

## **A silent pandemic: Industrial chemicals are impairing the brain development of children worldwide**

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(16.11.2006)

**Exposure to industrial chemicals may be responsible for a "silent pandemic" of brain development disorders affecting millions of children worldwide, according to a review study published by Philippe Grandjean from the Harvard School of Public Health, Boston and co-author Philip Landrigan, M.D., of New York's Mount Sinai School of Medicine Nov. 8, 2006, in the online edition of The Lancet. The authors recognized more than 200 industrial chemicals that have the capacity to damage the human brain, while their toxic effect on children have generally been overlooked.**

### **Background**

Fetal and early childhood exposures to industrial chemicals in the environment can damage the developing brain and can lead to neurodevelopmental disorders (NDDs)–autism, attention deficit disorder (ADHD), and mental retardation.

A developing brain is much more susceptible to the toxic effects of chemicals than an adult brain. During development, the brain undergoes a highly complex series of processes at different stages. An interference—for example, from toxic substances—that disrupts those processes, can have permanent consequences. That vulnerability lasts from fetal development through infancy and childhood to adolescence. Research has shown that environmental toxicants, such as lead or mercury, at low levels of exposure can have subclinical effects—not clinically visible, but still important adverse effects, such as decreases in intelligence or changes in behavior.

One out of every six children has a developmental disability, usually involving the nervous system. Treating NDDs is difficult and costly to both families and society. In recent decades, a gathering amount of evidence has linked industrial chemicals to NDDs. Lead, for example, was the first chemical identified as having toxic effects to early brain development, though its neurotoxicity to adults had been known for centuries.

### **The new study**

Using the Hazardous Substances Data Bank of the National Library of Medicine and other data sources the researchers compiled a list of 202 environmental chemicals known to be toxic to the human brain . The authors note that the list should not be regarded as comprehensive; for example,

the number of chemicals that can cause neurotoxicity in laboratory animal tests exceeds 1,000.

Roughly half of the chemicals are in common use, but very few have been tested to determine their impact on brain development. Of the industrial chemicals known to be toxic to the human brain, only five — lead, mercury, arsenic, PCBs, and toluene — have been proven to cause damage to the developing brain. These chemicals have been identified not because they are necessarily more dangerous than the others, but because they have been studied the most, Grandjean and Landrigan contend.

"Even if substantial documentation on their toxicity is available, most chemicals are not regulated to protect the developing brain," says Grandjean. To protect children against industrial chemicals that can injure the developing brain, the researchers urge a precautionary approach for chemical testing and control. Such an approach is beginning to be applied in the European Union (see REACH). It puts in place strong regulations, which could later be relaxed, if the hazard were less than anticipated, instead of current regulations that require a high level of proof. At present in the U.S., requirements for toxicity testing of chemicals are minimal.

Grandjean and Landrigan conclude that industrial chemicals are responsible for what they call a silent pandemic that has caused impaired brain development in millions of children worldwide. It is silent because the subclinical effects of individual toxic chemicals are not apparent in available health statistics. To point out the subclinical risk to large populations, the authors note that virtually all children born in industrialized countries between 1960 and 1980 were exposed to lead from petrol, which may have reduced IQ scores above 130 (considered superior intelligence) by more than half and increased the number of scores less than 70. Today, it's estimated that the economic costs of lead poisoning in U.S. children are \$43 billion annually; for methylmercury toxicity, \$8.7 billion each year. The researchers believe that the total impact of the pandemic is much greater than currently recognized.

"A generation of American children was exposed to this very dangerous neurotoxin while we were doing traditional risk assessment," says Grandjean and continues, "We can't afford to make the same mistake again."

## The new study

→ Philippe Grandjean, Philip J. Landrigan, *Developmental neurotoxicity of industrial chemicals*, The Lancet, Nov. 8, 2006; Vol. 368: online edition. [DOI: 10.1016/S0140-6736\(06\)69665-7](https://doi.org/10.1016/S0140-6736(06)69665-7)

## **Related Studies**

→ H.R. Andersen, J.B. Nielsen, P. Grandjean, *Toxicologic evidence of developmental neurotoxicity of environmental chemicals*, Toxicology, 144 (2000) 121-127. [doi:10.1016/S0300-483X\(99\)00198-5](https://doi.org/10.1016/S0300-483X(99)00198-5)

## **Related EVISA Resources**

- [Link database: Information related to autism](#)
- [Link database: Information about the toxicity of mercury and its compounds](#)
- [Link Database: Mercury Environmental Pollution](#)
- [Link Database: Lead Environmental Pollution](#)
- [Link Database: Chromium Environmental Pollution](#)
- [Link Database: Arsenic Environmental Pollution](#)

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- [May 3, 2006: Texas Study Relates Autism to Environmental Mercury](#)
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last time modified: March 8, 2020