No Safe Amount: Blood Lead Levels

by Sam Goldstein, PhD, and Rudolph R. Bustos, PhD

JOEL NIGG, AUTHOR OF THE COMPREHENSIVE VOLUME ***WHAT CAUSES AD/HD?*** (Guilford, 2007), will soon publish research suggesting that very low levels of lead in the blood, levels previously believed to be safe, could be contributing to the incidence of attention-deficit/hyperactivity disorder. Nigg, a professor at Michigan State University, studied 150 children in Lansing with the cooperation of the Michigan Department of Community Health. He found that all had at least some lead in their blood, but none had levels higher than 10 micrograms per deciliter, the level currently considered unsafe by the Centers for Disease Control and Prevention. The safe level for lead in the blood was lowered from 25 micrograms per deciliter to 10 in 1991.

Children with AD/HD had higher levels of lead in the blood than those without the disorder, according to Nigg's study. This research supports a growing body of evidence indicating that there is no safe level of lead in the blood. Nigg's findings were published in mid-February 2008 in the *Journal of Biological Psychiatry*; his study will continue for a number of years.

If replicated and substantiated over time, Nigg's research provides a strong foundation for screening blood lead levels (BLL) in all at-risk children evaluated for AD/HD. This article will briefly review the literature on lead exposure—in particular for immigrant children—and advocate for lead screening for this population.

Lead and child development

As a trace element, lead has no known use in the human body. Ingested flakes of lead paint can poison the energy-producing cells within the brain, causing them to swell. As the brain becomes more and more swollen, general brain function decreases and thinking becomes confused. Convulsions can occur and swelling can progress to brain injury and ultimately death. Nigg's studies and others demonstrate a correlational relationship between lead and development. But is there a cause and effect relationship? Can lead intoxication too mild to produce brain swelling and convulsions still cause AD/HD or other developmental conditions?

In the last forty years, researchers have demonstrated that very low blood lead levels, producing no initial clinical symptoms, can nonetheless negatively impact intelligence, motor coordination, and behavior in children. The findings of these studies suggest there may be a group of children with AD/HD or other developmental conditions whose symptoms, at least in part, are the result of lead exposure. How much is due to lead or to other differences (genetic influences, environment, etc.) is still yet to be completely determined. There is significant correlation between lead levels in the blood and teeth on the one hand, and full-scale IQ, verbal and auditory processing reaction time, and behavioral ratings on the other. This suggests that lead may be a contributor to AD/HD symptoms in some children—as Nigg's study again points out. However, there is a large body of research demonstrating that AD/HD is a strongly inherited condition with genetics contributing to the majority of risk that a child will receive a diagnosis of AD/HD.

The dangers of lead to the human brain have been well recognized for nearly half a century. The reported incidence of severe lead poisoning in children appears to be decreasing. The generally low incidence of elevated BLL in most children referred over the past twenty years for developmental problems, including AD/HD, has eliminated the routine use of lead screening as part of developmental assessments. However, in certain subgroups of our childhood population, particularly children of immigrants, the incidence of elevated blood lead levels continue to be alarmingly high. Current federal guidelines appear inadequate to address this problem.

Vulnerable children

A large and growing body of evidence indicates that children are more sensitive to the neurotoxic effects of lead than are adults. As with their teeth and bones, children retain more lead in soft tissue than do adults—about five to ten times more—and no blood lead level should be recognized as safe. Children between two and four years old are most likely to suffer from elevated BLL. Despite these advances in knowledge, a number of current studies demonstrate that we have failed to consider the risks of lead poisoning in immigrant children coming from developing countries, as well as in poor and ethnically diverse children. State and local data have shown that Hispanic children are more likely to have elevated BLL than non-Hispanic whites. For example, the Sonoma County Department of Health Services reported in 2005 that 81 percent of the children in that California county with high BLL over a five-year period were Hispanic.

Adrianna Quintero-Somaini and Mayra Quirindongo cite numerous other studies in their book, *Hidden Danger: Environmental Health Threats in the Latino Community* (Natural Resources Defense Council, 2004). New York City's Department of Health and Mental Hygiene reported in 2002 that 33 percent of children with elevated BLL were Hispanic. In California's San Bernardino County, 65 percent of children with elevated BLL were Hispanic. In 2003, the Arizona Department of Health Services reported that Hispanic children comprised 77 percent of children with elevated BLL in that state. And a study of Hispanic homes in inner-city

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and Children's Disabilities

Miami revealed that 55 percent of Hispanic homes exceeded the EPA's lead standards.

Because a child's chronic exposure to even low lead levels can cause developmental and neurological anomalies that may be difficult to detect through routine physical examination, blood lead screenings become essential. All children are considered at risk for lead poisoning, and Medicaid-eligible children must be screened as part of required prevention services offered through the Early and Periodic Screening, Diagnosis and Treatment Program (U.S. Department of Health and Human Services, 2005). However, although initial BLL tests are performed for Medicaid-eligible children, nearly half of the children found to have elevated BLL in a 2005 Michigan study did not receive any follow-up testing; of those, 58.6 percent had just one medical encounter in the ensuing six-month period.

Because the prevalence of elevated BLL among newly-arrived refugee children is significantly higher than the 2.2 percent prevalence of children in the United States (*Centers for Disease Control and Prevention*, 2005), federal guidelines call for a medical screening within ninety days of a refugee's arrival. However, most states have not adopted protocols for screening refugee children and collected BLL data do not identify children as refugees. It is difficult, if not impossible, to assess the children of illegal aliens entering the United States.

Greater screening needed

Evaluators must not only cautiously interpret the results of intellectual, academic, and developmental testing due to English being a second language in immigrant children, but also consider the possibility that a contributing cause for many developmental problems, including those symptomatically related to AD/HD, may be lead or other forms of toxic poisoning. The deleterious effects of even modest BLL on learning, behavior, intellectual development, memory, attention, and motor coordination are undeniable. Hispanic and other immigrant children coming to America legally or illegally often leave environments poisoned by lead and, once here, are more likely to live in polluted neighborhoods and older housing with lead paint and water pipes. Some immigrants bring household items, customs, or dietary preferences with them that are continuing sources of lead exposure, such as pottery dishware, home health remedies, and even candy.

Though federal guidelines mandate assessment, many states appear to be inconsistent in screening children for lead. Researchers and professionals must recognize that elevated BLL is not a thing of the past and advocate for broader community awareness and screening. Immigrant children should be carefully evaluated to ensure they receive appropriate diagnosis and care for this almost common condition.

It is critical that schools in partnership with community agencies initiate preventive, diagnostic, and management measures in accordance with the CDC guidelines. Educators and medical and mental health professionals should become knowledgeable about the behavioral and developmental impacts of lead exposure. Upon entering school all children at risk for lead exposure, immigrants in particular, should be screened for BLL.

It is still difficult to know what should be done as the result of these studies. It would appear that no level of lead in the blood should be considered safe relative to the potential for even mild impairments in development and behavior. A continued and aggressive policy to find and eradicate sources of lead in the environment, including paint and water pipes, is required. Unfortunately at this time, however, there is no evidence that treatment for lead poisoning will improve the performance of affected children. In addition, the data from these group studies are simply not sufficiently powerful to argue that blood or tooth lead levels can be used to help diagnose or explain AD/HD. A

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Due to the possibility that lead exposure is related to some cases of AD/HD, CHADD has joined other mental health and disability groups in a letter to the Environmental Protection Agency (EPA) calling for tougher, healthier lead standards. Be sure to read the letter in the Public Policy section of CHADD's Web site, www.chadd.org.

MORE INFO:
For a list of references and helpful resources, visit **www.chadd/org/attention/references.**

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