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The Effects of Endocrine Disruptors on the Environment

Part 3

Endocrine disruptors are ubiquitous in the environment, and as such, they can have polluting effects on all kinds of biomes. In humans, endocrine disruptors have been found to increase the risk of health conditions like obesity, cardiac problems, type 2 diabetes, infertility, and certain types of cancers (Encarnaç o et al., 2019). In animals, research reports similar findings, and one troublesome implication of this concerns both humans and the future of many species and their ecosystems. Besides these chemicals' effects on fauna, according to recent evidence from botanical science, endocrine disruptors have also been found to affect plant growth and tissue composition.

In the following article, the effects of endocrine disruptors on animals and plants will be discussed in detail, along with solutions to avoid them.

Concerns for Wildlife

Animal bodies function in the same way as human bodies. This may sound like a major oversimplification but results from animal studies show similar health consequences of exposure to endocrine disruptors as in humans. In animals, too, these chemicals have been found to hinder cellular functions leading to metabolic deficits and imbalances in multiple bodily systems (Annamalai and Namasivayam, 2015).



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Effect	Invertebrates	Fish	Amphibians	Reptiles	Birds	Aquatic/semi-aquatic mammals	Humans
Molecular Level							
DNA damage or mutations	● [1]	● [5]					
Altered gonadal gene expression	● [3]	● [5]		● [11]		● [18]	
Altered sex steroid hormone levels	● [3]	● [5]		● [12]		● [19]	● [24]
Organ Level							
Gonadal masculinization/feminization	● [2]	● [5]	● [8,9]				
Gonadal abnormality	● [2,3]	● [5]	● [10]	● [11,12]	● [14,15]	● [20,21]	● [25]
Reproductive organ cancer						● [22]	● [26,27]
Organism Level							
Alterations of secondary sex characteristics		● [5]					
Alterations of Gametes		● [5]		● [12,13]			● [28]
Delayed sexual maturity		● [5]			● [16]		
Decreased fertility	● [4]	● [5,6]		● [12,13]	● [17]	● [23]	● [29]
Population Level							
Decreased offspring viability				● [17]	● [17]	● [22]	
Population declines	● [4]	● [5,6,7]	● [30]	● [17]	● [17]	● [23]	

As can be concluded from the chart above, evidence across multiple studies show that endocrine disruptors have been found to affect different animals at not just a single, but multiple biological levels (Marlatt et al., 2022).

Stressed Out Plants and Stunted Growth

One common endocrine disruptor is known as bisphenol A and is often found in plastic food storage containers, plastic toys, bottles, receipt paper, and more. In 2015, one team of researchers exposed plants and their soil to varying concentrations of BPA (Wang et al., 2015). Their results showed that at high concentrations, BPA affected plant hormone production, notably by inhibiting growth hormones and increasing stress hormones in the roots. In Greece, a comparable study reported similar observations on the effects of BPA on plant biology (Adamakis and Eleftheriou, 2011).

If the previous study is not worrying enough, a different study in 2019 revealed even more alarming observations. In their experiments, Kim and colleagues studied the effects of nonylphenol – an endocrine disruptor that is used in lubricants, laundry and dish detergents, emulsifiers, and more – introduced into the soils for mung bean and rice plants. It turns out that nonylphenol can affect the structure of plant cells causing the leaves to produce fewer chlorophylls and reduce their ability to properly intake carbon dioxide, i.e., a crucial reactant for photosynthesis. In moong bean plants, plant leaves died prematurely too. In rice plants, shoot growth, chlorophyll concentrations, and root development were all impaired from chronic exposure to the endocrine disruptor.



Further research is needed to study the effects of other endocrine disruptors on plant life. It is also important to keep in mind that some endocrine disruptors are persistent (i.e., biodegrade slowly), whereas others are eliminated quickly; however, regardless of this, research shows that both types can influence plant growth and development (Kim et al., 2019). The most prominent concern for humans pertains to the agricultural domain. Today, crop yields are already negatively impacted by many factors including rising temperatures, decrease in pollinators, and poor water management. With the additional effects of endocrine disruptors, the consequences only multiply.

How to Avoid Endocrine Disruptors

Plants and animals are part of and make up important contributors to the ecosystems we humans share with them. Additionally, as humans occupy the top rank of the food chain, our exposure to endocrine disruptors is likely amplified through our consumption of animal and plant products – a link that current research is actively exploring.

Below are a couple of tips to reduce your exposure to endocrine disruptors:

- Wash your hands often, and especially before eating.
- Endocrine disruptors can collect in your dust. Vacuum and dust your house while wearing adequate protection (such as a mask to avoid inhaling dust particles).
- Reduce your use and consumption of plastic products. Avoid plastic bottles, plastic toys, and plastic food containers.
- Watch what you eat, and opt for organic, and in-season produce.
- Use natural, least-toxic cleaning products at home and in the workplace.
- Speak about the harmful effects of endocrine disruptors: the more people know, the better they will work to reduce their own exposures, and as a consequence, overall environmental levels of these chemicals could be reduced (esp. in indoor environments rather than outdoors).

For more information and tips on creating a healthy environment, go to: www.ecolivingguide.ca



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