ECO-JOURNAL
June 2022

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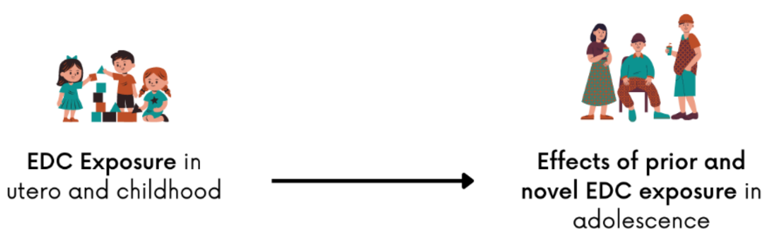
The Effects of Endocrine Disruptors on Teens, Adults, and the Elderly – Part 2

In the previous part, we covered the effects of endocrine-disrupting chemicals (EDCs) on pregnant women, fetuses, and children. To recapitulate, the article described how the EDCs that pregnant women are exposed to often end up being transmitted to their developing children through in utero exchanges at first and then ex utero exchanges such as breastfeeding. The article also described how EDCs affect childhood development and disrupt major bodily and brain functions, triggering a wide range of health challenges. In this second part of the series, we will cover the health effects of endocrine-disrupting chemicals on the rest of the lifespan starting with adolescence and finishing with old age.

The Leap from Childhood to Adolescence

How does previous exposure to EDCs (i.e., fetal and childhood) impact adolescents? One study published in the journal of *Brain Structure and Function* considered this very question (Weng et al., 2020). The researchers assessed 59 mother-child pairs at two different time points: (a) prenatally, taking urine and blood samples from the mothers during their third trimester of pregnancy, and (b) when the child entered their teen years, measuring their brain activity through functional magnetic resonance imaging (fMRI). The results of the experiment supported the argument that EDCs cause changes in the neural activity of particular brain areas, namely those associated with emotions, impulsivity, and rewards. A second study corroborated these results in 2021 using the same experimental procedures but employing different measuring techniques (Shen et al., 2021).



What about the effects of new exposures in adolescence? Prior exposures when combined with novel exposures can often create the perfect recipe for disaster, especially in those who are already at a disadvantage when it comes to health. As mentioned previously, EDCs can produce a wide range of effects in all age groups; however, in adolescents, current research expresses that exposure to EDCs is linked with:

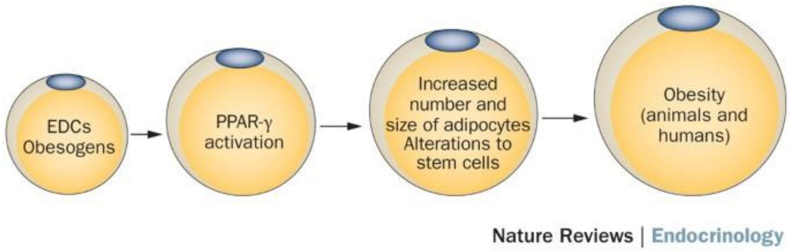
- An earlier onset of puberty (Massart et al., 2006; Yum et al., 2013)
- Problems with brain functions like memory, learning, and social behaviour (Pinson et al., 2016)
- The initiation and worsening of obesity (Heindel, 2003)
- Behaviours associated with attention-deficit/hyperactivity disorder (ADHD) (Shoaff et al., 2020)
- Alterations in breast tissue development (Binder et al., 2018)
- Uterine diseases, fibroids, and endometriosis (McLachlan et al., 2006)

This list is not comprehensive, and in fact, there is enough evidence to fill up the rest of this page and more as EDCs have been found to affect multiple bodily systems in different ways. It is also important to keep in mind that different EDCs (e.g., phthalates versus bisphenol A) affect the body in diverse ways and with varying intensities. At the same time, one should note that individual differences also come into play, meaning that certain people will suffer worse consequences while others may fare better with fewer explicit symptoms.

Adulthood: Previous Exposure Adding onto New Exposures

The transition from adolescence to adulthood is less dramatic than the jump from childhood to adolescence; however, what an individual accumulates in their previous years of life may and often does persist into their newer years of life, especially if there is an absence in lifestyle changes.

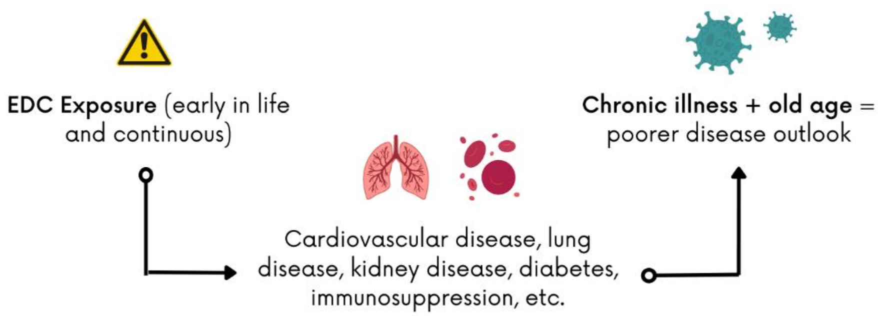
The Obesity Epidemic. In the previous section, it was briefly mentioned that EDCs were found to increase the risks of obesity in teenagers. In adulthood, the same story resumes (Darbre, 2017; Hatch et al., 2010). A specific group of EDCs has estrogen-like effects on the body. Estrogen is produced naturally in both men and women, but in higher quantities in women, hence the term "female hormone". Estrogen and estrogen-like compounds produce similar effects on the body: they favor fat cell development in specific body areas (namely the hips, pelvis, and breasts), regulate emotions, modulate brain functions, and control cardiovascular flow (*Estrogen's Effects on the Female Body*, n.d.).



One report published in the journal of *Diabetes & Endocrinology* divulged the widespread effects of EDCs in adulthood which stated that in addition to obesity, EDCs expose adults to higher risks of developing problems related to glucose tolerance, cardiovascular function, fertility, breast cancer, prostate cancer, and cognitive deficits (Kahn et al., 2020).

How EDCs Aggravate the Health Challenges Faced in Old Age

The natural aging process decelerates many bodily systems, making them more vulnerable to all kinds of health-related inflictions. EDCs often exacerbate the symptoms that are commonly associated with old age, including cognitive decline, diminished cardiovascular health, diabetes, and suppressed immunity.



EDCs and Immunity. One recent meta-study set out to assess the relationship between EDC exposure and the COVID-19 immune response in individuals over the age of 65 years (Adegoke et al., 2021). First, the numbers provided strong evidence for a worse disease outlook in (a) individuals over the age of 65 in general, (b) individuals with pre-existing chronic conditions, and (c) individuals who fit in both of the previously stated categories. The study also found that individuals who are exposed to high levels of EDCs faced higher mortality rates after contracting the recent coronavirus. Additionally, it was stated that the mechanism of action here is not idiosyncratic, but rather generalizable to other diseases as well. For example, in animal models who were exposed to EDCs, mortality and disease severity rose following an Influenza A virus (H1N1) infection.

Cognitive Decline. The aging of the brain and the loss of its functions can often be prevented unless external factors disallow it. This, of course, refers to EDCs, some of which have been linked with the impedance of neurogenesis and neuroplasticity (Weiss, 2007).

Key Takeaways

Although in this text we refer to all EDCs in a grouped manner, it is important to note that not all EDCs act alike. EDCs can mimic a variety of hormones, and similarly to how our natural hormones are diverse in terms of form and function, so too are EDCs. In conjunction to this, it must be kept in mind that prior exposures and novel exposures often coalesce to generate unique symptom profiles. For example, one individual may be exceedingly and consistently exposed to EDCs from birth to adulthood, whereas another may have been exposed at birth, but only encountered minute levels of EDCs due to lifestyle differences. In such a case, many sub-scenarios can ensue:

- Person A might have worse symptoms than person B due to a difference in cumulative exposure, or;
- Person A might have fewer symptoms than person B due to differences in genetics, health conditions, or type of EDCs that they were exposed to, or;
- Person A and B might both be completely normal, experience few to no effects during their lifespan, but still exhibit the possibility of transmitting cumulated EDCs to their offspring, or;
- Person A and B may both experience negative effects, etc.

The list can go on, but the point of this thought exercise is to depict the variety of scenarios that can take place when it comes to EDC exposure. Current literature does a fairly decent job with a lot of robust evidence available, but more is to come. In the meantime, some key takeaways from this article should include that:

- There is strong evidence about the health risks of EDC exposure.
- Avoiding EDCs is important for individuals from all age groups.

In the next parts of the series, we will discuss how endocrine disruptors disturb the environment and solutions to reduce your exposure to them.

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