

Birth Defect Research for Children, inc.

Fact Sheets

Endocrine Disruptors

In the book, *Our Stolen Future*, Theo Colborn, Diane Dumanoski and John Peterson Myers have focused the public's attention on a newly discovered threat from synthetic chemicals that was overlooked until only recently. These chemicals are known as endocrine disruptors (EDCs). EDCs include a wide range of synthetic chemicals that are not only found as toxic waste in the natural environment but also as part everyday household items. While the carcinogenic effects of these pollutants have been studied extensively, studies of the EDC effects are just starting to gain validity.

Although some sources of toxic waste may have been reduced and concentrations of these chemicals are declining on the land, in the air and surface waters, significant residues still remain. Some EDCs are persistent organic pollutants that take many years to break down, or degrade, by natural biological processes. They have accumulated in such places as lake and river sediments and in animal and human fat around the world as harmful substances that put us at risk. Among the most plentiful and active EDCs in the environment are the organochlorines which include PCBs (polychlorinated biphenyls), chlorinated pesticides (DDT, chlordane, lindane, etc.), and dioxins. While the U.S. manufacture of some of these chemicals has been banned, they still persist in the environment.

Persistent organic pollutants, also called bioaccumulators, are magnified as they move up the food web in aquatic systems from the smaller microorganisms in the sediments to small organisms to the largest organisms where they accumulate in the body fat. The substances may be at such low levels in the surface water that they are not detectable by normal sampling techniques. However, the pollutants work their way up the food web as the organisms eat each other. Over time, water birds near the top of the food web have accumulated contamination at levels millions of times higher than levels in the sediments.

The Arctic polar bear, a top predator and the Earth's largest land carnivore, has been found to have concentrations of PCBs magnified 3 billion times the levels of the ocean water. A beluga whale found dead in the St. Lawrence River, Quebec, in 1989, had 500 parts per million of PCBs in its body -- 10 times the level that qualifies as hazardous waste under Canadian law.

As humans regularly consume these contaminated fish and animals, most of the persistent organic pollutants can not be broken down in the body by our normal processes. They bioaccumulate in our body fat. High levels of PCBs are found in human body fat in places as far away as the Canadian Arctic, home of the Inuit Indians. As these persistent organic pollutants are concentrated and stored in the body, the possibility exists that their effects may be additive or even synergistic. We are exposed to vast cocktails of these chemicals, but their effects in combination are not known. Although some of us are already at our body's limit to tolerate these persistent organic pollutants, we tolerate them well compared to the developing embryo or fetus which is extremely sensitive to foreign chemicals in the womb or egg (fish, birds, reptiles). Women may pass them to the fetus through the placenta, and to the newborn through breast-feeding. A wide range of functional deficits can result that are not visible at birth and that can reduce a child's potential as he or she matures.

The development and functioning of an invertebrate's body are governed by the endocrine system. The endocrine system produces hormones, or chemical messengers, that move through the bloodstream, carrying signals that not only govern sex and reproduction, but also coordinate organs and tissues that work in concert to keep the body functioning properly. Many persistent organic pollutants that are active in the environment (not restricted to PCBs, DDT, and dioxins) act as endocrine disruptors. For some reason, the hormone receptors in organ tissue mistake these hormone mimics as the real thing, responding to a false signal. During prenatal and early postnatal development, organ defects and changed bodily functions result. Preliminary investigations have shown that timing, not dosage strength, governs the type of damage to a developing fetus or child. In fact, minute doses at the right time in the fetal development process have been shown to be more destructive than larger doses.

The endocrine system is similar among vertebrates, so what happens in laboratory rats or Arctic polar bears closely resembles what happens in the human body. The studies have shown a close correlation between exposure to hormone disruptors resulting in invisible defects that include incomplete and deformed reproductive systems, reduced fertility and compromised immune systems in wildlife and impaired mental development, learning difficulties, hyperactivity and clear cell vaginal cancer in humans.

The offending compounds have been detected not only in pesticides and other toxic chemicals, but household substances such as plastics used for toys, dental sealants, contraceptives, and dishwashing liquids. We need to know more about how this toxic cocktail affects our body and its reproductive system.

Resources

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