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Endocrine Disrupting Chemicals and Fertility

A brief introduction to endocrine disrupting chemicals

Endocrine disrupting chemicals, or EDCs, are chemicals that affect the endocrine system, in a variety of ways. Some chemicals mimic a natural hormone, tricking the body into over-responding to the stimulus (ex. a growth hormone increasing muscle mass), respond at inappropriate times (ex. producing insulin when it is not needed), block the hormone from certain receptors (ex. growth hormones required for normal development), stimulate or inhibit the endocrine system and cause overproduction or underproduction of hormones (ex. over or underactive thyroid).

Unfortunately, we have all been well exposed to EDCs for decades. Annual global production of plastics has risen from 50 million tons to 300 million since the 1970s, meaning thousands of new, untested chemicals have been released into the environment. These chemicals travel through our soil and water, as well as through the animal food chain. Eventually, when they enter the human body (through food, water, or air), they can even be spread from mother to fetus. They are also found in many everyday products, such as plastic bottles and containers, liners of metal cans, detergents, flame retardants, food, toys, cosmetics, and pesticides.

Given that hormones regulate everything from hunger to reproduction and influence nearly every cell, organ, as well as metabolic function, the potential for harm from EDCs is significant. Normal endocrine functioning of the body involves minute changes in hormone levels, which cause significant developmental and biological effects. Thus, even limited exposure to EDCs may have profound effects, including developmental malformations, interference with reproduction, increased cancer risk, and disturbances in the immune and nervous system function.





Connection with fertility

Of particular concern is the interference with reproduction. In the past 50 years, there has been declining sperm counts, earlier puberty in girls worldwide, and increased genital malformations in people and animals. While EDCs are not solely to blame (diet, lifestyle, medications most likely also play a big role in this phenomena), there is a concerning connection. The reproductive system is rich in hormones, and thus particularly susceptible to disruption, including the sex hormones (estrogen in females, androgens/testosterone in males) and hormones secreted by the pituitary gland and hypothalamus.

There are many adverse health outcomes for fertility and pregnancy linked to preconception and prenatal exposure to EDCs, including decreased semen quality with PCBs, miscarriage and fetal loss with solvents, impaired fetal growth with pesticides, fetal loss, low birth weight, and preterm delivery with air pollutants, decreased fetal and birth weight, and congenital malformations with toluene, shortened gestational age with phthalates, low birth weight with PCBs, and reduced birth weight and fetal growth with perfluorinated compounds. (PCBs refer to Polychlorinated Biphenyls, chemicals that were widely manufactured until the discovery of their toxic properties in 1979, but due to their longevity, they remain present in our environment.)

Healthy fertility rates rely on viable eggs in women and plentiful sperm in men. EDCs are linked to negative impacts on both. BPA changes the neuroendocrine pathways fundamental to reproductive health. Exposure during a woman's reproductive years has been shown to compromise embryo implantation. Other examples of EDCs with this effect include PBDEs, used in products from flame retardants to electronics, and phthalates, used to increase the flexibility of plastic and vinyl. EDCs have also been seen to induce changes to germ cells (the precursors to sperm and egg cells). In Denmark, women under 40 working in the plastics industry were more likely to have sought out fertility assistance than unexposed women of the same age. For men, sperm counts in North America, Europe, Australia and New Zealand have declined by 50 percent over the last half century.

The duration of fertility can be affected by EDCs as well. Early life exposure to DDT may contribute to an earlier onset of puberty in girls; as adults, this exposure may also lengthen menstrual cycles and accelerate menopause. Lead may also shorten a woman's



reproductive lifespan by changing reproductive hormones in prepubescent girls and healthy premenopausal women.

Finally, EDCs have been associated with altered sex features and functions; in men, undescended testicles and urethra defects and in women, endometriosis and fibroids. Ovarian cysts have also been linked with higher amounts of chemicals, such as BPA.

Some ways to avoid EDCs

Reduce pesticide use: Choose more natural alternatives for your home and wash fresh produce with tap water to remove pesticides.

Prevent leaching: Avoid heating canned or plastic-packaged foods, as this will allow EDCs to seep into the food.

Read product labels: On plastic containers, recycling numbers #1, #2, or #4 means the product is free of BPA and its substitutes (the BPA-free label can still mean the product contains BPS, BPF, BPAF or diphenyl sulphone, equally harmful EDCs). For cleaning supplies and cosmetics, check for phthalates-free products.

Avoid fragrances: Fragrances typically contain phthalates, a known class of EDCs. Instead try to air out your space, remove garbage regularly, and choose natural ways of freshening the air, such as citrus peels.

Filter tap water: Tap water and bottled water can contain EDCs, such as lead and residue from birth control pills.

References

<https://www.endocrine.org/topics/edc>

<https://www.niehs.nih.gov/health/topics/agents/endocrine/>

<https://www.epa.gov/endocrine-disruption/what-endocrine-disruption>

<https://www.endocrine.org/topics/edc/what-edcs-are/common-edcs/reproduction>

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6663094/>

<https://www.nrdc.org/stories/9-ways-avoid-hormone-disrupting-chemicals>

<https://www.endocrine.org/topics/edc/what-you-can-do>

<https://www.nationalgeographic.com/science/article/news-BPA-free-plastic-safety-chemicals-health>