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### Endocrine disruptors

#### Part I – What are they?

Every organism on Earth (such as animals or plants) has an endocrine system for the regulation of their bodies. This regulation consists of feedback loops of hormones (chemical messengers) released by internal glands directly in the circulatory system. In humans, these major endocrine glands are the thyroid gland, the hypothalamus and the adrenal glands. However, humans have also created many chemical substances that interfere with the natural messengers of the body; they are called the hormone/endocrine disruptors. In this article, I will give you a description of these groups of chemicals and where they are found, and especially in items used in our daily lives.

Every organism on Earth is made up of cells which include a cell nucleus (the seat of DNA) as well as several organelles (such as mitochondria), bathed in a cellular cytoplasm (a kind of gelatin), all enclosed in a lipid cell membrane. The assembly of many cells produces organs and glands, some of which make up the endocrine system (see the previous paragraph for examples). To help with the coordination of body functions, hormones are produced by these glands. Hormones act as messengers and carry specific messages. In order to receive these messages, a cell has receptors. Some of the receptors are found embedded in the cell surface (receptors for insulin, for example) while others are found within the cytoplasm (receptors for sexual hormones, for example). Both types of hormone receptors work the same way: the hormone attaches to a receptor, like a key into the lock, and enables a response from the receptor, which begins a cascade of signaling and induces a variety of changes within the cell. These changes are for the proper functioning of the cell: such as an increase or decrease of nutrient sources, growth and other metabolic functions. Problems arise when artificial chemical substances,





known as hormone/endocrine disruptors, mimic hormones by attaching to receptors, and thus interfere with these important processes of proper cell functioning. Thus, a message may not be delivered at all, or a wrong message can be sent, or a message sent at a wrong time can be delivered. These actions can have negative consequences on the body. When absorbed in the body, an endocrine disruptor can also decrease or increase normal hormone levels, mimic the body's natural hormones, or alter the natural production of hormones.

Health effects are mostly associated with the synthetic chemicals that mimic hormones and that are produced by industry. Essentially, you can be exposed to these substances through diet, air, skin, and water. Here is a short list of some common hormone/endocrine disruptors, why they are produced and where they are found:

- Bisphenol A — used to make polycarbonate plastics and epoxy resin — found in many plastic products like storage containers
- Dioxins — a byproduct in herbicide production and paper bleaching — also released into environment during waste burning and wildfires
- Perchlorates — a byproduct of aerospace, weapons and pharmaceutical industries — found in drinking water and fireworks
- Polyfluoroalkyl substances (PFAS) — see articles in ASEQ-EHAQ newsletters, June and July 2020 for more details
- Phthalates — used to make plastics more flexible — found in some food packaging, cosmetics, children's toys, and medical devices
- Polybrominated diphenyl ethers (PBDE) — used to make flame retardants — found in household products such as furniture foam and carpets.

In the next article, you will read about the impacts of these substances, both on your health and on wildlife, and how you can reduce your exposure to them. If you want to know more information on this subject, you can consult the followed links. Note that other links will be added in the other parts of this subject in the newsletters to follow.

Online links:

- Endocrine disruptors, National institute of environment health sciences, last reviewed on November 17<sup>th</sup> 2020,  
<https://www.niehs.nih.gov/health/topics/agents/endocrine/index.cfm>



- Hormone receptor, Wikipedia, the free encyclopedia, last modification made on December 6<sup>th</sup> 2020, [https://en.wikipedia.org/wiki/Hormone\\_receptor](https://en.wikipedia.org/wiki/Hormone_receptor)
- Endocrine system, Wikipedia, the free encyclopedia, last modification made on December 27<sup>th</sup> 2020, [https://en.wikipedia.org/wiki/Endocrine\\_system](https://en.wikipedia.org/wiki/Endocrine_system)
- Endocrine disruptors: OSH answers, Canadian Center for Occupational Health & Safety, Government of Canada, last reviewed on December 29<sup>th</sup> 2020, <https://www.ccohs.ca/oshanswers/chemicals/endocrine.html>