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Studies show danger of even small amounts of lead in children's blood

Levels well below the CDC 'threshold' are linked to kidney damage and other harmful effects.

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High doses of lead have for some time been linked to chronic kidney damage. But a recent study out of Johns Hopkins Children's Center found that even small levels of lead exposure may be damaging to children's kidneys.

The report, published January in the Archives of Internal Medicine, looked at the records of 769 healthy youth ages 12 to 20 with average blood lead levels of 1.5 micrograms per deciliter (well below the 10 microgram "threshold" of concern per the Centers for Disease Control and Prevention).

Researchers found that children with levels of just 2.9 micrograms per deciliters had worse kidney function than those with lower levels. With each doubling of lead levels, the filtration capacity dropped.

It is just the latest study in a growing body of research finding that lead levels well below the CDC's threshold may have a detrimental impact on children's health.

"I don't think anyone thinks there is a safe level of lead," said Dr. Jeffrey J. Fadrowski, a pediatric nephrologist at Hopkins Children's Center and a coauthor of the kidney study. "But the question becomes where you can reasonably mount a public health response."

Though lead is no longer found in gasoline and paint, children and adults still incur exposure from items such as old paint, contaminated soil and drinking water.

Approximately 1.4% of children had blood lead levels equal to or greater than 10 micrograms per deciliter in 2006 (the latest date for which nationally representative figures are available), down from 9% in 1988, according to research released in 2009 by the CDC.

Lead exposure affects cognitive ability and behavior. Studies have shown that children with elevated blood lead levels have problems such as hyperactivity, attention dysfunction, aggression and lowered IQ. Lead can also harm the kidneys and reproduction and cause hypertension and gastrointestinal issues such as colic, nausea and constipation.

The CDC's threshold was reduced from 30 micrograms to 10 in 1991 in response to studies showing potential health effects at the lower levels. For children with levels higher than 10 micrograms, many states have intervention programs, according to the Agency for Toxic Substances and Disease Registry. Medical evaluation and environmental remediation is performed when children test higher than 20 micrograms. And medical treatment may be necessary when blood lead concentration is higher than 45 micrograms.



DANGER: Humans incur exposure to lead from contaminated drinking water. (Matt Rourke / Associated Press)

But concern is growing among researchers and physicians about even lower levels.

Two studies have linked low lead levels with IQ impairment. The first, published in the *New England Journal of Medicine* in 2003, studied 172 children in Rochester, N.Y. Researchers from Cornell University, Cincinnati Children's Hospital Medical Center and the University of Rochester School of Medicine found that participants with lead levels of 1 microgram per deciliter had IQs about seven points higher than children with 10 micrograms.

A 2009 article in the *Archives of Disease in Childhood* looked at the lead levels of almost 500 2-year-old British children. The children were assessed at ages 7 and 8, and researchers found few problems with those kids with lead levels from 1 to 5 micrograms. But the children with levels between 5 and 10 micrograms had 49% lower reading scores and 51% lower writing scores and 0.3% lower spelling grades on standard assessment tests.

An article presented at the 2009 meeting of the American Physiological Society found a link between lead levels and cardiovascular function. The research, by researchers at the State University of New York at Oswego, studied 140 children, ages 9 to 11. Blood lead levels among the children were all equal to or lower than 3.8 micrograms per deciliter. Participants were given a mildly stressful computer task, and the researchers found that kids who had higher levels of lead had more constriction of blood vessels while they were stressed.

The SUNY Oswego group has found the same thing in a second, ongoing study with a different group of children, said Dr. Brooks B. Gump, one of the study's authors.

"I think these effects are just scratching the surface on what lead or other toxicants are doing, and it is probably not as important knowing what the level is as it is to know what the effects are," Gump says. "Clearly that 10 number is arbitrary, and there are effects below, on IQ and other systems."

There is concern with even the lowest levels of lead, said Dr. Helen J. Binns, a liaison to the CDC's Advisory Committee on Childhood Lead Poisoning Prevention. No exposure is safe, she says. The problem is what to do about it.

"The unfortunate thing with lower levels is there is no good body of research to show what medical intervention can help," Binns says.

For example, although parental education on potential lead hazards and interventions such as cleaning homes are provided when children are found to have high lead levels, there is little evidence that either of these help children with lower levels, Binns says. Drug therapy is not very effective either, she says — even for some kids with extremely high levels.

For now, proper treatment of low-level lead exposure is uncertain. The best that can be done, she says — beyond cleaning the home — is to try to work with families and schools to create environments in which kids with lead poisoning can work past the hurdles they face.

"We are hoping that enhanced parental skills and addressing the problems kids have from the exposure will be the best solution," she says.