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Female Health & Fertility: Endocrine Disrupting Chemicals.

The roles of chemicals in our environment are being shown to have a direct effect upon fertility and other body functions. The biggest culprits are the Endocrine Disrupting Chemicals (EDC), that effect all the hormones associated with the endocrine system. The US population is approximately 323,750,000, with approximately 163,920,000 of the population being female. *“Human and wildlife health depends on the ability to reproduce and develop normally. This is not possible without a healthy endocrine system.”* [1]

Infertility is defined as the inability to conceive after one year of unprotected intercourse (six months if the woman is over age 35) or the inability to carry a pregnancy to live birth.

Centers for Disease Control stated: *About 6% of married women 15–44 years of age in the United States are unable to get pregnant after one year of unprotected sex (infertility). Also, about 12% of women 15–44 years of age in the United States have difficulty getting pregnant or carrying a pregnancy to term, regardless of marital status (impaired fecundity).* [2]

Achieving pregnancy requires a normally functioning hypothalamic-pituitary-ovarian axis, a normal female reproductive tract, normal endocrine homeostasis, and normal semen parameters. [3]

The endocrine system is one of the most important systems throughout the human body. It's made up of the adrenal glands, hypothalamus, ovaries in females, pancreas, parathyroid glands, pineal gland, pituitary gland, thymus gland, thyroid gland, and testicles in males. These glands, are commonly referred to as 'ductless glands', which secrete hormones that act as chemical messengers via the bloodstream, that regulates metabolism, reproduction, stress (stimuli), homeostasis, growth and development. Additionally, organs like the gonads, heart, kidney and liver, produce secondary endocrine functions.

Hormones act at very low concentrations. In part, because hormones act through high affinity receptors; that is, very low concentrations of hormone can bind to the receptor population and initiate important biological effects. [1]

The hormones are: Adrenaline, Aldosterone, Calcitonin, Cortisol, Erythropoietin, Glucagon, Insulin, Leptin, Melatonin, Oxytocin, Progesterone, Prolactinoma, Prostaglandins, Testosterone, Thyroxin, Vitamin D.

Hormones that have a role in fertility are: Androgens, FSH; Follicle-stimulating hormone, GnRH: Gonadotropin-releasing hormone, HCG: Human chorionic gonadotropin, LH: Luteinising hormone, Oestradiol, Progesterone and Prolactin.

“Endocrine disruptors are chemicals that may interfere with the body's endocrine system and produce adverse developmental, reproductive, neurological, and immune effects in both humans and wildlife. A wide range of substances, both natural and man-made, are thought to cause endocrine disruption, including pharmaceuticals, dioxin and dioxin-like compounds, polychlorinated biphenyls, DDT and other pesticides, and plasticizers such as bisphenol A. Endocrine disruptors may be found in many everyday products– including plastic bottles, metal food cans, detergents, flame retardants, food, toys, cosmetics, and pesticides.” [4]

Close to 800 chemicals are known or suspected to be capable of interfering with hormone receptors, hormone synthesis or hormone conversion. However, only a small fraction of these chemicals have been investigated in tests capable of identifying overt endocrine effects in intact organisms.

- The vast majority of chemicals in current commercial use have not been tested at all.
- This lack of data introduces significant uncertainties about the true extent of risks from chemicals that potentially could disrupt the endocrine system. [1]

The most well-studied pathway by which EDCs affect the body is by direct interaction with hormone receptors. Hormone receptors are protein receptors in the cells that bind to a specific hormone, as a form of chemical communication within the body. Once a hormone binds to a receptor, a series of changes can occur in the cell, to bring about a physiological state in the body. Everything from sexual development, to metabolism, to brain development is affected by this process. EDCs can alter this process in several ways. They can bind to the receptors meant for naturally occurring hormones, thereby setting off a series of physiological changes in the body. Many EDCs only bind partially to these receptors, but they can still affect the endocrine system. EDCs can also block the receptors, so that the body's natural hormone messengers cannot reach their target receptors.

In addition to the steroid hormone receptors described above, there is another class of proteins that are called estrogen-related receptors (ERRs) because they are structurally very similar to ERs. These ERRs, especially ERR γ , serve as binding sites for several endocrine-disrupting compounds including bisphenol A (BPA) and diethylstilbestrol (DES) (Takayanagi et al., 2006). [5]

The main EDC's to avoid are: Phytosterogens, Chlorinated pesticides, Dioxins, Polychlorinated biphenyls, Cadmium. Other chemicals to avoid are:

Pesticides	DDT, chlorpyrifos, atrazine, 2,4-D, glyphosate
Children's products	Lead, phthalates, cadmium
Food contact materials	BPA, phthalates, phenol
Electronics and Building materials	Brominated flame retardants, PCBs
Personal care products, medical tubing	Phthalates
Antibacterials	Triclosan
Textiles, clothing	Perfluorochemicals

While it is virtually impossible to remove all exposures to EDC's, you can make lifestyle changes that will benefit yourself, family, future children: by going organic, using filtered water, avoidance of personal care items whose ingredient list reads like a chemical stock room, avoiding all plastics and replacing with stainless steel products, especially cookware and storage containers, natural pest control, organic bedding/linens, avoidance of fragrances, air fresheners, anything with a scent to cover up a smell that should be remediated not ignored.

Toxins attached to nano-particulates in polluted indoor and outdoor air undergo translocation by two mechanisms via inhalation: (a) olfactory nerve into the hypothalamus/pituitary axis and (2) via the surfactants into the systemic circulation resulting in damage to all organs of the body [6,7]

REFERENCES:

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