



## Selected Research for Healthcare Providers on Incidence, Prevalence, Severity, and Response to Blood Lead Concentrations above the Reference Value

Researchers are continuously improving our understanding of the risks and health effects of lead exposure. In recent years, there has been a greater focus on the effects of low-level lead exposure. While we know that there is no known safe level of lead exposure in children, the latest findings show that low-level lead exposure can lead to serious, irreversible, neurocognitive deficits in children. Below, we have compiled additional sources describing the effects of lead exposure. **Links to the full text of these and more articles are available at <https://nvclppp.org/provider-portal/resources-and-references/>**

### New Findings of the Effects of Low-Level Lead Exposure

Shefa, S. T., & Héroux, P. (2017). Both physiology and epidemiology support zero tolerable blood lead levels. *Toxicology Letters*, 280, 232–237. <https://doi.org/10.1016/j.toxlet.2017.08.015>

- Summarizes findings on chronic low-level lead exposure and the development of neurobehavioral and renal disorders
- Research shows negative health outcomes at blood lead levels as low as 2 µg/dL, suggesting that even very low blood lead concentrations can have negative impacts on health – especially in children.

Earl, R., Burns, N., Nettelbeck, T., & Baghurst, P. (2015). Low-level environmental lead exposure still negatively associated with childrens cognitive abilities. *Australian Journal of Psychology*, 68(2), 98-106. [onlinelibrary.wiley.com/doi/full/10.1111/ajpy.12096](http://onlinelibrary.wiley.com/doi/full/10.1111/ajpy.12096)

- Describes intellectual deficits of lead-exposed children in detail
- Significant negative correlation between blood lead concentration and IQ, even when controlling for socioeconomic status, environmental conditions, and familial variables
- Found irreversible changes deleterious to cognitive development, challenging the perception that IQ reductions resulting from lead exposure were not serious

### Fundamentals of Lead Exposure

Ruckart, P. Z., Jones, R. L., Courtney, J. G., LeBlanc, T. T., Jackson, W., Karwowski, M. P., Cheng, P. Y., Allwood, P., Svendsen, E. R., & Breyse, P. N. (2021). Update of the blood lead reference value – United States, 2021. *Morbidity and Mortality Weekly Report*, 70(43), 1509–1512. <https://doi.org/10.15585/mmwr.mm7043a4>

- Provides updates to the blood lead reference value (BLRV) and the rationale behind the decision. As of 2021, the BLRV was lowered from 5 µg/dL to 3.5 µg/dL based on the 97.5th percentile of blood lead levels for children aged 1–5 years
- The updated BLRV is not a health-based standard – there is no safe level of lead in the body
- Provides guidance on how to use the BLRV. The BLRV should be used to help determine whether follow-up actions are needed for a child and to help prioritize high-risk communities

Collin, S.M., Venkatraman, S.K., Vijayakumar, N., Kanimozhi, V., Arbaaz, S.M., Stacey, R.G.S., Anusha, J., Choudhary, R., Lvov, V., Tovar, G.I., Senatov, F., Koppala, S., Swamiappan, S., (2022). Bioaccumulation of lead (Pb) and its effects on human: A review. *Journal of Hazardous Materials Advances*, 7, Article 100094. 10.1016/j.hazadv.2022.100094.

- Lead is a prevalent heavy metal that, when absorbed by the body, can cause acute and chronic damage to every body system. Children are more likely to be affected by the toxicity of lead due to their developing bodies
- Documented effects of lead absorption include neural defects in early childhood, abdominal pain, vomiting, anemia, chronic kidney disease, preterm birth, low birth weight, coma, and even death
- Early detection of lead poisoning and blood lead level monitoring may help prevent significant health consequences

Warniment, C., Tsang, K., & Galazka, S. (2010). Lead poisoning in children. *Am Fam Physician*, 15(81), 6th ser., 751-757. Retrieved from [www.aafp.org/afp/2010/0315/p751.html](http://www.aafp.org/afp/2010/0315/p751.html)

- Prevalence and severity of lead poisoning has steadily decreased since 1970s
- Venous blood draw is the preferred method but capillary tests with confirmation are an acceptable alternative
- To reduce lead absorption, improve childhood nutrition focusing on diets high in Iron, Calcium, and Vitamin C
- Prevention is best achieved with education and avoidance of lead-contaminated products