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## CU study: Lead levels even well below U.S. standard may affect brain function in children

By Susan Lang

Even very small amounts of lead in children's blood -- amounts well below the current federal standard -- are associated with reduced IQ scores, finds a new, six-year Cornell study.

The study examined the effect of lead exposure on cognitive function in children whose blood-lead levels (BLLs) were below the Centers for Disease Control and Prevention (CDC) standard of 10 micrograms per deciliter (mcg/dl) -- about 100 parts per billion. The researchers compared children whose BLLs were between 0 and 5 mcg/dl with children in the 5-10 mcg/dl range.

"Even after taking into consideration family and environmental factors known to affect a child's cognitive performance, blood lead played a significant role in predicting nonverbal IQ scores," said Richard Canfield, a senior researcher in Cornell's Division of Nutritional Sciences and senior author of the study in the journal *Environmental Health Perspectives*. "We found that the average IQ scores of children with BLLs of only 5 to 10 mcg/dl were about 5 points lower than the IQ scores of children with BLLs less than 5 mcg/dl. This indicates an adverse effect on children who have a BLL substantially below the CDC standard, suggesting the need for more stringent regulations," he said.

In the United States over the last several months, nearly 50 specific products, including millions of toys for young children, have been recalled due to excessive lead in the paint, plastics and metal. "Our findings emphasize the very real dangers associated with low-level exposures, to which lead in toys can contribute," Canfield said.

U.S. children are exposed to lead primarily from household dust contaminated by deteriorating interior lead-based paint. In addition to toys, other potential sources include contaminated soil, imported food stored in lead-glazed pottery and certain plastic, metallic and painted products.

This most recent finding builds on the same research team's influential 2003 study, published in the *New England Journal of Medicine*, that reported adverse effects of BLLs below 10 mcg/dl in a group of children followed from infancy to age 5. "Our new findings are based on follow-up testing of the same children at age 6, using a more comprehensive IQ test to assess cognitive function. The results provide compelling evidence that low-level lead exposure has effects into the school-age years," said Todd Jusko '01, a University of Washington Ph.D. candidate in epidemiology and co-author on both reports.

"Children living in poverty disproportionately suffer from elevated BLLs," said statistician and co-author Charles Henderson, a Cornell senior researcher in human development. He also noted that "even a small decline in an IQ score is likely to be reflected in aptitude test scores such as the SAT."

According to the CDC, about one out of every 50 children in the United States between ages 1 and 5 has a BLL above 10 mcg/dl and about 10 percent of children have BLLs of 5 mcg/dl or higher; about 25 percent of U.S.

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homes with children under age 6 have a lead-based paint hazard.

"The bottom line," according to Canfield, "is that lead is a persistent neurotoxin that causes brain damage. The fact that lead has been found in millions of toys, even toys specifically designed for children to put into their mouths, presents an unacceptable risk. Our findings suggest the need to re-evaluate the current federal standards for lead in consumer products and the current definition of an elevated BLL in children."

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