Perfluoroalkyl substances in cord blood and attention deficit/hyperactivity disorder symptoms in seven-year-old children.

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Abstract

OBJECTIVE: The effect of perfluoroalkyl substances (PFASs) on the development of neurotoxicity in children is still controversial. This study aimed to evaluate the association between in utero exposure to four PFASs and the development of neurobehavioral symptoms related to attention deficit hyperactivity disorder (ADHD) in early childhood.

METHODS: Eligible study subjects were selected from the Taiwan Birth Panel Study and the Taiwan Early-Life Cohort, which enrolled a total of 1526 mother-infant pairs during 2004 and 2005. We collected umbilical cord blood and analyzed perfluorooctanoic acid (PFOA), perfluorooctanyl sulfonate (PFOS), perfluorononanoic acid (PFNA), and perfluoroundecanoic acid (PFUA) levels. When a child was 7 years old, to evaluate ADHD related neurobehavioral symptoms, their parents completed the Swanson, Nolan, and Pelham IV scale (SNAP-IV), the Child Behavior Checklist (CBCL), and the Strengths and Difficulties Questionnaire (SDQ) questionnaires. We used linear regression models with inverse probability weighting to explore the association between prenatal exposure to four PFASs and ADHD rating scores.

RESULTS: A total of 282 subjects have completed the PFASs analysis and questionnaire survey. After adjusted for potential confounders, we observed that PFNA is inversely associated with inattention and oppositional defiant disorder of SNAP-IV, and hyperactivity/inattention of SDQ. No association between PFOA, PFOS, or PFUA and ADHD symptoms was found.

CONCLUSIONS: Prenatal exposure to PFNA was found to associate with neurobehavioral symptoms related to ADHD among Asian seven-year-old children. Further studies are needed to elucidate the causal relationship.