



# Sperm in hormonal trouble?

Endocrine active substances from the environment are the deemed culprits for a variety of health disorders in humans. However, whether that is really the case is disputed. Illustrations: André Gottschalk

What is it with the sperm? This question was asked not so long ago by Nicholas Kristof from the "New York Times" just to immediately provide the answer himself: that it is in decline. The prominent author referred to a scientific study from the year 2017, according to which in the western world sperm counts indicated an up to 59 percent decline in viable sperm over a period covering the years 1973 to 2011. In the media studies like these regularly cause a great stir. There is talk of a sperm crisis, even of "spermageddon". Kristof stated some cells to have two heads while others swam around in circles to conclude that something alarming is happening between our legs.

Some scientists and journalists are quick to claim hormonally active substances to be the cause for such reports. According to them, it is the uptake of hormonal active substances from the environment that causes disruption of sensitive hormonal control loops, for example, by imitating or blocking natural hormonal action. In cases where such action causes bodily harm one speaks of endocrine disruptive chemicals, EDCs for short. Examples of much discussed hormonally active substances are Bisphenol A or phthalates used for the production of plastics or as plasticisers respectively. These can act similarly to oestrogen, the female sex hormone, if sufficiently high concentrations are present.

**A LONG LIST OF SUFFERING**

The list of health issues supposedly triggered by EDCs also includes, besides the aforementioned reduced sperm counts, thyroid disorders, diabetes, obesity, among others. The list of ailments seems almost as long as that of the suspicious substances. Yet these kinds of claims should be taken with a pinch of caution as the

case is not that clear. The connection between physical illness and hormonal cause is often based on mere assumption rather than an established fact. Even the supposedly clear cut linkage between "feminising" hormonally active substances and declining sperm counts is less clear than it might appear at first glance. Amongst the difficulties encountered when trying to establish a real or alleged sperm crisis is that the number of ejaculated sperm cells can be subject to tremendous individual fluctuations. Normal counts can cover a range between 15 million to 200 million sperm per millilitre of seminal fluid. What is more, different laboratories count differently, counts can be subject to large regional differences and many of the corresponding studies are subject to methodological deficiencies. It gets even more complicated once chemical substances are included. A recent assessment of the scientific evidence regarding sperm quality and production provides a

more cautious conclusion by stating: "Overall, the available data do not allow us to conclude that human semen quality is deteriorating worldwide or in the western world, but that a trend is observed in some specific areas."

**A CONCLUSION BASED ON CONFUSION**

"We have to take potential EDCs seriously," says biologist and toxicologist Dr Tewes Tralau from the German Federal Institute for Risk Assessment (BfR). His take of why this topic has so many people concerned is that many of the purported conclusion are based on epidemiological observations, which are difficult to interpret, particularly for laymen. Such data are often used for trying to establish potentially harmful effects of chemical substance exposure on public health. This then produces buzzwords like the one about the sperm crisis. However, there is a problem with this. In many instances, the corroborated links between cause and effect are postulated rather than scientifically validated. Although epidemiological studies can provide hints about possible correlations, they cannot determine cause and effect. Failing to acknowledge this will cause confusion instead of conclusion.



"Many of the chemicals that are important to humans are scientifically assessed with regard to whether and to what extent they could have an effect on the hormone system," says Tralau. This includes pesticide active substances, biocides as well as industrial chemicals produced in large amounts that require testing according to the European REACH legislation. Also toys, cosmetics, food contact materials and medical devices are examined and evaluated accordingly. For example, for materials with food contact there are set limit values of how much migration of a given substance is tolerable. If these values are observed there is no health risk to be expected.

**NOT ALL HORMONAL ACTIVITY IS HARMFUL**

Not every hormonally active substance is harmful. The fact that a substance affects the endocrine system does not mean that it necessarily causes health effects. It may be, for example, that the effect in question is only minor or that the body can effectively compensate for it. In some instances the effect might even be desired. "The crucial point about an endocrine disruptor is that the respective substance has an unwanted impact on human health and that this effect cannot be compensated for anymore," says Tralau.

The scientist is convinced that in Germany there already is a very high level of protection with little risk for consumers of being exposed to established endocrine disruptors at



**“In Germany there is already a very high level of protection. Nevertheless there is a need for research.”**

DR TEWES TRALAU, BFR

harmful levels. Nevertheless, there is still need for research. "Hormonal effects are not always easy to detect," Tralau points out. "While test systems exist for sex hormones and crucial aspects of the thyroid axis, there is need for better coverage of the hormonal aspects of the immune system, metabolism as well as the developmental system."

New methods and models for endocrine disruptor assessment are also the focus of the EDCMET project. The abbreviation stands for the large-scale EU project "Metabolic effects of Endocrine Disrupting Chemicals: novel testing METHods and adverse out-

come pathways" which was launched in 2019. Within this project the BfR is establishing methods for the early detection of liver damage. "We fill knowledge gaps," Tralau says. "This is crucial, even if it is not the fate of humanity that is at stake." —

**More information**



BfR FAQ  
"Endocrine disruptors"



BfR YouTube channel @bfr\_bund  
Dr Tewes Tralau on endocrine  
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