

Endocrine Disruptors: Your Toxic Environment



What is weighing on your endocrine system today? Could it be bisphenol A (BPA), PCBs, dioxins, polychlorinated biphenyls, DDT, pesticides, heavy metals, solvents and/or pharmaceutical agents?... just to name a few.

Your endocrine system is actively involved in healthy metabolism, hormone production, energy, cognitive function, growth, fertility, and stress management. This complex system must function properly to maintain your overall health. Unfortunately, our ever-increasing toxic environment contains endocrine disruptors that alter normal function of the endocrine system. These disruptors can weigh heavily on the endocrine system to cause health ailments linked to growth and development, hormone imbalances, infertility, neurological disorders, certain cancers, and weakened immunity.

A variety of materials, including plastic bottles, canned goods, cosmetics, pesticides, toys, detergents, and food, contain endocrine disruptors. Researchers and medical specialists have found many reasons

to limit exposure to materials containing these harmful substances. This month, we review the most common endocrine disruptors and discuss how to limit these synthetic chemicals from your environment. We also look at the influence of endocrine disruptors on weight gain and obesity.

What Are Endocrine Disruptors?

Endocrine disruptors are synthetic compounds that mimic hormones naturally found in your body. They are able to change and turn normal hormone signals on and off. This can inhibit natural hormone activity or generate extreme hormone activity. These synthetic

chemicals can come from Teflon coatings, cosmetics, inflammable furnishings, detergents, canned goods, air fresheners, hair dyes, and many plastic products. The influence of endocrine disruptors has been linked to several health concerns, including mood disorders, infertility, certain cancers, ADD/ADHD, autism, and learning disabilities.^{1,2}



The U.S. Environmental Protection Agency (EPA) defines endocrine disruptors as "chemicals that either mimic or block the effects of hormones at the target receptor/tissue; or chemicals that directly stimulate or inhibit production of hormones by the endocrine system."³ Endocrine disruptors do not have to accumulate in the body overtime to interfere with hormone and endocrine activity, but low doses can significantly disrupt the body.⁴ These chemicals act through hormone receptors, neurotransmitter receptors, enzymatic pathways, and several other mechanisms that play a role in endocrine function. Endocrine disruptors also change DNA methylation and interact with cytosol fluid found inside your cells.⁵

The hypothalamic-pituitary-thyroid axis is sensitive to endocrine disruptors.⁶ Endocrine disruptors cross the blood-brain barrier to have a direct influence on brain cells. This may explain how endocrine disruptors have a central effect on the porous blood-brain barrier around the hypothalamic-pituitary-

thyroid axis involved with the endocrine system. Furthermore, exposure to endocrine disruptors in early life has shown to affect neuroendocrine gene expression and DNA methylation, as well as relate to premature reproductive aging.⁷



Persistent Organic Pollutants (POPs)

POPs are toxic chemicals that accumulate in the environment and adversely affect human health. Many endocrine disruptors fall under this category. DDT is a prime example of a POP, which is an insecticide used on agricultural crops.

POPs can be transported by wind and water to reach countries worldwide. These chemicals accumulate and remain in the environment for many years. Due to health risks, the production of 12 main POPs have been eliminated or reduced. However, the compounds can still remain in our environment.

POPs have been related to blood sugar disruption, mitochondrial damage, inflammatory cytokines, obesity, and cardiovascular dysfunction. Researchers have found that exposure to these substances may contribute to inflammatory diseases and cardiovascular ailments. Serum concentrations of POPs were measured in 889 adults (ages 40 and older) to find PCBs (a type of POP), as well as the pesticide - organochlorine, were associated with an increase in cardiovascular dysfunction among women. Another POP, polychlorinated dibenzo-p-dioxins (PCDDs), was also related to greater cardiovascular risks in men and women.⁸ Exposure to the POP, hexachlorobenzene (HCB), during infancy could lead to greater obesity risks in children.⁹

Common Endocrine Disruptors

Endocrine disruptors are constantly in our environment. Some of the most common chemical and toxic disruptors include:



Bisphenol A (BPA)

As a plasticizer, BPA is used to keep plastics supple. It can be found in the lining of canned goods (soup, legumes, pasta, fruit, and vegetables) to leach into the canned food consumed by humans. Furthermore, BPA is in polycarbonate plastic food containers, typically marked as "PC" or "#7". This is typically a transparent and rigid plastic used for food storage containers and water bottles. BPA is also in plastic wrap, dental sealant, and flame retardant. It is best to avoid purchasing polycarbonated plastics and imperative to avoid heating liquids or foods in these containers.

BPA used to be considered a weak estrogen compound, but recent studies suggest it has stronger estrogen-like activity that interferes with endocrine signaling pathways and estrogen receptors.¹⁰

Phthalates

As a synthetic substance added to plastic to make it soft, flexible, and resilient, phthalates also extend the life of a product. They are found in plastic bags, glues, IV tubing, vinyl flooring, inks, pesticides, detergents, food packaging, toys, shower curtains, soaps, shampoos, hair spray, nail polish, and perfumes.

Phthalates, often consumed by humans through their diet, are related to abdominal obesity and insulin resistance in humans.¹¹ One study showed vegetable (specifically tomatoes and potatoes) and poultry consumption were associated with higher phthalate metabolite levels in the body.¹²

Parabens

These synthetic compounds are used as preservatives in thousands of food, cosmetic, and pharmaceutical products. Parabens may preserve product shelf life, but they have estrogen-like activity that can accumulate in breast tissue leading to greater breast cancer risks.¹³

PBDEs (polybrominated diphenyl ethers)

As a persistent organic pollutant (POPs), PBDEs are used in flame retardants for furniture, mattresses, carpets, curtains, and televisions. While its use has been banned in several countries, it still circulates through our environment and can be stored in animal fat, such as dairy products, meat, and fish. Chemicals, including PBDEs, have been shown to disrupt thyroid function.¹⁴

PCBs (polychlorinated biphenyls)

PCBs are another highly toxic POP that has been related to endocrine dysfunction and cancer.¹⁵ Before

1976, this compound was used for insulation fluid in electrical transformers, components in plastics, and mixed with adhesives, ink, and dyes. PCBs are now banned from production, but the chemical still persists in the environment.

Dioxins

As a general name for hundreds of chemicals that remain in the environment, dioxin is formed unintentionally as a byproduct in many industrial processes. Small dioxin molecules diffuse into the atmosphere, fall into land soil, and are consumed by soil microbes. Then, dioxins are passed through the food chain from plants and vegetation that grows in the ground. Environmental levels of dioxins have decreased since the 1990's; however, it is still a predominant toxin in the environment.

Everyone is exposed to dioxins, as they are one of the POPs that remains in the environment. The highest levels are found in soils, sediments, and food – most commonly meat, dairy, and fish. The lowest levels are found in water, air, and plants. More than 90% of human exposure to dioxins is through our food. Dioxins interfere with hormones, reproduction, and immunity to cause significant health risks, including cancer.^{16,17}

Pesticides & Herbicides

A variety of pesticides have been shown to influence nervous system function, as well as impair reproduction and development. Some of the most common pesticides and herbicides are organochlorine pesticides (DDT, DDE, Chlordane, Heptachlor, Methoxyne), organophosphate pesticides (Diazinon, Chlorpyrifos), triazine herbicides (Atrazine, Simazine, Cyanazine), and chlorophenoxy herbicides (Agent Orange).

Pesticides and herbicides are sprayed on agricultural crops and stay on the produce we consume. These chemicals are also used on golf courses, home lawns, gardens, fields, and pest control in our homes. Furthermore, pesticides and herbicides can end up in our drinking, cooking, and bathing water, as they are not always filtered through public water systems.

After these compounds get into the body, they accumulate in fatty tissue, including the breast, in which there are concerns for breast cancer risks.^{18,19,20} Several pesticides and herbicides have estrogen-like compounds that mimic estrogen naturally found in the body to alter estrogen metabolism.

Heavy Metals

Cadmium, mercury, lead, and arsenic are examples of heavy metals that disrupt the endocrine system.

These metals are not metabolized in the body and accumulate in the soft tissues. Heavy metals often enter the body through food, water, air, and absorption through the skin. A few symptoms of heavy metal toxicity include nerve damage, birth defects, muscle weakness, cognitive dysfunction, and mental confusion. Heavy metal laboratory tests are available to determine levels in your body.



Obesogens: Endocrine Disruptors & Obesity

Obesity has continued to increase in the United States. In 2008, approximately 32.2% of adult men and 35.5% of adult women were considered obese.²¹ Furthermore, obesity in children is a concern, as reports from 2010 show obesity present among 16.9% of adolescents in the United States.²²

The influence of endocrine disruptors on the obesity epidemic has become a common area of research. In fact, researchers have coined the term "obesogens" to designate dietary, pharmaceutical, and industrial compounds that may alter metabolic function and make people more susceptible to weight gain.²³ Obesogens appear to interact with signaling pathways involved with weight regulation. Individuals exposed to certain endocrine disruptors may have disrupted appetite control, greater fat cell accumulation, fewer calories burned at rest, and increased BMI.^{24,25}

Various studies find that adolescents exposed to these chemicals during their prenatal life are more likely to be overweight, as metabolic and fat cell composition will be altered for their lifetime.

Researchers examined exposure to dioxins, PCBs, DDE, and hexachlorobenzene among 138 infants before birth to three years old. Pollutants were measured in the mothers' umbilical cord serum before birth. The study indicated that DDE and PCBs were significantly associated with greater BMI during early childhood.²⁶

Researchers investigated eleven environmental chemicals to find that four chemicals (BPA, phthalates, butylparaben, PCB 153) caused an increase in adipogenesis - formation of fat cells. Furthermore, eight chemicals increased leptin release - a hormone that regulates appetite.²⁷

The influence of endocrine disruptors on body weight continues to be a main focus in medical research

and may provide more reasoning behind the obesity epidemic.

How to Reduce Exposure to Endocrine Disruptors

Do you breathe pure air, consume clean foods, drink fresh artesian water, and enjoy a calm, slow pace? Probably not. So, how do you avoid environmental toxins? The best way to lessen exposure to environmental toxins is by doing what you can to avoid bringing these toxins into



your home. While it is merely impossible to completely avoid endocrine disruptors, there are smart ways to lessen the load on your endocrine system.

First, it is important to know what endocrine disruptors you are exposed to on a daily basis. Assess the contaminants in your home, car, or work environment. Many common toxins come from plastics (food ware, shower curtains, water bottles, etc.), housing and clothing material, home cleansers, bath and beauty products, cosmetics, and pesticides.

Cosmetics & Bath Products

Lotions, shampoos, deodorants, and soap can all contain synthetic chemicals that absorb through your skin to burden the endocrine system. For this reason, several products state they do not contain specific chemicals. It is important to read labels and know what to avoid.

Some of the most common preservatives are imidazolidinyl urea, diazolidinyl urea, parabens (methyl, propyl, butyl, and ethyl), petrolatum, and triethanolamine (TEA). These substances can cause allergic reactions and be harmful if they are continually absorbed into the body. Phthalates are used in perfumes, air fresheners, and skin moisturizers. Women's cosmetics may contain parabens and phthalates.

Cleaning Supplies

Household cleaners and clothing detergents may make you feel clean, but they also contain harsh chemicals. Nonylphenol ethoxylates (NPEs) are a class of chemicals that disrupt the endocrine system. These chemicals can be found in common household products and super-strength cleaners. Akylyphenol

ethoxylates (APEs) are endocrine disruptors that act like surfactants to help cleaning solutions spread easily over a surface. APEs are in disinfectants, detergents, all-purpose cleaners, disposable diapers, sanitary towel, and laundry cleansers.

Formaldehyde is a preservative in household cleansers, disinfectants, nail polish, and personal care products. Organochlorines can be found in degreasers, bleach, detergents, and pesticides.

Detoxify

Filtered H₂O, fiber consumption, exercise, sleep, antioxidants – all of these elements are important to detoxification and help eliminate the accumulation of endocrine disruptors in your body.

Food Sources

Limiting your consumption of animal fat, dairy, and fish can reduce your intake of heavy metals and endocrine disruptors, which often accumulate in animal protein sources. Eat more organic fruits and vegetables to avoid produce that is heavily sprayed with pesticides. If you can only choose a small selection of organic produce, be sure not to buy these 12 conventional produce with the highest pesticide residue. These items are known as the “Dirty Dozen” - apples, bell peppers, celery, cherries, grapes, lettuce, nectarines, peaches, pears, potatoes, spinach, and strawberries. Also, be sure to wash produce with mild soap or veggie wash before eating.

Plastics

Reduce your exposure to plastics by replacing plastic utensils, dishes, and cups with glass and stainless steel. Avoid cling wrap for storing food and use ceramic or glass materials instead. Never heat your food in plastic. Use glassware or ceramic containers instead. Stainless steel or glass water bottles are a good alternative to plastic. For children, find natural materials (wood, cloth, etc.) for them to chew on, instead of plastic. Avoid dental materials that contain BPA. To reduce BPA intake that is found in canned foods, choose to buy fresh, organic fruits and vegetables instead. You can also can your own foods in glass jars to avoid chemicals found in store bought canned goods.

Supplements

While there tends to be an ongoing disagreement concerning the value of vitamins, in today's world you need essential nutrients to fight off the ever-increasing toxins and free radicals in our environment. Furthermore, our food supply lacks the nutrients that were once found in our soils. Taking at least a daily multivitamin and essential fatty acids supplement can provide crucial nutrition that may not be

obtained through our food.²⁸

Probiotics are key nutrients to balance gut health that becomes compromised from endocrine disruptors.²⁹ This “good” bacteria has been shown to reduce absorption of BPA and other chemicals.^{30,31}

Water Filtration

Drink plenty of filtered water and find out if your community conducts water tests that determine endocrine disruptors and heavy metals levels. Avoid storing water in plastic water bottles, as a means to drink filtered water. If you do have to use plastic water bottles, keep the bottles out of direct sunlight, as heat activates molecules in the plastic to increase the leaching of polycarbons in your water. Also, avoid freezing water in plastic containers.

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