Current chemical risk assessment system is not up to par, researchers say

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How much is an "acceptable dose" of a pollutant? Are existing studies to measure safety adequate? A systematic literature review by The University of Texas Health Science Center at San Antonio (UT Health

San Antonio) suggests that the current system of chemical risk assessment is inadequate and contradictory. The result, say the authors, is an underestimation of the levels of flame retardants and other pollutants needed to cause harmful health effects.

The journal *Reviews on Environmental Health* published the findings in May. The authors, who included a Canadian environmental research analyst, reviewed 74 toxicology studies (42 in vitro and 32 in vivo) and 74 epidemiological studies. These research works analyzed chemical groups that at high enough levels are linked with disruption of the endocrine system (such as the thyroid) and increased risk of neurodevelopmental deficits (such as autism).

"Our study originated in response to increasing trends in the environmental presence and human body burdens of several types of flame retardants used in products such as televisions, drapes and mattresses," said study corresponding author Raymond F. Palmer, Ph.D., professor in the Department of Family and Community Medicine at UT Health San Antonio. "These trends were emerging parallel to an expressed increase in prevalence and burden of thyroid and neurodevelopmental deficits."

The team sought to test the hypothesis that a method called Margin of Exposure (MOE) to determine acceptable dose is inadequate and potentially harmful because MOE may underestimate human risk. The researchers conducted a review of studies associating levels of pollutant dose with harmful effects in vivo (in the body), in vitro (in a test tube or petri dish), and in epidemiology in animal and human study populations.

The study focused on chemicals classified as non-thyroid endocrine disruptors, developmental neurotoxins and thyroid disruptors.

"Overall, our results suggest a systematic toxicology vs. epidemiology

difference that is to the detriment of regulatory agency efforts to establish standards for safety in people," Dr. Palmer said. The authors seek to kindle dialogue toward reform of safety standards.

The 1976 Toxic Substances Control Act (TSCA) considered approximately 62,000 chemicals as "existing" and not subject to testing or regulation unless proven to "present an unreasonable risk of injury to health or the environment," said co-author Joel E. Michalek, Ph.D., professor of population health sciences at UT Health San Antonio. More recent reports put the number of chemicals at 83,000 and assert that the TSCA laws are outdated and need reform.

More information: Tom Muir et al, Determination of safe levels of persistent organic pollutants in toxicology and epidemiology, *Reviews on Environmental Health* (2022). DOI: 10.1515/reveh-2021-0105

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