classes of these chemicals and some specific examples are:

- Industrial solvents or lubricants and their byproducts—polychlorinated biphenyls (PCBs) and dioxins
- Plastics; plasticizers—bisphenol A (BPA); phthalates (pronounced THAL-ates)
- Pesticides (use to kill insect pests)—methoxychlor, chlorpyrifos, DDT
- Fungicides (used to kill fungus)—vinclozolin
- Herbicides (used to kill unwanted plants)—atrazine
- Antibacterials—triclosan

Some EDCs occur naturally in food. The best known example is phytoestrogens. Phytoestrogens are plant substances that can produce effects similar to those of the female sex hormone estrogen. Soy beans and flax seeds are foods high in phytoestrogen content. However, a person would probably need to consume substantial amounts of these foods for phytoestrogens to affect the endocrine system.

High levels of specific EDCs are known to cause endocrine, reproductive, or neurological problems in humans. Examples of high-level exposure include local toxic spills or environmental contamination. For example, in 1976 an industrial accident in Seveso, Italy exposed local populations to high levels of dioxins. Long-term studies showed an increase in diabetes and certain types of cancer, among other health effects, in people living in highly contaminated areas.

In humans, health impacts of low-level exposure to EDCs are not as well known. Still, studies of low-dose exposure in animals show definite harm to health, and scientists suspect similar effects in humans.
Some EDCs such as DDT, BPA, phthalates, and PCBs can mimic or block the effects of female and male sex hormones. These chemicals may affect both female and male reproductive health. The impact of early exposure can be seen throughout life. Before birth, exposure can interfere with fetal growth and development. Later, sexual development may be affected, and decreased fertility or diseases of the male and female reproductive systems may develop.

Some EDCs may also affect other endocrine systems, such as the thyroid and neuroendocrine systems. The thyroid gland, located in the neck, releases thyroid hormone into the bloodstream. This hormone is necessary for normal brain development, control of metabolism, and other aspects of maintaining healthy bodies. Studies have shown that many industrial chemicals can interfere with thyroid function.

The neuroendocrine system is made up of nerves in the brain, spine, and throughout the body. It controls overall endocrine system functions including reproduction, stress responses, growth, lactation (production and secretion of breast milk), and metabolism. Disruption of the neuroendocrine system may affect these functions.

People are exposed to complex mixtures of chemicals throughout their lives. This makes identifying a cause-and-effect relationship between specific EDC exposure and disease virtually impossible in most cases. Still, scientists continue working to better understand how EDCs act in the body and the consequences of exposure to EDCs. Several issues are key to a full understanding of the effects of EDCs.

Exposure during critical periods

A developing fetus or infant is more vulnerable to the effects of EDCs than an adult because organ systems are still developing. Exposure during this time period can lead to different and more harmful health impacts than might result from adult exposure.

Delayed effects

There may be a long lag between the time of exposure and signs of a disorder. For reproductive health, the effects of exposure to an EDC in the womb or shortly after birth may not be seen until puberty or adulthood.

Chemical mixtures

Environmental contamination is rarely due to a single compound. This makes understanding the effects of individual EDCs more complicated.

What should you do with this information?

Prevention is the key to lowering health risks related to EDCs. Even if some suspected health effects are not fully proven scientifically, taking precautions is wise. A first precaution is awareness. Make yourself familiar with EDCs that you and your family may be exposed to. A good place to start is with the resources listed below.

Although you can’t completely avoid exposure to EDCs, try to avoid unnecessary, preventable exposure to EDC-containing consumer products. This is especially important if you are pregnant, plan to have children, or already have small children. You should talk to your doctor when planning a family to discuss needed precautions to avoid endangering yourself and your offspring.

Research on EDCs is growing, so watch for new information on products and precautions to help protect your family’s health.

Resources

- [www.niehs.nih.gov](http://www.niehs.nih.gov)
  National Institute of Environmental Health Sciences
- [www.psr.org/resources/pediatric-toolkit.html](http://www.psr.org/resources/pediatric-toolkit.html)
  Pediatric Environmental Health Toolkit
- [www.dhs.ca.gov/ohb/HESIS/hesispubs.htm](http://www.dhs.ca.gov/ohb/HESIS/hesispubs.htm)
  Hazard Evaluation System and Information Service
- [www.ewg.org](http://www.ewg.org)
  Environmental Working Group

EDITORS

Jean-Pierre Bourguignon, MD, PhD
Andrea Gore, PhD
Alvin M. Matsumoto, MD
Sheela Sathyanarayana, MD, MPH
R. Thomas Zoeller, PhD

November 2009