

Children more vulnerable to harmful effects of lead

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Contrary to prevailing assumptions, children are more vulnerable to the harmful effects of lead exposure at the age of 6 than they are in early childhood, according to a Cincinnati Children's Hospital Medical Center study to be presented May 4 at the annual meeting of the Pediatric Academic Societies in Honolulu.

“Although we typically worry about protecting toddlers from lead exposure, our study shows that parents and pediatricians should be just as, if not more concerned about lead exposure in school-aged children,” says Richard Hornung, Dr.P.H., a researcher in the division of general and community pediatrics at Cincinnati Children's and the study's main author.

The researchers found that blood lead concentrations (BPb) at age 6, compared to those at younger ages, are more strongly associated with IQ and reduced volume of gray matter in the prefrontal cortex of the brain, which is involved in planning, complex thinking and moderating behavior.

Overall, the children's average BPb levels peaked at 13.9 micrograms of lead per deciliter of blood at age 2, then declined to an average of 7.3 micrograms per deciliter by age 6. For children, however, with the same average blood lead levels through age 6, those who received more of their exposure at age 6 had substantially greater decrements in intellectual ability than those more heavily exposed at age 2.

“Lead toxicity is difficult to recognize in a clinical setting, but it can have devastating effects,” says Bruce Lanphear, M.D., director of the Cincinnati Children’s Environmental Health Center and the study’s senior author. “We found that children may be particularly vulnerable to lead exposure just as the child approaches school age, during a period of rapid cognitive development.

Because IQ tests were not administered to children older than 6, it is unknown whether older children are even more vulnerable to environmental lead exposure, according to Dr. Hornung.

Approximately 310,000 U.S. children age 1 to 5 years have blood lead levels greater than 10 micrograms per deciliter, the level at which the Centers for Disease Control and Prevention recommends public health actions be initiated. But research has consistently shown that blood lead levels considerably lower than 10 micrograms per deciliter are associated with adverse effects.

Federal and state regulatory standards have helped to minimize or eliminate the amount of lead in U.S. consumer products and occupational settings, according to the National Institute of Environmental Health Sciences (NIEHS). Today, the most common sources of lead exposure in the United States are lead-based paint in older homes, contaminated soil, household dust, drinking water, lead crystal and lead-glazed pottery.

While extreme lead exposure can cause a variety of neurological disorders, such as lack of muscular coordination, convulsions and coma, lower lead levels have been associated with measurable deficits in children’s mental development and behavioral problems. These include hyperactivity, or ADHD, lowered performance on intelligence tests, and deficits in fine motor function, hand-eye coordination and reaction time. Chronic lead exposure in adults can result in increased blood pressure,

decreased fertility, cataracts, nerve disorders, muscle and joint pain as well as problems with memory or concentration.

Source: Cincinnati Children's Hospital Medical Center

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