



Massachusetts Department of
Environmental Protection

f a c t s h e e t

Exposure to Chemicals in Drinking Water by Infants and Young Children

When considering risk posed by environmental contaminants in drinking water, exposures to infants and young children are particularly of concern. Due to their smaller size relative to adults and the fact that they are still growing and developing at a high rate, children may often be more highly exposed and/or more susceptible than adults to the same chemical.

Children's bodies differ from adult bodies in the amount of water they need as well as in the way their bodies process chemicals. They consume more water, eat more food, and breathe more air per unit of body weight than do adults. According to the Agency for Toxic Substances and Disease Registry (ATSDR), during the first six months of life, an infant drinks seven times more liquids per unit of body weight than an adult (ATSDR, 2012). Exposure to chemicals that might be present in drinking water would also be proportionately higher.

Furthermore, because infants and young children are still developing, their capacity to break down or "metabolize" chemicals in the body may not be fully developed. Some chemicals may be metabolized more slowly or differently in children than in adults and might be more toxic. Metabolism can also facilitate elimination of chemicals from the body. Thus, if children metabolize a chemical more slowly, the chemical might remain in their body for a longer period of time. According to ATSDR, studies have shown that in the first six months of life, chemicals that enter an infant's body may persist in the body 3-9 times longer than for an adult (ATSDR, 2012).

In addition to the biological reasons for increased susceptibility discussed above, when exposure to a carcinogen occurs early in life, there are many more years of life expectancy during which a latent cancer may occur than with later-life exposure. Thus, the probability that an infant or young child that is exposed in early life will experience an effect sometime over their lifetime is even higher than when exposure occurs during adulthood.

For the many reasons discussed above, additional precaution should be taken to limit exposure to chemicals in drinking water to infants and young children, including from bottle-feeding. While breast-fed infants may also be exposed to some chemicals that pass into breast milk, these infants benefit from any exposure reduction taken by the mother and from the numerous health benefits of nursing.

References:

ATSDR (Agency for Toxic Substances and Disease Registry). February 2012. ATSDR Case Studies in Environmental Medicine Principles of Pediatric Environmental Health. US Department of Health and Human Services. (weblink at: https://www.atsdr.cdc.gov/csem/ped_env_health/docs/ped_env_health.pdf.)

US EPA (US Environmental Protection Agency). March 2005. Supplemental Guidance for Assessing Susceptibility from Early-Life Exposure to Carcinogens. EPA/630/R-03/003F. (weblink at: https://www.epa.gov/sites/default/files/2013-09/documents/childrens_supplement_final.pdf#:~:text=The%20Supplemental%20Guidance%20addresses%20a%20number%20of%20issues,carcinogens%20acting%20through%20a%20mutagenic%20mode%20of%20action.)

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Produced by the
Bureau of Water Resources
Drinking Water Program
December 2022

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