Working Memory Low in Children With ADHD

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PHILADELPHIA — Children with attention-deficit/hyperactivity disorder performed worse than children without the disorder on tests of working memory—an important factor in learning and academic success, according to the results of a case-controlled study of 64 children aged 7-12 years.

In the study, 35 children with ADHD (24 males and 11 females) and 29 healthy controls (6 males and 23 females) were asked to perform the Digit Span test, which assesses working memory. Working memory allows a person to receive, store, and retrieve information on a temporary basis, said Dr. Kanchana Roychoudhury, a pediatrician at Flushing (N.Y.) Hospital Medical Center.

The Digit Span test comprises digit span forward (DSF) and digit span backward (DSB) tasks. In DSF, a list of random numbers is read aloud and, at the end of a sequence, the child is asked to recall the items in order. The test begins with two or three numbers, increasing until the child commits an error. In DSB, the child must recall the list of digits in reverse order. DSF relies on simple short-term auditory memory with sequencing and verbal expression; DSB requires more attentional demands.

On the Digit Span total score, the control group performed significantly better than the ADHD group. Likewise, the control group performed significantly better on the DSB. There was no difference between the groups on the DSF, said Dr. Roychoudhury, who presented the findings at the annual meeting of the Eastern Society for Pediatric Research.

The results indicate that with ADHD, "working memory is low and children have difficulty in remembering material, especially pertaining to dates in social studies and sequencing information appropriately in science and social studies. In mathematics, they have significant problems in procedures since they have to remember in a stepwise fashion how to do the calculation," Dr. Roychoudhury said in an interview. ■

Exposure to Lead, Tobacco Linked to ADHD

HONOLULU — More than 800,000 cases of attention-deficit/hyperactivity disorder in the United States may be linked to childhood exposure to lead and intrauterine exposure to tobacco smoke, Dr. Tanya E. Froehlich said at the joint meeting of the Pediatric Academic Societies and the Asian Society for Pediatric Research.

Her cross-sectional study used data from a nationally representative sample of children aged 8-15 years, which was part of the National Health and Nutrition Examination Survey (NHANES) conducted between 2001 and 2004. Data were collected from 2,588 children and their parents.

Dr. Froehlich of Cincinnati Children's Hospital Medical Center was able to determine that 9% of that sample met DSM-IV criteria for ADHD.

In the bivariate analysis, blood lead levels, in utero tobacco smoke, and serum cotinine were all significantly associated with ADHD. However, after controlling for current tobacco exposure, age, sex, race/ethnicity, preschool attendance, maternal age at child's birth, and birth weight in a multivariate analysis, only lead and in utero tobacco smoke remained significantly associated with ADHD.

Children whose mothers reported smoking during pregnancy were 2.4-fold more likely to develop ADHD than were those whose mothers reported not smoking during pregnancy. Compared with children in the first tertile of blood lead level, those in the second tertile were 1.7-fold more likely to develop ADHD. That increased to 2.3-fold for children in the third tertile. All of those results were statistically significant.

Dr. Froehlich was able to determine that 35% of the current prevalent cases of ADHD in the United States could be linked to in utero tobacco exposure or to blood lead levels in the third tertile. This corresponds to 824,000 excess cases of ADHD.

Dr. Froehlich stated that she had no conflicts of interest related to her presentation.

—Robert Finn

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