

## Communication 022/2024

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### **Hormonally active chemicals: a question of dose**

The dose makes the poison is the “fundamental law” of toxicology, the science of poisons. Yet, are there substances for which there is no “safe” dose, where even the smallest amount is potentially harmful? This question is subject of a controversial debate which, amongst others, also comprises hormonally active chemicals. As xenobiotics such substances can affect the hormonal system and impair health. If this is the case they are referred to as endocrine disruptors. While there are repeated claims that for such substances there is no safe dose many scientists dispute this.

A team of researchers from the German Federal Institute for Risk Assessment (BfR) has now put the question of this dispute to the test. In a case study they analysed toxicological data for four representatively selected endocrine disruptors in order to determine possible threshold values for adverse health effects. The results of the study are published in the journal “Archives of Toxicology” (<https://link.springer.com/article/10.1007/s00204-024-03748-9>). The data show that, sufficient data pending, threshold values can indeed be determined for the substances assessed and most likely for many other endocrine disruptors also. The dose makes the poison – also for endocrine disruptors.

The BfR researchers assessed dimethomorph, metiram, propiconazole and epoxiconazole as examples of four pesticide active substances. All substances were previously identified as established or probable endocrine disruptors in the EU based on their mode of action. Due to the extensive regulatory data requirements for these substances the respective assessment could refer to broad and reliable dataset.

The substances tested interfere with hormone metabolism in various ways. Dimethomorph acts as an antagonist of male sex hormones (androgens), while propiconazole and epoxiconazole influence several hormones and metiram inhibits the formation of thyroid hormones. For all four substances, their adverse effects only occurs above a certain threshold - the higher the dose, the greater the effect.

Based on their findings the BfR researchers suggest to scrutinise and critically re-evaluate any “no threshold”-concept for endocrine disruptors. Sufficient data pending risk thresholds for endocrine disruptors can principally be determined hence allowing for a science-based risk assessment.

**Questions and answers on endocrine disruptors:**

[https://www.bfr.bund.de/en/questions\\_and\\_answers\\_on\\_endocrine\\_disruptors-50804.html](https://www.bfr.bund.de/en/questions_and_answers_on_endocrine_disruptors-50804.html)

## About the BfR

The German Federal Institute for Risk Assessment (BfR) is a scientifically independent institution within the portfolio of the Federal Ministry of Food and Agriculture (BMEL) in Germany. The BfR advises the Federal Government and the States ('Laender') on questions of food, chemicals and product safety. The BfR conducts independent research on topics that are closely linked to its assessment tasks.

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