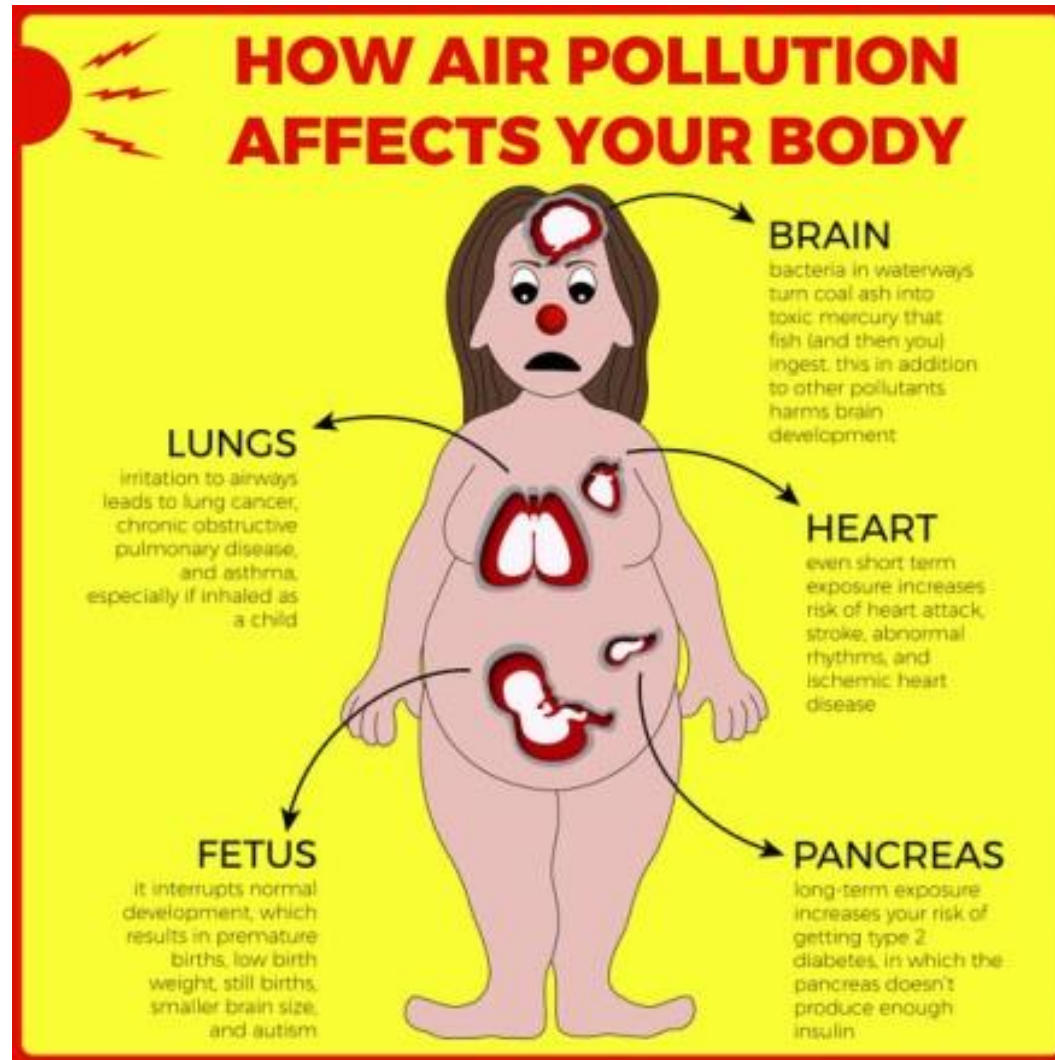


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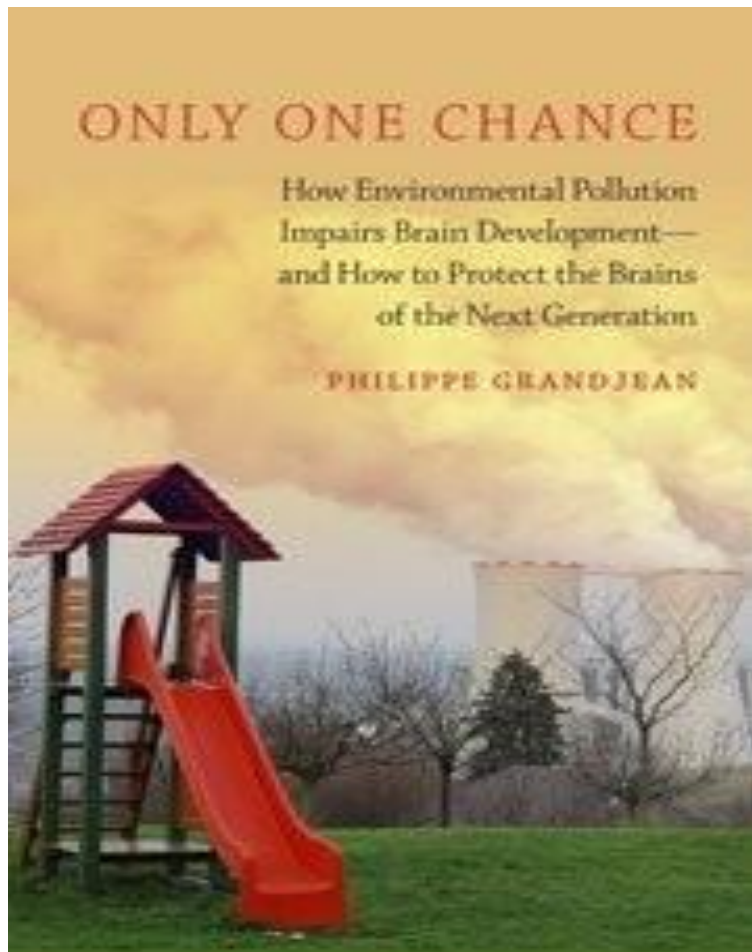


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Pollution levels in Cochabamba dropped 70% on nationwide car-free day



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Dr. Philippe Grandjean
on **Chemical Brain
Drain**: How the Next
Generation's Brain
Functions are
Endangered by EDCs
and Other
Environmental
Chemicals

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2

Erroneous and dangerous assumptions:

- The placenta protects the fetus
- Children are just little adults
- Poisonings are reversible
- Proof is needed for regulation
- Testing is too expensive

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Minamata disease

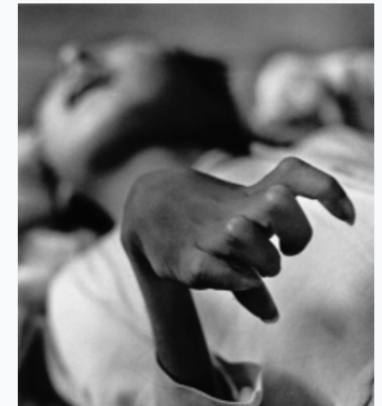
From Wikipedia, the free encyclopedia

Minamata disease (**Japanese:** 水俣病 **Hepburn:** *Minamata-byō*), sometimes referred to as Chisso-Minamata disease (チッソ水俣病 *Chisso-Minamata-byō*), is a **neurological** syndrome caused by severe **mercury poisoning**. Symptoms include **ataxia**, **numbness** in the hands and feet, general **muscle weakness**, **loss of peripheral vision**, and damage to **hearing** and **speech**. In extreme cases, **insanity**, **paralysis**, **coma**, and **death** follow within weeks of the onset of symptoms. A **congenital** form of the disease can also affect **fetuses** in the womb.

Minamata disease was first discovered in **Minamata** city in **Kumamoto prefecture**, **Japan**, in 1956. It was caused by the release of **methylmercury** in the industrial **wastewater** from the **Chisso Corporation's** chemical factory, which continued from 1932 to 1968. This highly **toxic** chemical **bioaccumulated** in shellfish and fish in **Minamata Bay** and the **Shiranui Sea**, which, when eaten by the local populace, resulted in mercury poisoning. While cat, dog, pig, and human deaths continued for 36 years, the government and company did little to prevent the pollution. The animal effects were severe enough in cats that they came to be named as having "dancing cat fever".^[1]

As of March 2001, 2,265 victims had been officially recognised as having Minamata disease (1,784 of whom had died)^[2] and over 10,000 had received financial compensation from Chisso.^[3] By 2004, Chisso Corporation had paid \$86 million in compensation, and in the same year was ordered to clean up its contamination.^[4] On March 29, 2010, a settlement was reached to compensate as-yet uncertified victims.^[5]

Minamata disease



The crippled hand of a Minamata disease victim named **Tomoko Uemura**

Classification and external resources

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Brain development gone astray

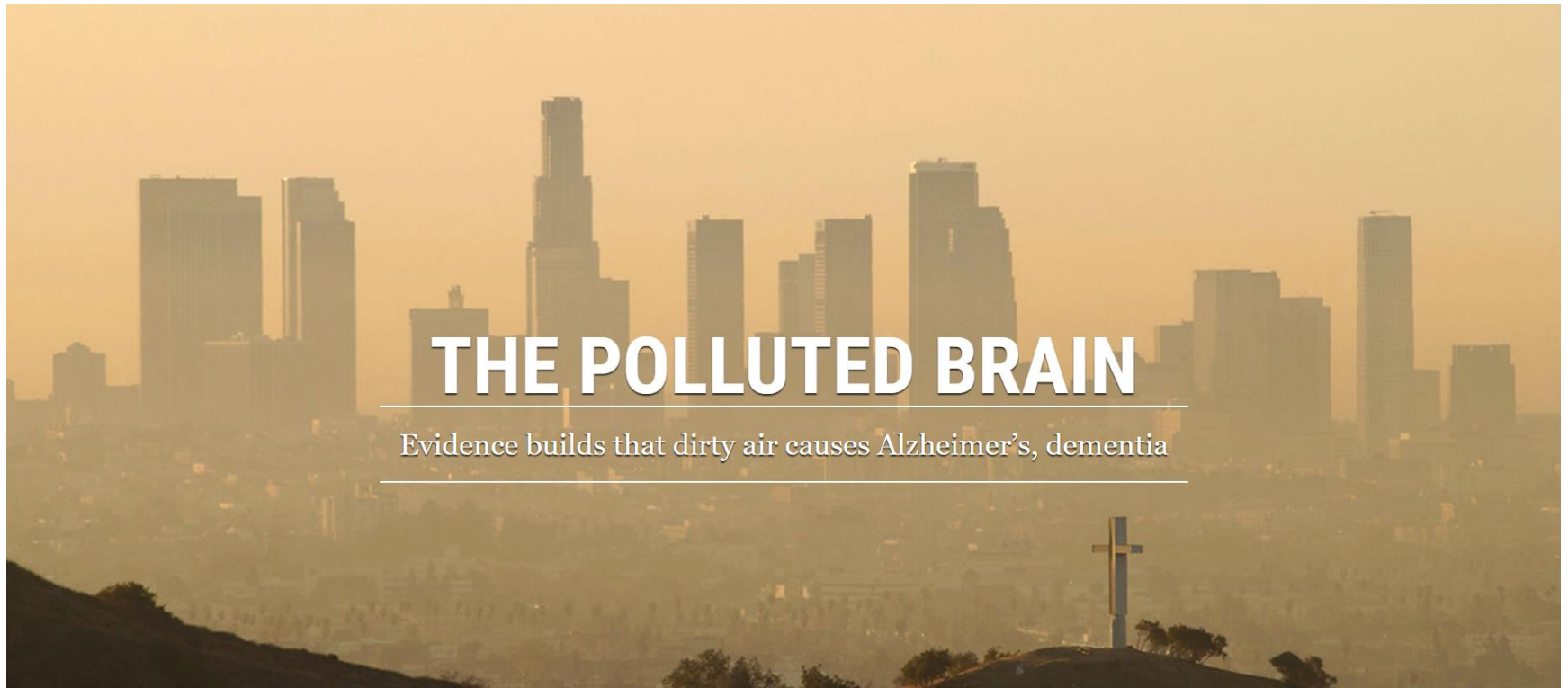
...in every case the mother was healthy, and it was not until more than three months after birth that the symptoms were recognized

Shoji Kitamura (1959)



Photo: W. Eugene Smith

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THE POLLUTED BRAIN

Evidence builds that dirty air causes Alzheimer's, dementia

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7

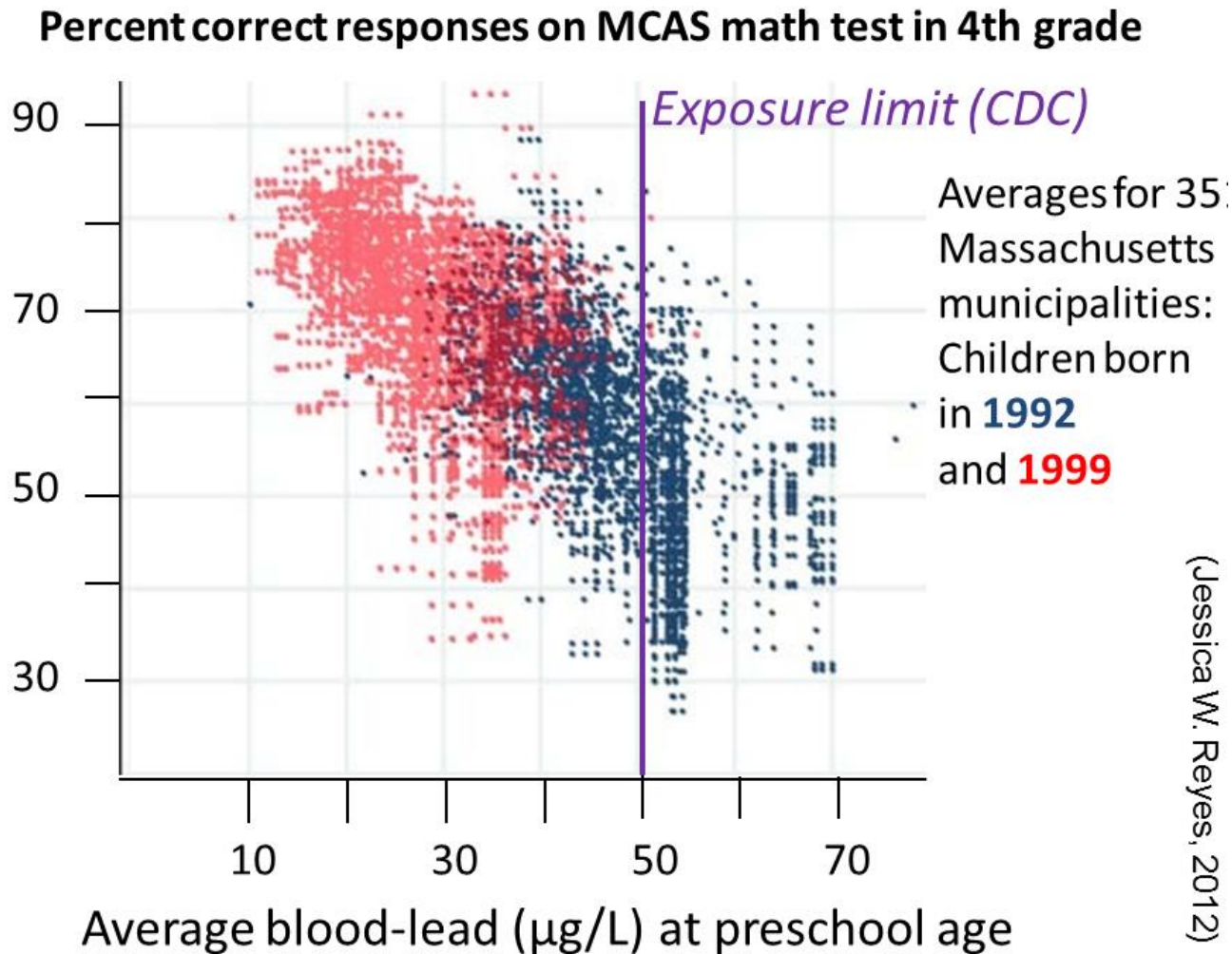
Chemical brain drainers

<i>Chemical group</i>	<i>Known in 2006</i>	<i>Newly identified</i>
Metals/inorganic compounds	Arsenic* Lead* Methylmercury*	Fluoride* Manganese*
Organic solvents	(Ethanol) Toluene*	Tetrachloroethylene*
Pesticides		Chlorpyrifos* DDT/DDE*
Other organic compounds	Polychlorinated biphenyls (PCBs)*	Brominated diphenyl ethers*
Total	6	6

*Endocrine disruptor, according to TEDX

(Grandjean & Landrigan, Lancet Neurology, 2014)

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Long-term exposure to air pollution may harm your brain

American Heart Association Rapid Access Journal Report

April 23, 2015 | Categories: Stroke News

Study Highlights

- Long-term exposure to air pollution is linked with brain shrinkage.
- A small increase in fine particulate matter pollution was associated with hidden brain damage linked to impaired cognitive function.

Embargoed until 3 p.m. CT/4 p.m. ET Thursday, April 23, 2015

DALLAS, April 23, 2015 — Long-term exposure to fine particle [air pollution](#) may cause subtle structural changes in the brain that could precede cognitive impairment and hidden brain damage, according to research in the American Heart Association journal *Stroke*.

Fine particle air pollution – smaller than 2.5 micrometers in diameter (PM_{2.5}) – may be the most common and hazardous type of air pollution. It comes from burning wood or coal, car exhaust and other sources.

“Long-term exposure to air pollution showed harmful effects on the brain in this study, even at low levels, particularly with older people and even those who are relatively healthy,” said Elissa H. Wilker, Sc.D., study lead author and researcher in the Cardiovascular Epidemiology Research Unit at Beth Israel Deaconess Medical Center and the Harvard T.H. Chan School of Public Health in Boston.

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- **Long-term exposure to air pollution may harm your brain (contd.)**
 - “The magnitude of association that we observed for brain volume was similar to approximately one year of brain aging,” Wilker said.
 - Fundamental changes in the structure of the cerebral brain volume and smaller brain size are markers of age-associated brain atrophy.
 - “We found that people who live in areas where there are higher levels of air pollution had smaller total cerebral brain volume and were more likely to have evidence of covert brain infarcts,” said Wilker, who is also an instructor of medicine in the Harvard Medical School.

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Case Study: Mexico City

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- Mexico's capital used to be the most polluted city in the world.



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- Mexico City in 1980s
 - 16,500 tons of lead and toxins daily
 - 3 million cars in city daily
 - Factories with no pollution controls, many owned by the government, e.g. Pemex
 - trees in the city`s famed Chapultepec Park dying
 - killed birds in the city
 - lead, copper and mercury poisoning made some people appear to be schizophrenic and psychotic
 - Reports of increased mental retardation in children

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- Mexico City in 2008
 - banned most drivers from using their cars one day a week idling at least 320,000 cars a week.
 - public transit accounted for 82.5 percent of trips taken each day
 - 36 air-quality monitoring stations showed lead levels down 95 percent since 1990, while sulfur dioxide fell 86 percent, carbon monoxide 74 percent, and peak ozone levels 57 percent since 1991.
 - 70 to 80 percent of emissions remain vehicle-related.

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- Mexico City today
 - Instituted a free bicycle loan program
 - Expanded public transportation systems
 - Added Saturday driving restrictions
 - In 2015 Mexico City government loosened air regulations and air pollution has steadily increased.

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Bolivia

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Pant by numbers: the cities with the most
dangerous air – listed

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What is the Solution?

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Policy & Regulatory Steps to Clean the Air & Water

1. National legislation, e.g. Clean Air Act, Clean Water Act
2. Promulgate regulations federal, state & local levels
3. Establish regulatory enforcement including permits & penalties
4. Educational programs public & private

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Policy & Regulatory Steps to Clean the Air & Water (contd.)

5. Phased in over time to avoid hardship on stakeholders

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Questions?