

**Communication 056/2026**

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## **Study on the links between early childhood intake of dioxins as well as PFAS and semen quality in young men**

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There is evidence to suggest that early intake of chemicals from the groups of dioxins and perfluoroalkyl substances (PFAS) in the womb and during infancy could impair semen quality in adulthood. A team of scientists from the German Federal Institute for Risk Assessment (BfR) and the University of Ulm has now investigated this link. The 98 mother-son pairs included in the study formed a subgroup of the Ulm Birth Cohort Study, which began in 2000.

The result: no link could be established between early intake of PFAS and semen quality later in life. Whilst a negative trend was observed for dioxins, this could not be statistically confirmed. The authors emphasise that, due to the small sample size, possible systematic errors (bias) and confounders, this study does not rule out a link with certainty.

The study was published in the “Journal of Hazardous Materials Advances”.

Link to the study: <https://www.sciencedirect.com/science/article/pii/S2772416626005474>

As both groups of compounds accumulate in the food chain, they are mainly taken up via food of animal origin such as meat, eggs and fish. Both dioxins and PFAS are taken up in significant quantities via breast milk. In order to investigate the possible consequences of this intake on semen quality, exposure to both groups of substances had to be measured simultaneously.

Maternal blood serum collected at the time of birth and breast milk collected six weeks later were initially stored in deep freeze. To determine the concentrations of PFAS and dioxins, the samples were then thawed and analysed more than 20 years later. Measurements were taken of dioxins (PCDD, PCFD and dioxin-like PCBs) in the breast milk and PFAS in the serum. These values were used to estimate prenatal intake and total intake during the breastfeeding period. The semen quality of the male participants was assessed approximately 20 years after the birth. The evaluation examined whether there was a correlation between the two parameters – exposure and semen quality.

As observed in many other studies, the intake of dioxins and PFAS has declined significantly in Germany since the turn of the millennium. No negative association was found between early childhood intake of PFAS (prenatal and during breastfeeding) and parameters of semen quality, such as sperm concentration. This did not confirm the results of a Danish study published in 2022.

A negative trend was observed for dioxins, although this was not statistically significant. There was no evidence to suggest that critically low sperm concentrations (below 15 million per millilitre) were associated with high dioxin exposure. Overall, however, due to the small sample and possible systematic errors (bias) and confounders, the study cannot rule out a negative association with dioxins. Such an effect is regarded as the most sensitive dioxin effect at higher intakes (for example, in the Seveso accident in 1976) and is supported by findings from animal studies. The European Food Safety Authority (EFSA) could not consider this new study in its recent update of the dioxin assessment.

#### **Further information on PFAS and dioxins**

Questions and answers on PFAS

<https://www.bfr.bund.de/en/service/frequently-asked-questions/topic/here-to-stay-per-and-polyfluoroalkyl-substances-pfas-in-food-and-in-the-environment/>

Questions and answers on dioxins and PCBs in food

<https://www.bfr.bund.de/en/service/frequently-asked-questions/topic/frequently-asked-questions-about-dioxins-and-pcbs-in-food/>

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