

Chronic lead poisoning from urban soils

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Chronic lead poisoning, caused in part by the ingestion of contaminated dirt, affects hundreds of thousands more children in the United States than the acute lead poisoning associated with imported toys or jewelry. Could treating contaminated soil with water prevent this public health scourge?

In a study appearing in the August issue of the journal *Applied Geochemistry*, Gabriel M. Filippelli, Ph.D., professor of earth sciences and department chair at Indiana University-Purdue University Indianapolis, conducted a literature review of studies of urban soils as a persistent source of lead poisoning and also investigated the lead burden in the soils from a number of cities, including Indianapolis. His findings reveal that older cities like Indianapolis have a very high lead burden resulting in a lead poisoning epidemic among their youngest citizens.

Filippelli suggests two possible remedies, one of which he believes to be feasible from both the practical and monetary perspectives and doable almost immediately.

According to 2007 U.S. Census Bureau data, there are approximately 20 million children below the age of five in the United States, the age range of greatest susceptibility to the harmful affects of lead poisoning. Filippelli notes that about 2 percent of these children (approximately 400,000) have lead poisoning, many in epidemic proportions.

While acute lead poisoning from toys and direct ingestion of interior paint has received more publicity, these cases account for only a portion

of children with lead poisoning. Many health officials are increasingly concerned with chronic lead poisoning, which occurs at lower levels of lead in the blood and are harder to diagnose. Babies and young children may develop chronic lead poisoning when playing in dirt yards or playgrounds or in areas with blowing dry soil tainted with the lead, which is ubiquitous in older urban areas.

"These national numbers for chronic lead poisoning are staggering but the percentage of affected children in older urban areas is much much higher than in rural areas or newer cities. The blowing soil and dust young children ingest contains large amount of lead from lead paint and leaded gasoline deposited decades ago, and from industrial contamination. In Indianapolis, we found high levels of soil contamination. Many older urban centers, have lead poisoning rates that are 5 to 10 times the national average." said Filippelli, who is a biogeochemist studying environmental contamination of heavy metals and its effects on children's health.

Going into neighborhoods where yards are dirt rather than grass-covered and spraying clean water with high power shower systems when tests show that soil moisture is low (usually mid-July to mid-September in Indianapolis, for example), would significantly decrease the chronic lead poisoning in children, according to Filippelli. Since contaminated dirt blows from one property to another, this cannot be done on a house by house basis but must be carried out on a regional basis.

A better but less feasible remedy would be to put a layer of clean soil on top of the contaminated soil and to hydroseed the fresh dirt with grass. While preferable it is less practical as the grass has to be maintained, more costly and probably unrealistic to expect money-strapped municipalities to attempt. The high end remedy, removal of all contaminated dirt, perhaps two feet deep, is unattainable, except in small areas around industrial sites such as lead smelters.

Lead levels in the dirt in which children play are a public health hazard. "Our review plus the new directions we suggest for remoisturizing soil to prevent blowing of contaminants, confirm that our approach to estimating lead burden and its remediation can be done anywhere in the U.S. where there is a lead concern. The Environmental Protection Agency and the U.S. Department of Housing and Urban have focused their attention on indoor contamination as the direct source of lead to children. It is now time to open the door and solve the contaminated soil problem. We hope our study will raise awareness, and ultimately funding, to stop the poisoning of America's children, especially those living in older urban areas," said Filippelli, who is associate director of the Indiana University Center for Environmental Health.

Young children, especially those who crawl, put objects in their mouth, eat dirt, or are exposed to blowing dirt, and can consume a significant amount of lead. Children's developing digestive systems are very susceptible to lead poisoning. To a child's body, lead looks like calcium because they both have same ionic charge and size. As their neurons develop, the nervous system tries to use lead in place of calcium and the child's neural systems fail to form correctly. This impairs neural function leading to irreversibly decreased IQ and increased attention deficient issues.

Chelation, which purges lead from the body, is used to treat acute lead poisoning but is much less effective in chronic lead poisoning.

Source: Indiana University

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