



# AMERICAN FLUORIDATION SOCIETY

## Response to a Video: The Impact of Fluoride on Brain Development

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This animated video was co-produced by Christine Till and Bruce Lanphear, who have authored recent journal articles about fluoride. This animated video contains a variety of false or misleading claims and half-truths. In addition to relying on invalid arguments against fluoridation, the producers make health recommendations for pregnant women in contradiction to accepted standard of care and for which the producers have no qualifications to render. The following details the errors and misinformation contained in this video, with references embedded in the text of the responses.

*1. Video: "For years we were led to believe that fluoride is safe."*

**Facts:**

- The underlying implication here is that "we" have been misled into believing that fluoride at the level at which water is fluoridated is safe. The reality is that there is no credible, peer-reviewed scientific evidence that community water fluoridation is, in any manner, unsafe.
- While there are countless unsupported, irrational claims consistently made against fluoridation, for every seemingly plausible one there is ample peer-reviewed scientific literature to refute it.

*2. Video: "Meanwhile, the sugar industry, which knew sugar caused tooth decay promoted the use of fluoride and mounted a campaign to thwart efforts to reduce sugar consumption."*

**Facts:**

- This is a clear example of the common utilization of irrelevant conspiracy theory by fluoridation opponents to discredit this public health initiative. Sugar does not cause cavities. Dental decay is caused by acid secreted by oral bacteria which attaches itself to the teeth. Sugar is a source

of nutrition for this bacteria, and it isn't just foods with added sugar that can feed decay-causing bacteria. All carbohydrates that are eaten eventually break down into simple sugars.

- The video's "meanwhile" language misleads viewers by implying that the sugar industry's efforts to promote fluoride were a big boost to water fluoridation. This "meanwhile" phrase jumps from the late 1930s to industry efforts that [started in 1959](#)—a gap of at least 20 years. By 1959, fluoride-adjusted tap water reached more than 33 million Americans, so the momentum was already strong.

- What the sugar, or any other industry, may or may not have promoted at any given time, is of no relevance to the effectiveness and safety of water fluoridation, which has been repeatedly demonstrated within the peer-reviewed scientific literature over the past 7 decades.

3. Video: "Then, beginning in the 1970s, soon after fluoride was added to toothpaste, cavities declined sharply in countries with water fluoridation, but they also declined in countries without fluoridation."

**Facts:**

- The simplistic graph of dental decay incidence, as depicted in the video, appears to be the same one created by the New York-based antifluoridation group called the Fluoride Action Network, to misrepresent data of the World Health Organization.

## Critics distort oral health data

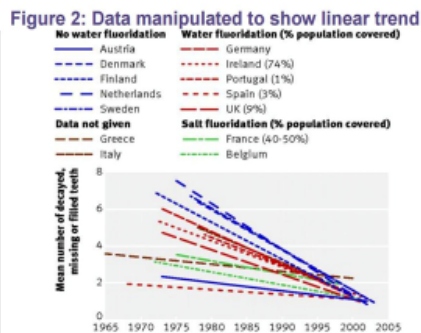
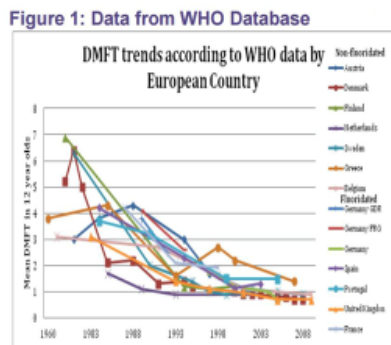


Figure 1 scatter-plot is drawn from data collected by the World Health Organization. Figure 2 is attributed to Cheong et al., "Adding fluoride to water supplies," *BMI*, 2007, 335:7622.



- The chart on the left is data from the World Health Organization
- The chart on the right is by opponents of water fluoridation. Straightened out true data points

The chart on the left is from the World Health Organization. The chart on the right was created by opponents of water fluoridation who straightened the trajectory of the data points — a manipulation in which reputable researchers would never engage.

Opponents to water fluoridation attempt to trivialize the added benefit that fluoridated water adds above and beyond fluoride toothpaste by presenting the graphs in Figures 1 and 2. Figure 3 was produced using the same World Health Organization's data and Ireland was used as an example. Like in other countries where water fluoridation is in place, Ireland clearly shows that the added benefit of fluoridated water results in decreased cavity prevalence in areas where fluoridation is in place than where it is absent.

## A clear benefit from fluoridation

A chart like this compares apples to apples. Children in Ireland who live in fluoridated areas have lower rates of decay

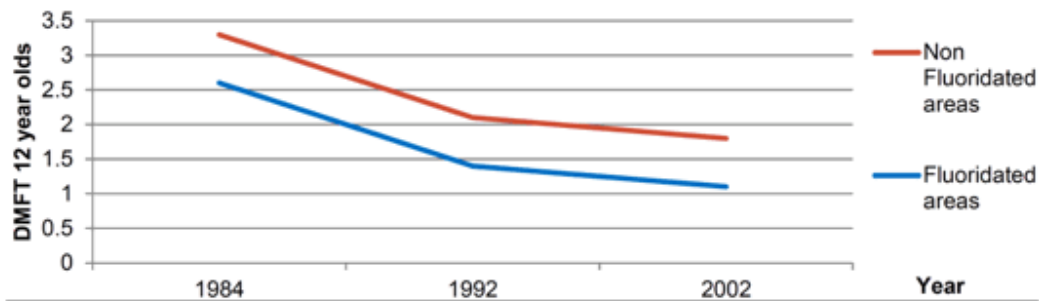


Figure 3: Data from the World Health Organization database. Available at <http://www.mah.se/CAPP/Country-Oral-Health-Profiles/>

The chart above clearly shows the reduction in cavities above and beyond those already reduced by fluoride toothpaste and other topical fluoride products. The WHO data used in the first two graphs was used to show the additive benefit of CWF in Ireland. When fluoridated toothpaste is already considered (red line), CWF (blue line) reduces cavities by at least an additional 25% in adults and children.

The video fails to mention this additional benefit where CWF is used.

A New Zealand chemist, Ken Perrott, PhD, provides a detailed exposure of this misrepresentation by FAN, [here](#).

4. Video: "A new study show [sic] that water fluoridation prevents about one cavity per child"

**Facts:**

▪ It is unclear as to what "new study" is referred here, but this manipulates averages in order to trivialize the devastating effects of untreated dental decay. Decay is *not* evenly distributed throughout the population. People living at lower income levels are much more likely to experience cavities. And research shows that fluoridated water has a pronounced decay-prevention benefit for the most disadvantaged people in a community. For example:

- A [study in South Korea](#) (2017) reviewed childhood decay data and concluded that water fluoridation programs "should be sustained to overcome oral health inequalities due to socio-economic factors and improve children's overall oral health."
- [Research in England](#) (2014) found that preschool-age children living in fluoridated areas "are 28% less likely to have had tooth decay than those in non-fluoridated areas."

▪ Tooth decay is a very serious bacterial infection occurring in close proximity to the brain, with a direct path to the rest of the body via the bloodstream. It's no wonder [the Mayo Clinic](#) has called oral health "a window to your overall health." Setting aside the misuse of averages, even one untreated cavity in one tooth can lead to a lifetime of extreme pain, debilitation, black discoloration and loss of teeth, development of serious medical conditions, and life-threatening infection. People die as a direct result of this "one cavity" antifluoridationists seek to trivialize.

"One cavity":



Began with "one cavity":



▪ [Deamonte Driver](#), a 12 year old Maryland child, died as a result of "one cavity" that was untreated and became a more serious infection.

▪ A Journal of Endodontics [study](#) looked at nine years of admissions to hospitals for periapical abscesses: 61,000+ were hospitalized and 66 people died.

▪ [Kyle Willis](#), a 24-year-old unemployed father from Cincinnati, died in 2009 as a result of "one cavity".

▪ [John Schneider](#), a 31 year old Ohio man, died in 2014 after what he thought was a sinus infection but was actually an untreated abscess that eventually led to multiple organ failure resultant — all of which began from "one cavity".

- [Vadim Kondratyuk](#), a Sacramento truck driver died from "one cavity".

5. Video: *"Everybody agrees that fluoride is toxic at very high levels. What about at low levels? In over a dozen studies, mostly from China, children who lived in villages with naturally high levels of fluoride had about 7 IQ points fewer than children in other villages. But those levels were somewhat higher than those found in North America."*

**Facts:**

- "Everybody" also agrees that there is no substance known to man which is not toxic at high levels, including plain water. Fluoridation opponents disingenuously seek to demonize fluoride by calling it out for a property that is common to virtually all substances.

- The "over a dozen studies" is a reference to [a 2012 review](#) of 27 Chinese studies. As far as the fluoride levels being "somewhat higher than those found in North America" these studies were of the effects of far higher levels of fluoride (as high as 11.5 ppm) in the well-water of various Chinese, Mongolian, and Iranian villages. These fluoride levels were irrelevant to the minuscule 0.7 mg/liter in fluoridated water in the US.

- In addition, by the admission of Grandjean and Choi, themselves, these studies had key information missing, inadequate control for confounders, and questionable methodologies. Elevated [lead](#) and [arsenic](#) levels exist in the water found in various regions of China.

- The control group in the studies they evaluated (where children's IQ scores were higher) had fluoride levels approximating levels in CWF: 0.7 mg/L. **The children in the control group had no IQ changes** as opposed to the 7 point drop in the high fluoride studies.

- These 27 studies were so seriously flawed that Grandjean and Choi were led to issue a public statement in March, 2012 that the studies should not be used to judge water fluoridation in the US. This obviously has not stopped antifluoridationists from doing so anyway.

*"These results do not allow us to make any judgment regarding possible levels of risk at levels of exposure typical for water fluoridation in the U.S. On the other hand, neither can it be concluded that no risk is present. We therefore recommend further research to clarify what role fluoride exposure levels may play in possible adverse effects on brain development, so that future risk assessments can properly take into regard this possible hazard."*

– Anna Choi, research scientist in the Department of Environmental Health at HSPH, lead author, and Philippe Grandjean, adjunct professor of environmental health at HSPH, senior author

6. Video: *"Two newer studies of pregnant women and their children, one in Mexico where fluoride is added to salt, and the other in Canada, where fluoride is added to water, also found that fluoride led to IQ deficits in children."*

**Facts:**

- The producers of this video do not disclose that these two "newer studies" were co-authored by some of the same people who co-produced or served as advisors for this video. Respect for scientific integrity should have prompted them to make this disclosure.

- The poor methodology, inadequate control for confounders, and other discrediting flaws have been identified by a wide array of researchers and organizations within the respected scientific community. A number of the organizations and their critiques are linked below:

- [The Canadian Agency for Drugs and Technologies in Health](#) (CADTH), which determined that the authors' findings were based on "weak" evidence and their conclusion "was not supported by the data"

- A systematic review published by the [Archives of Toxicology](#) reviewed numerous studies, including the two cited in the video. This review concluded that the overall evidence "did not support the presumption" that fluoride should be considered a neurotoxicant at the exposures common in western nations.

- [Science Media Centre](#), a web portal that posted concerns about the 2019 Canadian study from numerous toxicologists, neurologists and researchers

- [American Association for Dental Research](#) (AADR)

- [American Dental Association](#) (ADA)

- [British Fluoridation Society](#)

7. Video: *"Some critics say that because our study was an observational study we did not dose pregnant women with fluoride like a drug study, it was inconclusive. But if we dismissed all observational studies we would have little evidence that water fluoridation prevents tooth decay."*

**Facts:**

- Critics do not criticize this study because it is observational. Concerns have focused, instead, on other aspects of the methodology and on the data analysis. Due to fluoridation opponents promoting this study as proof that fluoridated water causes IQ impairment, the scientific community has correctly pointed out that this study does not prove, or even address, causation. It simply demonstrates what the study's authors claim to be an association between fluoridated water and lower IQs. Given the other complex factors involved in brain development, including those not controlled in this study, such an association is of little value — certainly not a "smoking gun" as opponents present it to be.

8. Video: *"Some critics say that it's only one study, but that ignores over a dozen high quality studies showing that fluoride is toxic to the developing brain."*

**Facts:**

- There are no high quality peer-reviewed scientific studies showing that fluoride at the 0.7 mg/liter concentration in water is toxic to the developing brain, or any other bodily system.

- This reference to “over a dozen high quality studies” might be intended to include some of the studies, mostly from China (cited earlier), that were reviewed in a 2012 journal article. Yet, as mentioned earlier, those studies were not high quality; indeed, consider the assessment of the authors of that 2012 article [who wrote](#) that “each of the articles reviewed had deficiencies, in some cases rather serious ones, that limit the conclusions that can be drawn.”

*9. Video: Two recent studies from Mexico and Canada “also found that fluoride led to IQ deficits in children.”*

**Facts:**

- Led? That term presumes a cause-and-effect relationship, which is very different from the “association” that these studies reported. Nowhere within the text of the Mexican or Canadian studies do the authors write that fluoride exposure “caused” or “led” to lower IQ scores. Using this kind of language in the video is a very big and unjustified leap — especially for people who want their research products to be taken seriously.

- This kind of language suggests that the producers of this video have made up their minds. It’s as if they are saying “fluoride causes X and we don’t need any more research to validate our views.” That is an irresponsible disposition for researchers.

- Given the numerous concerns that experts have expressed about these two studies, one would expect conscientious researchers to be prudent and not use such presumptuous language as this.

*10. Video: “Some critics say it’s of little consequence if a child loses 3-5 IQ points. Is it worth losing 3-5 IQ points to prevent one cavity?”*

**Facts:**

- This whole section on IQ rests on the speculative assumption that fluoridated water causes IQ reduction. Given that the video producers have provided no valid evidence to support that assumption, this delve into the importance of IQ points is not relevant to water fluoridation.

- That the producers attempt to equivocate this speculation with the volume of peer-reviewed science which has clearly demonstrated significant dental decay reduction by fluoridation, while they once again trivialize this infection as “one cavity”, is further evidence of the disingenuousness of this video.

*11. Video: “... what’s more, children are often exposed to many chemicals that impair brain development, like lead, air pollution, pesticides and fluoride.”*

**Facts:**

- Yes, the factors involved in brain development are complex and countless. That the producers fail to realize the ironic nature of their noting the “many chemicals that impair brain

development" is further evidence of their misunderstanding of the lack of adequate control within their study for the numerous variables other than fluoride.

12. Video: *"Pregnant women and children should limit fluoride ingestion. After all, it only benefits children once their teeth have erupted."*

**Facts:**

This is false. While it is true that everyone should limit ingestion of fluoride and all other substances — including [Vitamin D](#), [iron](#) or plain water — to those amounts which have been determined to be safe, it has been clearly demonstrated that fluoride incorporated into teeth during their development both before and after birth, strengthens teeth against decay:

- [Buzalaf](#): "Evidence also supports fluoride's systemic mechanism of caries inhibition in pit and fissure surfaces of permanent first molars when it is incorporated into these teeth preeruptively."
- [Singh, et al](#): Their findings "indicated the importance of a preeruptive exposure to fluoridated water without which there was no significant prevention of caries. The preventive effect was maximized by continuous exposure both before and after eruption."
- [Iida and Kumar](#): "This study's findings suggest that molars with fluorosis are more resistant to caries than are molars without fluorosis." [Dental fluorosis can only occur during tooth development]

13. Video: *"If you are pregnant, don't drink fluoridated water or black tea"*

**Facts:**

This recommendation is unsupported, and contradicts accepted standard of care by Medicine and Obstetrics.

- The [American Academy of Pediatrics](#):

"The results of the study are difficult to interpret given that the IQ difference was small and in one group it only appeared in boys. In the group where an association was seen for boys and girls, the fluoride intake was self-reported, which is less reliable. They also stressed the study did not look at children's fluoride intake, only that of pregnant women."

"The Academy continues to recommend children use age-appropriate amounts of fluoride toothpaste and drink fluoridated tap water to protect teeth from painful damage. Optimum fluoridation levels are continually re-evaluated. Those living in communities without fluoridated water can supplement with dietary fluoride."

- The [American College of Obstetrics and Gynecology](#):

A tweet posted on September 21, 2017: "ACOG & @AmerDentalAssn recommend that #pregnant #women drink fluoridated water."



- A 2012 Statement by the [National Maternal and Child Oral Health Resource Center](#):  
"Drink water throughout the day, especially between meals and snacks. Drink fluoridated water (via a community fluoridated water source) or, if you prefer bottled water, drink water that contains fluoride."
- [Public Health Ontario](#):  
"Article Review on "Prenatal Fluoride Exposure and Cognitive Outcomes in Children at 4 and 6-12 Years of Age in Mexico"
- [American Dental Association](#) on the Mexican fluoride study (2017)

14. Video: *"If possible, breastfeed your baby. Otherwise, don't use fluoridated water to make infant formula."*

**Facts:**

- Yes, breastfeeding is certainly supported by medicine and dentistry. However, there is no high quality peer-reviewed scientific evidence to support a recommendation against using optimally fluoridated water to prepare infant formula.
- The only potential consequence of mixing powdered infant formula with fluoridated water is mild to very mild dental fluorosis in the developing teeth of bottle-fed infants. This barely detectable effect causes no adverse effects on cosmetics, form, function, or health of teeth. As peer-reviewed science has demonstrated mildly fluorosed teeth to be more decay resistant, many consider this effect to [not even be undesirable](#), much less adverse.

15. Video: *"Children should only use a rice-sized amount of toothpaste when they brush their teeth, not the amount shown on toothpaste commercials. And they shouldn't swallow it."*

**Facts:**

- Yes, this is the recommendation of the [American Dental Association](#) and the [American Academy of Pediatrics](#) for children under age 3. However, from age 3 to 6, these organizations recommend that children brush their teeth with a pea-sized amount of fluoride toothpaste. These recommendations are designed to work in conjunction with water fluoridation.

16. Video: *"Adding fluoride to water isn't the only way to prevent cavities. You can choose to not buy products from companies that market sweetened drinks and highly processed foods to children. After all, sugar is the main cause of tooth decay."*

**Facts:**

- Yes, water fluoridation isn't the only way to prevent cavities. It is, however, the most cost-effective means to prevent significant amounts of dental decay in entire populations. In addition, fluoridation is meant to work in conjunction with all other viable means of decay prevention, not in the place of them.

- A key advantage of fluoridation is that people in a community can receive its protective benefits at home, work or school simply by consuming tap water or foods/drinks that are made with it. Given how the coronavirus pandemic has disrupted access to dental care and school-based dental programs, this makes fluoridation particularly important.

- Sugar is not the main cause of tooth decay. While sugar is a contributing factor, tooth decay is caused by acid secreted by oral bacteria adhering to the teeth. Reducing sugar reduces a food source for this bacteria; however, it is the removal of this bacteria from the teeth, and the strengthening of the teeth against the acidic assault which prevents decay. Fluoridated water has been clearly demonstrated to provide this increased resistance.