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Chemical mixtures: Challenges for research and risk assessment

In the last decades, evidence has become available to show that the combined effects of endocrine disruptors belonging to the same category (e.g., estrogenic, antiandrogenic or thyroid-disrupting agents) can be predicted by using dose addition. This is true for a variety of end points representing a wide range of organizational levels and biological complexity. This is also true for chemicals acting by differential mechanisms of actions to produce the same overall adverse effect. An example of this arises from comprehensive developmental rat studies, in which chemicals inhibiting testosterone synthesis are combined with chemicals blocking the androgen receptor, causing an overall additive effect on male reproductive health endpoints. Mixtures of endocrine disruptors are able to produce a significant effect, even when each chemical is present at low doses that individually do not induce observable effects. The highlights and conclusions on these mixture studies will be presented. All taken together, the accumulated evidence highlights the urgent need for finding alternatives to the current customary chemical-by-chemical approach to risk assessment for endocrine disruptors. Instead, we should consider group-wise regulation of classes of chemicals and various methods and research needs for grouping of chemical will be highlighted. Furthermore, a major limitation to proper mixture risk assessment is lack of knowledge on single compounds and future research should focus on alternative strategies of risk assessing chemicals.

Biography

Anne Marie Vinggaard conducts research with the overall aim of improving chemical food safety and safety of consumer products. She has more than 25 years of experience in research within molecular toxicology with a focus on mechanisms of toxicant action. Developmental and reproductive toxicology and molecular endocrinology are her major fields of expertise. She has 4 yrs of experience from a pharmaceutical company, developing a strategy for early toxicity testing. She has 84 ISI journal publications; Citations excl. self-citations: 2351 and H-index: 31.

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