Study elucidates the mechanism underlying “Cocktail Effects” of endocrine disrupting chemicals

Endocrine disrupting chemicals might be involved in fertility disorders for they impair the function of human sperm. Scientists from Germany and Denmark have now taken another, closer look at the chemical’s action in sperm; in particular, at the so-called cocktail effect. The results: If the chemicals teams up, their individual actions do not simply add up, but amplify each other.

In our daily life, we incorporate a complex mixture of various endocrine disruptors - each individual chemical, however, only in a very low, rather ineffective concentration. Despite the miniscule concentrations of the individual components, cocktails of endocrine disruptors, such as those found in blood, have a pronounced action in sperm. "The results of our new study can be easily summarized," says Dr. Christoph Brenker from the CeRA, head of the study: "If the chemicals teams up in cocktails, their individual actions do not simply add up, but amplify each other.

In pharmacology, this phenomenon is called "synergism": one plus one does not make two, but three! The researchers found that also the female hormones have a synergistic action in sperm. "The endocrine disruptors just imitate the female hormones - including their synergistic interaction," said Brenker.

Whether the use of endocrine disrupting chemicals should be further restricted is a much debated question. The new results are important for assessing their toxic action: so far, "safety limits" are determined only for each chemical individually. Considering that in cocktails, the actions of individual chemicals become amplified, such an isolated risk assessment is prone to underestimate the risk potential of endocrine disrupters. In fact, synergistic actions of endocrine disruptors have also been observed in other cells and tissues.
Cocktails of endocrine disrupting chemicals affect the function of human sperm, which might interfere with the fertilization process.

Image: R. Pascal, Caesar, Bonn