Safe levels of major toxins unknown

An overview of the epidemiologic data shows that there is no clearly safe level of exposure to four of the most common environmental toxins - lead, radon, tobacco smoke and byproducts of drinking-water disinfection resistant to natural and human-induced environmental perturbations.

Environmental epidemiology offers the promise of strengthening human health protection. In contrast with animal studies, epidemiologic studies can be used to assess health risks at exposure levels prevalent in human populations. Thus when available, epidemiologic data should be used to develop environmental standards and to assess the adequacy of existing standards based on experimental animal studies.

In a new report, researchers overviewed epidemiologic studies of four widespread toxins with potential health effects: lead, radon, tobacco smoke and byproducts of drinking-water disinfection. Although most regulatory agencies assume the existence of a threshold level below which the exposures to these toxins can be considered as “safe”, according to the report there is growing evidence that even exposure levels below the safety thresholds can have severe health consequences.

For instance, the World Health Organisation urges that at least 98% of children have blood levels of lead less than 100µg/l. However, epidemiologic studies of children in several countries found inverse relationships between IQ and blood lead levels below 100µg/l, with no evidence of a threshold.

Most countries have adopted a radon concentration of 200–400 Bq/m3 for indoor air as reference level above which mitigation measures should be taken to reduce the level in homes. Epidemiologic evidence suggests that radon exposure below this level also increases the risk of lung cancer. Furthermore, there are studies that show that prolonged exposure to low levels is more hazardous than shorter exposure to high levels.

When it comes to disinfection byproducts, namely trihalometanes, in most countries the maximum allowable level in water ranges from 80-100µg/l. However, recent analysis of several epidemiologic studies showed that even levels above 1µg/l of trihalometanes may increase the risks of bladder cancer.

Finally, in the case of tobacco smoke, growing evidence suggests that low-level, secondhand exposure or “passive smoking” during pregnancy can reduce fetal growth, a long-recognized danger of active smoking.

Based on their findings, the authors suggest that risk assessments should not assume thresholds for noncarcinogens nor for carcinogens, especially for toxins for which epidemiologic data do not exhibit apparent thresholds and those not yet adequately tested for developmental toxicity.

The public depends on decision makers, scientists, and regulators to restrict exposure to widespread toxins that have known or suspected adverse health effects. In the case of the four major widespread toxins reviewed here, emerging evidence indicates that exposures must be virtually eliminated to protect human health.


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