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Neuropsychological correlates of hair arsenic, manganese, and cadmium levels in school-age children residing near a hazardous waste site

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Abstract

A pilot study was conducted to explore the potential associations between hair metal levels and the neuropsychological function and behavior of school-aged children. Thirty-two children, 11–13 years old, were administered a battery of tests that assessed general intelligence, visual-motor skills, receptive language, verbal memory, nonverbal problem-solving, and behavior problems. Parents and teachers rated the children's attention, executive functions, and behavior problems. The concentrations of manganese (Mn), arsenic (As), and cadmium (Cd) were measured in hair samples provided by 31 of the children. The mean hair metal levels were: Mn, 471.5 parts per billion (ppb); As, 17.8 ppb; Cd, 57.7 ppb. Children's general intelligence scores, particularly verbal IQ scores, were significantly related, inversely, to hair Mn and As levels.

particularly verbal IQ scores, were significantly related, inversely, to hair Mn and As levels, as were scores on tests of memory for stories and a word list. In some cases, a significant Mn-by-As interaction was found. It appeared that it was the low scores of children for whom both Mn and As levels were above the median values in the sample that were responsible for the main effects observed for each metal. No other significant relationships were found. These results suggest the need to study further the neuropsychological correlates of developmental exposure to Mn and As, particularly as a mixture.



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Keywords

Children; Neuropsychology; Behavior; Manganese; Arsenic; Cadmium; Metal mixtures

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