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Autism Risk Linked To Distance From Power Plants, Other Mercury-releasing Sources

ScienceDaily (Apr. 25, 2008) — How do mercury emissions affect pregnant mothers, the unborn and toddlers? Do the level of emissions impact autism rates? Does it matter whether a mercury-emitting source is 10 miles away from families versus 20 miles? Is the risk of autism greater for children who live closer to the pollution source?

Is the risk of autism greater for children who live closer to the pollution source? (Credit: iStockphoto/Marcin Pawinski)

A newly published study of Texas school district data and industrial mercury-release data, conducted by researchers at The University of Texas Health Science Center at San Antonio, indeed shows a statistically significant link between pounds of industrial release of mercury and increased autism rates. It also shows—for the first time in scientific literature—a statistically significant association between autism risk and distance from the mercury source.

“This is not a definitive study, but just one more that furthers the association between environmental mercury and autism,” said lead author Raymond F. Palmer, Ph.D., associate professor of family and community medicine at the UT Health Science Center San Antonio. The article is in the journal Health & Place.

Dr. Palmer, Stephen Blanchard, Ph.D., of Our Lady of the Lake University in San Antonio and Robert Wood of the UT Health Science Center found that community autism prevalence is reduced by 1 percent to 2 percent with each 10 miles of distance from the pollution source.

“This study was not designed to understand which individuals in the population are at risk due to mercury exposure,” Dr. Palmer said. “However, it does suggest generally that there is greater autism risk closer to the polluting source.”

The study should encourage further investigations designed to determine the multiple routes of mercury exposure. “The effects of persistent, low-dose exposure to mercury pollution, in addition to fish consumption, deserve attention,” Dr. Palmer said. “Ultimately, we will want to know who in the general population is at greatest risk based on genetic susceptibilities such as subtle deficits in the ability to detoxify heavy metals.”

The new study findings are consistent with a host of other studies that confirm higher amounts of mercury in plants, animals and humans the closer they are to the pollution source. The price on children

may be the highest.

“We suspect low-dose exposures to various environmental toxicants, including mercury, that occur during critical windows of neural development among genetically susceptible children may increase the risk for developmental disorders such as autism,” the authors wrote.

Study highlights

- Mercury-release data examined were from 39 coal-fired power plants and 56 industrial facilities in Texas.
- Autism rates examined were from 1,040 Texas school districts.
- For every 1,000 pounds of mercury released by all industrial sources in Texas into the environment in 1998, there was a corresponding 2.6 percent increase in autism rates in the Texas school districts in 2002.
- For every 1,000 pounds of mercury released by Texas power plants in 1998, there was a corresponding 3.7 percent increase in autism rates in Texas school districts in 2002.
- Autism prevalence diminished 1 percent to 2 percent for every 10 miles from the source.
- Mercury exposure through fish consumption is well documented, but very little is known about exposure routes through air and ground water.
- There is evidence that children and other developing organisms are more susceptible to neurobiological effects of mercury.

Implications

“We need to be concerned about global mercury emissions since a substantial proportion of mercury releases are spread around the world by long-range air and ocean currents,” Dr. Palmer said. “Steps for controlling and eliminating mercury pollution on a worldwide basis may be advantageous. This entails greener, non-mercury-polluting technologies.”

The U.S. Environmental Protection Agency (EPA) estimated environmental mercury releases at 158 million tons annually nationwide in the late 1990s, the time period studied by the Texas team. Most exposures were said to come from coal-fired utility plants (33 percent of exposures), municipal/medical waste incinerators (29 percent) and commercial/industrial boilers (18 percent). Cement plants also release mercury.

With the enactment of clean air legislation and other measures, mercury deposition into the environment is decreasing slightly.

Limitations

Dr. Palmer and his colleagues pointed out the study did not reflect the true community prevalence rates of autism because children younger than school age are not counted in the Texas Education Agency data system. The 1:500 autism rates in the study are lower than the 1:150 autism rates in recent reports of the U.S. Centers for Disease Control and Prevention.

Furthermore, the authors note that distance was not calculated from individual homes to the pollution source but from central points in school districts that varied widely in area.

Data sources

Data for environmentally released mercury were from the United States Environmental Protection Agency Toxics Release Inventory. Data for releases by coal-fired power plants came from the same inventory and from the Texas Commission for Environmental Quality. Data for school district autism came from the Texas Education Agency.

Journal reference: Palmer, R.F., et al., Proximity to point sources of environmental mercury release as a predictor of autism prevalence. Health & Place (2008), doi:10.1016/j.healthplace.2008.02.001.

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