A child's IQ can be affected by mother's exposure to urban air pollutants

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A mother's exposure to urban air pollutants known as polycyclic aromatic hydrocarbons (PAHs) can adversely affect a child's intelligence quotient or IQ, a study reports. PAHs are chemicals released into the air from the burning of coal, diesel, oil and gas, or other organic substances such as tobacco. In urban areas motor vehicles are a major source of PAHs.

The study, funded by the National Institute of Environmental Health Sciences (NIEHS), a component of the National Institutes of Health, the U.S. Environmental Protection Agency and several private foundations, found that children exposed to high levels of PAHs in New York City had full scale and verbal IQ scores that were 4.31 and 4.67 points lower than those of less exposed children. High PAH levels were defined as above the median of 2.26 nanograms per cubic meter (ng/m^3). A difference of four points, which was the average seen in this study, could be educationally meaningful in terms of school success, as reflected, for example, in standardized testing and other measures of academic performance. However, the researchers point out that the effects may vary among individual children.

"This research clearly shows that environmental PAHs at levels encountered in an urban setting can adversely affect a child's IQ," said Linda Birnbaum, Ph.D., director of NIEHS. "This is the first study to report an association between PAH exposure and IQ, and it should serve as a warning bell to us all. We need to do more to prevent environmental exposures from harming our children."

The study was conducted by scientists from the Columbia University Center for Children's Environmental Health. It included children who were born to non-smoking black and Dominican-American women age 18 to 35 who resided in Washington Heights, Harlem or the South Bronx in New York. The children were followed from utero to 5 years of age. The mothers wore personal air monitors during pregnancy to measure exposure to PAHs and they responded to questionnaires.

At 5 years of age, 249 children were given an intelligence test known as the Wechsler Preschool and Primary Scale of the Intelligence, which provides verbal, performance and full-scale IQ scores. The test is regarded as a well validated, reliable and sensitive instrument for assessing intelligence. The researchers developed models to calculate the associations between prenatal PAH exposure and IQ. They accounted for other factors such as second-hand smoke exposure, lead, mother's education and the quality of the home caretaking environment. Study participants exposed to air pollution levels below the average were designated as having low exposure, while those exposed to pollution levels above the median were identified as high exposure.

"The decrease in full-scale IQ score among the more exposed children is similar to that seen with low-level lead exposure," said lead author Frederica P. Perera, Dr.P.H., professor at Columbia's Mailman School of Public Health and director of the Columbia Center for Children's Environmental Health.

"This finding is of concern," said Perera. "IQ is an important predictor of future academic performance, and PAHs are widespread in urban environments and throughout the world. Fortunately, airborne PAH concentrations can be reduced through currently available controls, alternative energy sources and policy interventions."

More information: Perrera, FP, Zhigang L, Whyatt R, Hoepner L, Wang, S, Camann D, Rauh V. 2009. Prenatal Airborne Polycyclic Aromatic Hydrocarbon Exposure and Child IQ at Age 5 Years. *Pediatrics*. 124(2). August, 2009.

Source: NIH/National Institute of Environmental Health Sciences