

FREQUENTLY ASKED QUESTIONS

on

The 2012 CHOI et al IQ Study; **Developmental Fluoride Neurotoxicity: A Systematic Review and Meta-Analysis**

The Choi et al study can be accessed online at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3491930/>.

1. Who were the researchers? **Anna Choi**, from the Harvard School of Public Health, was the Lead Author, and **Philippe Grandjean** of the Harvard School of Public Health and the Institute of Public Health at the University of Southern Denmark was the Senior Author. The other authors were **Guifan Sun** and **Ying Zhang** from China Medical University in Shenyang, China.
2. Who funded the study? Harvard University
3. Who published the study? Environmental Health Perspectives, a highly respected peer-reviewed journal published by the National Institute of Environmental Health Sciences, a division of NIH.
4. What is a meta-analysis? It is a systematic method of study that takes data from a number of independent studies and integrates them, using statistical analysis. (*Dorland's Medical Dictionary for Health Consumers*) A meta-analysis makes the data more statistically relevant.
5. What studies did it review? It reviewed twenty-seven studies which examined the effects of fluoride exposure on IQ in children. Twenty-five studies were in China and two were in Iran. The studies were published between 1989 and 2011. Twenty-one studies measured fluoride from drinking water, three from coal burning and three from comparing fluorosis rates. Fluorosis, a mottling of the teeth, is caused by excessive fluoride.
6. What did it find? In 26 of 27 studies, children with increased exposure to higher levels of fluoride tested lower for IQ. The weighted average was 7 IQ points, which is highly statistically significant. In a large population like Wichita, KS or Portland, OR, for example, a shift of 5 IQ points would cut the number of geniuses in half and double the number of mentally handicapped.
7. Were the fluoride levels in the water for the villages studied higher than fluoridation levels in U.S. cities? For the most part, yes. However, concentration levels are not as relevant as the dose of fluoride intake. Most U.S. cities fluoridate at a concentration level of 0.7 milligrams per liter (mg/L). The villages in the studies that had the high fluoride/lower IQ's had water levels ranging from .88 mg/L to 11.5 mg/L. Fourteen of the high fluoride/low IQ test villages had levels between 3 mg/L. and 5 mg/L.
8. Since the levels in the high fluoride/low IQ villages were usually higher than 0.7 mg/L, does that mean there isn't a problem here? No. There is no margin of safety for actual dose or for variations between individuals. Some people, such as those with iodine deficiency, are more susceptible to fluoride's toxicity than others. Others, such as athletes, manual laborers and those with kidney disease and/or diabetes, typically drink more water. The dose can be just as big a factor as the level of fluoride.

To take into account these variations when determining a margin of safety for the entire range of a population, toxicologists figure in a factor of at least 10. For example, if children drinking water with a fluoride level of 3 mg/L are showing lower IQ's, **the margin of safety to protect the entire range of a population would be .3 mg/L, lower than the 0.7 mg/L levels of most U.S. fluoridated cities.**

There is another major factor that is often neglected. U.S. children in a .7 mg/L area consume soft drinks using fluoridated water, eat food processed with fluoride, take fluoride supplements, etc. and will likely receive as much fluoride as Chinese children drinking water with 2-3 mg/L of fluoride. (over)

9. Choi noted that “each of the articles reviewed had deficiencies, in some cases rather serious, which limit the conclusions that can be drawn.” Does this make the study invalid? No. Choi also noted; “...**most deficiencies relate to the reporting, where key information is missing.**” Most epidemiological studies have weaknesses and none are perfect – it’s virtually impossible to control for every variable when comparing two communities.

One of the main variables can be arsenic, which also lowers intelligence. However, many of the individual studies controlled for arsenic and Choi stated that: “**From the geographical distribution of the studies, it seems unlikely that fluoride-attributed neurotoxicity could be due to other water contaminants.**”

Actually, China is a favorable place to conduct these studies, as it has many villages with stable populations of similar socio-economic levels, water supplies and fluoride levels that haven’t varied for many years.

The main point is this: After considering all the variables, the study concluded, “**...our results support the possibility of adverse effects of fluoride exposures on children’s neurodevelopment.**” Also, noting the consistency of results of the studies (26 out of 27 is quite extraordinary), the study stated that “**potential developmental neurotoxicity of fluoride should be a high research priority.**”

10. Are there any other studies that have been done since Choi? Yes, one in India in 2012 and one in China in 2011.
11. What did the newer studies find? The same results – the higher the fluoride exposure, the lower the IQ. Choi commented on the 2011 study (Ding et al), which used a different measurement. It showed the higher the level of fluoride in the urine, the lower the IQ. This individual measurement is even stronger than simply comparing the high and low fluoride villages. Choi said that the Ding study “**suggested that low levels of water fluoride (range 0.24 to 2.84 mg/L) had significant negative associations with child’s intelligence.**”
12. Have there been any similar studies done in the U.S.? No, even after the landmark 2006 study done by the National Research Council of the National Academy of Science’s Fluoride in Drinking Water recommended it.
13. What about animal studies? There have been over 80 animal studies that consistently found fluoride causing harmful effects on memory, learning and behavior. There really is no question – the National Academy of Science’s 2006 report said: “**It is apparent that fluorides have the ability to interfere with the functions of the brain and the body by direct and indirect means.**” Also, “**...these changes have a bearing on the possibility that fluorides act to increase the risk of developing Alzheimer’s disease.**”
14. What can we conclude? The answer to that question depends on the ‘Standard-of-Proof’ that you are using. Although we clearly have ‘proof beyond reasonable doubt’ that fluoride lowers IQ in children, even with all the information cited above, there is not absolute 100% proof that fluoridating water at 0.7 mg/L always lowers IQ’s in all children living in the affected area. Until and unless we control the matter of fluoride concentration vs. fluoride dose, that question will remain scientifically un-provable. Over the past 23 years of studies, a wealth of significant compelling data has accumulated, clearly indicating that fluoride lowers IQ in all mammals, with human children being highly at risk. This trend has been consistent over the 23 years of studies. Any scientific Standard-of-Proof requires repeatability and that element of proof has been confirmed by the Harvard study.

In the Sept. 5, 2012 [Harvard School of Public Health Press Release](#) on the study, co-author **Philippe Grandjean** stated “**Fluoride seems to fit in with lead, mercury and other poisons that cause chemical brain drain.**” Then, on February 11, 2013, in [clarifying](#) some misinformation about the study which appeared in two Kansas newspapers, **Grandjean** clarified: “**The average IQ deficit in children exposed to increased levels of fluoride in drinking water was found to correspond to about 7 points.**” Scientifically, we are well beyond the point of arguing “if” fluoride lowers IQ in children; the prudent question today is: “how much does fluoride lower IQ?”

The consistency of these results in both human and animal studies and the ethics of the margin of safety factor noted above, point to the unequivocal need to immediately stop all water fluoridation, to allow time for further study and research. Logically, the ‘burden of proof’ is on those who want to add fluoride to drinking water. In conclusion, it is obvious that fluoridation most certainly cannot be declared safe beyond a reasonable doubt.