



Scientific Facts on **Endocrine Disruptors**

Source document:

IPCS (2002)

Summary & Details:

GreenFacts

Context - Some chemicals, both natural and man-made, can interfere with the hormonal system. They are called 'endocrine disruptors'. The most controversial issue is whether low level exposures to such chemicals can have adverse effects. Have endocrine disruptors affected wild life and our hormonal system? How much do we know so far?

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This Digest is a faithful summary of the leading scientific consensus report produced in 2002 by the International Programme on Chemical Safety (IPCS):
"Global Assessment of the state-of-the-science of Endocrine Disruptors"

The full Digest is available at: <https://www.greenfacts.org/en/endocrine-disruptors/>

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- Each question is answered in Level 1 with a short summary.
- These answers are developed in more detail in Level 2.
- Level 3 consists of the Source document, the internationally recognised scientific consensus report which is faithfully summarised in Level 2 and further in Level 1.

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1. What are Endocrine Disruptors (EDCs)?

1.1 The endocrine system is a set of glands and the hormones they produce, which help guide the development, growth, reproduction, and behaviour of animals and humans. Some hormones are also released from parts of the body that are not glands, such as the stomach, intestines or nerve cells, and act closer to where they are released.

1.2 Some chemicals, both natural and man-made, can interfere with endocrine glands and their hormones or where the hormones act - the target tissues. These chemicals are called 'endocrine disruptors' or 'endocrine disrupting chemicals' (EDCs).

1.3 The presence of EDCs in our environment raises concerns because:

- harmful effects have been observed on reproduction, growth and development in certain species of wildlife,
- there are increases in some human reproductive disorders and some cancers which could be related to disturbance of the endocrine system, and
- adverse effects from some environmental chemicals known to act on the endocrine system have been observed in laboratory animals.



See also GreenFacts' Digest on Dioxins [see <https://www.greenfacts.org/en/dioxins/index.htm>]



See also GreenFacts' Digest Polychlorinated biphenyls [see <https://www.greenfacts.org/en/pcbs/index.htm>]

2. How do EDCs act?

2.1 Endocrine disrupting chemicals (EDCs) can act in a number of ways in different parts of the body, they may:

- reduce the production of hormones in endocrine glands,
- affect the release of hormones from endocrine glands,
- copy or counteract the action of hormones at target tissues, or
- speed up the metabolism of hormones and so reduce their action.

In many cases, it is not yet clear exactly how EDCs act, even in some cases where a link has been shown between EDC exposure and an adverse effect.

2.2 What has been established mainly in the laboratory is:

- exposure to EDCs during early development (e.g. in the womb, during childhood) may cause permanent effects,
- exposure to EDCs during adult life may not show any significant or visible effects,
- exposure to EDCs may produce varying effects depending upon the stage of the life cycle or even the season, and
- unforeseen effects may occur in the target tissues due to endocrine interactions.

2.3 The most controversial issue is whether low level exposures to EDCs can have adverse effects. Some scientists have found effects at low doses in laboratory experiments, while others have not been able to corroborate these findings. Some say that traditional testing methods are not robust enough to pick up low-dose effects. These are important issues to resolve because of the presence of low levels of EDCs in the environment.

3. Do EDCs affect wildlife?

Certain endocrine disrupting chemicals (EDCs) have affected reproduction in wildlife populations. While some EDCs disappear quickly from the natural environment, others persist and these have been the most studied. Aquatic animals are particularly affected, especially carnivores, because they are at the top of the 'food chain' where high levels of persistent chemicals build up over time.

3.1 Some examples of effects in wildlife include:

- reduction in the population of Baltic seals,
- eggshell thinning in birds of prey,
- decline in the alligator population in a polluted lake,
- reduction in frog populations,
- adverse effects on fish reproduction and development, and
- development of male sex organs in female marine animals such as whelks and snails.

The effects in seals, birds and alligators are most likely due to EDCs such as PCBs, dioxins, DDT/DDE and other pesticides that contain chlorine. The effects on fish appear to be caused by oestrogens in the water flowing from sewage treatment works into rivers. The effects on marine whelks and snails are due to the use of TBT – tributyltin -in anti-fouling paints on boats and ships.

3.2 Overall, the current evidence shows that certain effects seen in wildlife can be attributed to EDCs. Most effects have been observed in highly contaminated areas. Moreover, in many cases where wildlife has been affected, it is still not known how the EDC is working to bring about these effects.

4. Do EDCs affect human health?

At the moment there is no firm evidence that environmental endocrine disrupting chemicals (EDCs) cause health problems at low levels of exposure. However, the fact that high levels of chemicals can impair human health through interferences with the endocrine system, raises concerns about the possible harmful effects of mixtures of so called endocrine disrupting chemicals, even at low background-levels.

4.1 It has been suggested that in humans EDCs may be causing:

- reductions in male fertility,
- abnormalities in male reproductive organs,
- female reproductive diseases,
- earlier puberty, and
- declines in the numbers of males born.

4.2 Some EDCs may affect development of the nervous system and the immune system.

4.3 As yet, there is no substantial evidence to show that exposure to environmental EDCs causes cancer, such as breast cancer, uterine cancer, testicular cancer, prostate cancer or thyroid cancer.

4.4 However, it is plausible that EDC exposure could be harmful to humans and could be a reason for some of the increases in human disorders mentioned above, but more research is needed to investigate this possibility.

5. What are potential sources of EDC exposure?

Most of the information on exposure to endocrine disrupting chemicals (EDCs) has focused on the presence of so-called 'persistent organic pollutants' in lakes, rivers and seas. Exposure of humans can occur via contaminated food or water, combustion sources – from industrial processes and burning of waste – and chemicals used in consumer products. Humans are also exposed to natural oestrogens from plants that are found in foods like soya.

6. Conclusions

6.1 There is some evidence that humans are vulnerable to endocrine disrupting chemicals (EDCs) at high levels of exposure. However, effects from exposure to long-term and low-level EDCs have yet to be proven.

6.2 Evidence suggests that wildlife has been harmed by EDCs, especially aquatic species in highly polluted areas.

6.3 Present knowledge of effects on wildlife and humans is insufficient. Further research is needed to better understand this important issue.