# Reasons to End Water Fluoridation

*A Science-Based Assessment*

Fluoride Action Network
fluoridealert.org

UPDATED APRIL 2025

*"The evidence that fluoridation is more harmful than beneficial is now overwhelming."*

**Hardy Limeback, DDS, PhD**
**Former President of the Canadian Association for Dental Research**

*"Fluoridation goes against all principles of pharmacology. It's obsolete."*

**Arvid Carlsson, MD, PhD**
**Nobel Laureate in Medicine/Physiology**

*"In summary, we hold that fluoridation is an unreasonable risk."*

**U.S. Environmental Protection Agency's Headquarters Union of Scientists and Professionals (2001)**

*"We've gone with the status quo regarding fluoride for many years—for too long, really—and now we need to take a fresh look. In the scientific community, people tend to think this is settled. But when we looked at the studies that have been done, we found that many of these questions are unsettled and we have much less information than we should, considering how long this has been going on."*

**John Doull, MD, PhD**
**Chairman, National Research Council's Review on Fluoride in Drinking Water**

*"The Court finds that fluoridation of water at 0.7 milligrams per liter ("mg/L") – the level presently considered "optimal" in the United States – poses an unreasonable risk of reduced IQ in children…the Court finds there is an unreasonable risk of such injury, a risk sufficient to require the EPA to engage with a regulatory response."*

**United States District Court of the Northern District of California (2024)**

# Overview

Water fluoridation is the practice of using the public's drinking water as a delivery system to increase the amount of fluoride residents ingest on a daily basis. This is done by adding industrial waste by-products known as "silicofluorides" (i.e., hydrofluorosilicic acid and sodium fluorosilicate) to public water systems during the treatment process in either liquid or powder form to artificially elevate the fluoride content to 0.7 ppm (parts per million).


Prior to 2015, U.S. Health and Human Services recommended fluoride levels in water up to 1.2 ppm. However, this recommendation was significantly lowered to the present level of 0.7 ppm following the acknowledgment of government research from 2006, eight years prior. This research revealed that most adolescents in the U.S. experienced overexposure to fluoride during childhood development, resulting in visible side effects. According to the EPA and peer-reviewed research, the primary source of this overexposure was the consumption of water and water-based beverages. Unfortunately, even the reduced level of 0.7 ppm has continued to contribute substantially to over-ingestion of fluoride, with the percentage of children in the United States with visible side effects from overexposure now exceeding 70%, according to the U.S. Centers for Disease Control (CDC).

Throughout North America and the world, most fresh ground and surface water naturally contains very low "trace" levels of fluoride, with an average concentration of less than 0.1 ppm. This is 7 to 10 times lower than the levels added by water departments in fluoridated communities, where levels typically fluctuate between 0.7 and 1.0 ppm due to imprecision in the injection process as well as variations in water usage and temperature. This significant increase in fluoride is neither a small adjustment nor typical of the naturally occurring levels found in most water sources.

Fluoride in water is regulated by the Environmental Protection Agency (EPA) as a contaminant. Naturally occurring fluoride in water results from the erosion of fluoride-rich rocks and soil by surface and groundwater. Fluoride can also be found in water as the result of pollution from coal-burning facilities and from the production of steel, glass, aluminum, ceramics, solar panels, and semiconductors. The silicofluorides used for water fluoridation are largely derived from the pollution abatement scrubbers installed on smokestacks at aluminum smelting and phosphate fertilizer manufacturing plants. It's important to note that the fluoride compounds used in the fluoridation of public water supplies are not of pharmaceutical or food-grade quality and do not undergo additional refinement or filtration to remove contaminants before being added to drinking water.

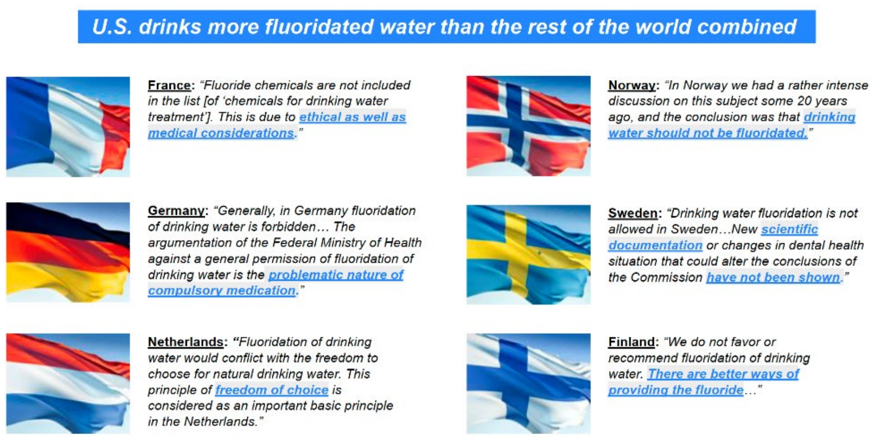

Silicofluorides are the only chemicals added to public water supplies that are not intended to improve the safety or potability of drinking water. Unlike chlorine and coagulants that are added to purify and clarify the water, silicofluorides offer no such benefits. Conversely, batch samples and certificates of analysis that accompany shipments of fluoridation additives reveal that silicofluorides are contaminated with harmful toxins, including lead, aluminum, and arsenic. Due to the extreme acidity of silicofluorides, they can increase corrosion of the water infrastructure, resulting in the leaching of heavy metals from pipes and fixtures into the water that residents rely on for drinking, cooking, and bottle-feeding their infants. Moreover, the caustic nature of fluoridation chemicals requires the introduction of an additional treatment chemical to the drinking water to inhibit corrosion, called orthophosphate.

In contrast to all other water treatment chemicals, silicofluorides are added to water supplies to treat the residents consuming the water. Fluoride is categorized as a drug by the U.S. Food and Drug Administration (FDA) when employed for the prevention or mitigation of disease (Plaiseier, 2000). Thus, fluoridating water for the purpose of preventing tooth decay (a non-water borne disease) is a form of medical treatment. It's the only pharmacologic agent being forced on the public at large, many of whom are unaware of the addition of this chemical or informed of its side effects and potential risks. This practice contradicts the prevailing trends in modern medical care, which emphasize targeted therapies, personalized medicine, and the importance of informed consent.

With fluoridation, the same concentration is delivered to the entire population, regardless of age, weight, health, or nutritional status, and it does so without the individual oversight of a doctor or any control over the dosage administered. While water departments can generally control the concentration of fluoride being added to water, they cannot control the amount (dose) individuals receive or protect them from overexposure because everyone drinks varying amounts of water. Some residents will drink substantially more water than others, particularly bottle-fed infants who have an impaired ability to excrete fluoride and receive up to 400% more fluoride (per pound of body weight) than adults consuming the same level of fluoride in water due to their small size and potential reliance on formula reconstituted with fluoridated tap water for most of their diet. Clearly, this practice from the 1940s contradicts modern pharmacology, which recognizes that individuals respond differently to the same dosage of a given drug.

For over 50 years, proponents of fluoridation hypothesized that following ingestion, fluoride would enter the bloodstream and some of it would be excreted in the saliva, providing a continuous fluoride bath for the teeth. However, subsequent research has since confirmed that any potential benefit from fluoride occurs after the teeth have erupted from the gums and predominantly from topical exposure rather than from ingestion. Consequently, this research confirms that there is little to no potential oral health benefit from swallowing fluoride, particularly for fetuses and infants. Instead, there is only a risk of overexposure and harm to other exposed tissues.

The brain is just one of the tissues that fluoride impacts aside from teeth. There's now a large body of government-funded research indicating that fluoride is neurotoxic to the developing brain and is associated with lowered IQ in children and a doubling of neurobehavioral disorders, including a significant increase in ADHD diagnosis in children at doses experienced in fluoridated communities. A federal judge has ruled that "optimally" fluoridated water poses an unreasonable risk to human health, and the U.S. EPA must eliminate that risk with new rules. Experts in toxicology have drawn parallels between the cognitive impairment caused by fluoride and that of lead. Basic logic tells us that while a cavity can easily be filled and repaired, damage to a child's brain is lifelong and irreversible; there are no second chances.




In stark contrast to the CDC's claim that fluoridation is one of the top ten public health achievements of the 20th century, it is actually one of the most widely rejected health interventions in the world. Out of 196 nations, only 24 have any fluoridation, and only 10, like the U.S., have it for more than half their population. Over 95% of the world's population is fluoridation-free. None of the largest Asian nations, including China, India and Japan, fluoridate. All African nations are virtually fluoridation-free. In Europe, only four out of 48 countries fluoridate (less than 2% of the population). A few have fluoridated salt, but only as a consumer choice.

International health authorities have made this decision primarily due to the low safety margin of fluoride and the lack of control over individual intake when it is administered to an entire population. Even those affiliated with Harvard's School of Public Health cited their concerns in Harvard Public Health magazine by saying, "Now, evidence is mounting that in an era of fluoridated toothpastes and other consumer products that boost dental health, the potential risks from consuming fluoridated water may outweigh the benefits for some individuals" (Davis, 2016). Evolving science should inspire decision makers and health authorities to re-evaluate claims about the safety of fluoridation, especially for the fetus and infant for whom there is no claimed benefit.

I urge you to stand with the majority of the world against water fluoridation. Let us ensure the safety of public drinking water for all citizens, including bottle-fed infants, the developing fetus, the hypersensitive, and those with thyroid, liver, and kidney impairment, among other vulnerable subpopulations. Fluoride ingestion ought to be a choice, not a mandate.

Stuart Cooper
Executive Director
Fluoride Action Network (FAN)

# Publication History & Contributors

This document used the 2012 version of “50 Reasons to Oppose Water Fluoridation” as its foundation. Updates were made by FAN’s Director, Stuart Cooper, in cooperation with JANA Life Sciences and with contributions from Rick North and Hardy Limeback, DDS, PhD.

The 50 reasons were first compiled by professor and environmental toxicologist Paul Connett, PhD, and presented in person to the Irish Fluoridation Forum in October 2000. The document was refined in 2004 and published in Medical Veritas.

The document was updated in 2012, after there had been many major scientific developments including the publication of the U.S. National Research Council report (NRC, 2006), FAN’s translation of over 20 Chinese studies on fluoride toxicity, publication of the Harvard team’s meta-review of fluoride and IQ (Choi 2012), the publication of Bassin’s study on Osteosarcoma (Bassin 2006), and any more studies of fluoride’s interaction with the brain. That update was made with the generous assistance of James Beck, MD, PhD, Michael Connett, JD, Hardy Limeback, DDS, PhD, David McRae and Spedding Micklem, D.*Phil*.

# Key Facts

- The U.S. is an extreme outlier when it comes to the use of fluoridation chemicals. More people drink artificially fluoridated water in the U.S. than the rest of the world combined. Out of 196 nations, only 24 have any fluoridation. This means that over 95% of the world's population is fluoridation-free. This includes most developed nations, with 98% of the population in Western Europe drinking public water without fluoridation chemicals. In fact, France, Germany, Belgium, the Netherlands, Denmark, Norway, and Sweden have all made fluoridation illegal, many citing the ethical problem of putting any drug in drinking water. Several European nations do allow table salt to be fluoridated, but the vast majority do not, and in contrast with water fluoridation, this practice gives the consumer the choice of whether to purchase salt with or without added fluoride.

- According to World Health Organization data, fluoridated countries DO NOT have less dental decay than non-fluoridated countries. Developed nations have experienced the same decline in tooth decay over the past 50+ years regardless of fluoridation status. CDC data comparing childhood dental decay in U.S. states also shows no correlation between fluoridation rates and decay rates. Many of the states and cities with the highest rates of fluoridation for decades continue to have some of the highest rates of decay and tooth loss, while many states with the lowest decay are among the least fluoridated.

- The largest, most recent, and highest-quality published studies on water fluoridation's effectiveness have shown no significant reduction in cavities and no meaningful reduction in social inequalities or benefit to low-income families.

- It is now well established that fluoride is not an essential nutrient. This means that no human disease, including tooth decay, will result from ingesting less fluoride.

- Modern dental research shows that swallowing fluoride is unnecessary. Studies have confirmed that fluoride's potential benefit comes from topical exposure and not from ingestion, which unnecessarily exposes many other tissues in the body that are only harmed by fluoride. Under oath, the CDC has confirmed this fact as well. There is no shortage of topical fluoride products in the developed world, and thus no justifiable reason to continue the practice. Fluoride-containing toothpastes, mouthwashes, and flosses are inexpensive and abundant in virtually every local supermarket, pharmacy, big box store, corner convenience store, online, and at food banks and W.I.C. offices.

- The dose cannot be controlled. Once the water is fluoridated, it is impossible to control the dose each individual receives because people drink varying amounts of water.

- CDC data has repeatedly confirmed that over 70% of adolescents in the U.S. have permanent unsightly defects in their enamel, called dental fluorosis. This is a biomarker of systemic overexposure to fluoride during infancy and childhood, with the primary source of exposure being the ingestion of fluoridated tap water. The stains and discoloration lower the sufferer's confidence and often weaken the enamel, increasing dental decay.

- Fluoride is the only medicine added to the water supply. It's a drug as defined by the FDA, but fluoride ingestion or supplementation has never been FDA approved for safety or efficacy. There has also never been a single randomized controlled trial (RCT) confirming fluoridation's safety or efficacy after nearly 80 years. All drugs can have harmful health effects. Putting it in the drinking water takes away your right to informed consent. Using the public water supply to administer ANY drug is unethical. All citizens should be free to hydrate without having to regulate their total fluoride intake. Fluoride ingestion should be a choice, not a mandate.

- There is now very strong evidence that fluoride damages both the fetal and infant brain at the levels used in artificially fluoridated areas. Over 400 studies have found that fluoride is a neurotoxin (a chemical that can damage the brain). This research includes over 200 animal studies showing that prolonged exposure to varying levels of fluoride can damage the brain, particularly when coupled with an iodine deficiency or aluminum excess, and 79 human studies linking low to moderately high fluoride exposures with reduced intelligence. The National Institutes of Health (NIH) have funded 10 studies on fluoride and the brain, and all 10 found neurotoxic side effects.

- After an 8-year long systematic review, the National Toxicology Program found "with moderate confidence, that higher estimated fluoride exposures are consistently associated with lower IQ in children." The NTP reported that out of 72 human studies assessing the association between fluoride exposure and cognitive impairment in children, 64 linked higher fluoride exposures with significantly lower IQs in children, an 89% consistency. Out of the 19 highest-quality studies, 18 found neurotoxicity – 7 of those studies at levels present in "optimally" fluoridated communities.

- A federal court has found that "there is substantial and scientifically credible evidence establishing that fluoride poses a risk to human health." In August 2024, the court ruled that "fluoridation of water at 0.7 [mg/L] -- the level presently considered 'optimal' in the United States –- poses and unreasonable risk of reduced IQ in children." The EPA is now required by law to promulgate rules to eliminate the "unreasonable risk" to the health of children.

- Fluoridation chemicals are not pharmaceutical-grade or food-grade products; they're classified as hazardous waste originating from phosphate fertilizer production and aluminum factories, as noted in the EPA's National Primary Drinking Water Regulations (NPDWR). These silicofluorides undergo no purification procedures and, as a result, can contain elevated levels of arsenic and other heavy metal contaminants, more than any other water treatment chemical. In addition, recent research suggests that the addition of silicofluorides to water is a risk factor for elevated lead exposure, particularly among residents who live in homes with old pipes.

- Apart from reverse osmosis, distillation, or buying properly tested spring or bottled water with low fluoride, it is difficult to avoid ingesting fluoride, making fluoridation a water equity issue. Reverse osmosis filtration systems and distillation units are expensive and require regular maintenance and continued expense to operate. Those with a low income are the least able to avoid fluoride if it's added to the water supply.

- Fluoridation is a significant waste of taxpayer money. Cities are spending tens of millions of dollars on fluoridation equipment and chemicals, with even the smallest communities spending tens of thousands of dollars. It's estimated that 99% of all tap water is used for purposes other than drinking, meaning that 99% of fluoridation chemicals, representing hundreds of thousands of tons of siliocofluoride waste goes directly into the environment and watershed. This takes funds away from more effective oral health strategies.

- There are better and safer alternatives for preventing cavities. Good nutrition, as well as brushing, flossing, and regular dental care, are at the top of the list. Nations with the lowest decay rates have focused on school-based programs, such as oral health screenings, sealant, and voluntary topical rinse programs instead of resorting to fluoridation chemicals.

# Table of Contents

# I. Fluoride is Neurotoxic, Especially to the Developing Brain.

One of the most alarming effects of fluoride is its neurotoxicity, which has been shown to be 'on par' with that of lead. The fetus and infants are the most susceptible to fluoride exposure given their brains are still developing and their body mass and ability to excrete fluoride is radically different from that of an older child, much less than that of an adult. In particular, exclusively bottle-fed infants are most susceptible when infant formula is prepared with fluoridated 'tap' water. Canadian researchers "investigated the association between water fluoride concentrations and intellectual abilities of Canadian children who were formula-fed or breastfed", and they found "formula-fed infants who reside in fluoridated areas have a 70-fold higher intake of fluoride than exclusively breastfed infants." In addition, they noted that formula-fed infants also retain more fluoride than breastfed infants, because infants have a limited capacity to excrete fluoride before renal function reaches its full capacity at about two years of age. Their conclusion statement reads, "Exposure to increasing levels of fluoride in tap water was associated with diminished non-verbal intellectual abilities; the effect was more pronounced among formula-fed children" (Till et al. 2019).

**For the fetus and for infants, fluoridation provides only risk.**
The CDC has admitted under oath that there is no known benefit to ingesting fluoride for the fetus or an infant. Meanwhile, a substantial body of government-funded research now indicates that fluoride possesses neurotoxic properties. This neurotoxicity may be associated with a decline in children's IQ levels and a rise in ADHD diagnoses and related behaviors. There are studies that suggest this is happening even at levels to which fluoridated communities are commonly exposed (Fiore, 2023).

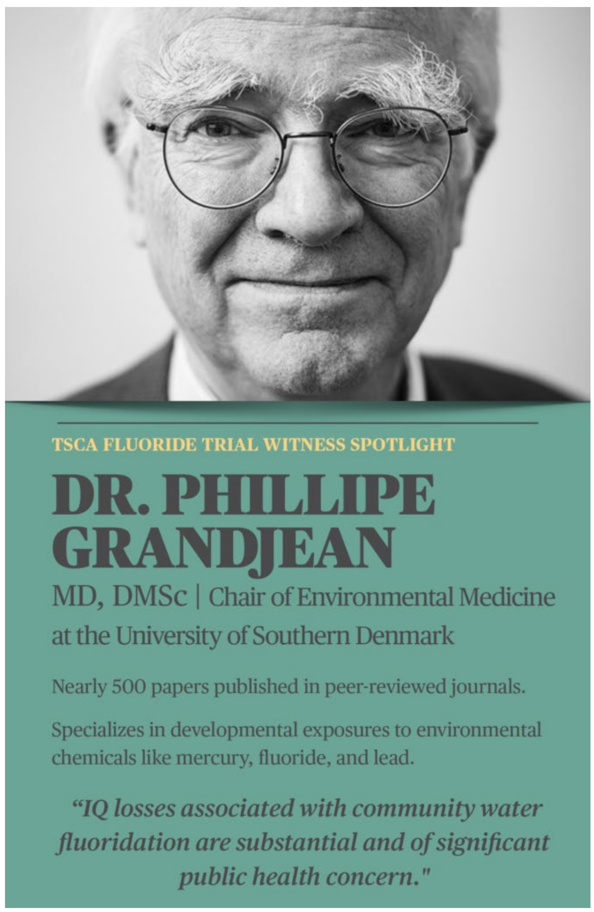
Experts in the field of toxicology have drawn parallels between the magnitude of this effect and that observed with lead exposure. As of January 2025, there are at least 85 human studies that have reported an association between fluoride exposure and reduced IQ. The current depth of evidence demonstrating the neurotoxicity of fluoride surpasses the evidence that led to the removal of lead from gasoline. It's essential to emphasize that, while cavities can easily be treated, damage to a child's brain is permanent.

In July of 2012, scientists from Harvard University warned that the developing brain may be another target for fluoride toxicity in the medical journal *The Lancet* (Choi et al., 2012). The Harvard team based their warning on a large number of studies from China that have found reduced IQ scores among children exposed to elevated fluoride during their early years of life. [This source of the elevated fluoride levels was attributed to groundwater adversely affected by the geological composition of the affected areas, particularly in shallow wells used for drinking.] Twelve of the studies the Harvard team reviewed found IQ loss at fluoride levels deemed safe in the U.S. and a study sponsored by UNICEF found IQ loss in iodine-deficient children at the so-called "optimal" fluoridation level. The possibility that fluoridated water can reduce IQ is a matter that "definitely deserves concern."

Since 2012, the National Institutes of Health (NIH) has funded ten consecutive studies showing that fluoride significantly impacts brain development in young children. Many of these studies were conducted in optimally fluoridated communities in North America.

**First-ever benchmark dose analysis conducted on fluoride in water and its impact on IQ.** A Benchmark Dose Analysis (BMD) by Grandjean et al., published in the journal *Risk Analysis*, confirms that extremely low fluoride exposure during pregnancy impairs fetal brain development and at the population level may currently be causing more damage than lead, mercury, or arsenic (2021). The study found that a maternal urine fluoride concentration of just 0.2mg/L, **which is actually exceeded 4 to 5 times in pregnant women living in fluoridated communities**, was enough to lower IQ by 1 point. They state that:

> "These findings provide additional evidence that fluoride is a developmental neurotoxicant … and the benchmark results should inspire a revision of water-fluoride recommendations aimed at protecting pregnant women and young children."



While fluoridation promoters claim that IQ loss only occurs at fluoride concentrations much higher than the levels used in fluoridation programs (0.7 ppm), in reality pregnant women's urine levels in fluoridated communities are about four to five times higher than this estimated benchmark dose of 0.2 ppm (Northern California and across Canada) (Abduweli Uyghurturk et al., 2020; Riddell et al., 2021)." Grandjean et al. used pooled data from the ELEMENT and MIREC birth cohorts in Mexico and Canada. These cohorts were used in two major mother-offspring studies (Bashash, 2017 and Green, 2019) funded by the U.S. National Institutes of Health.

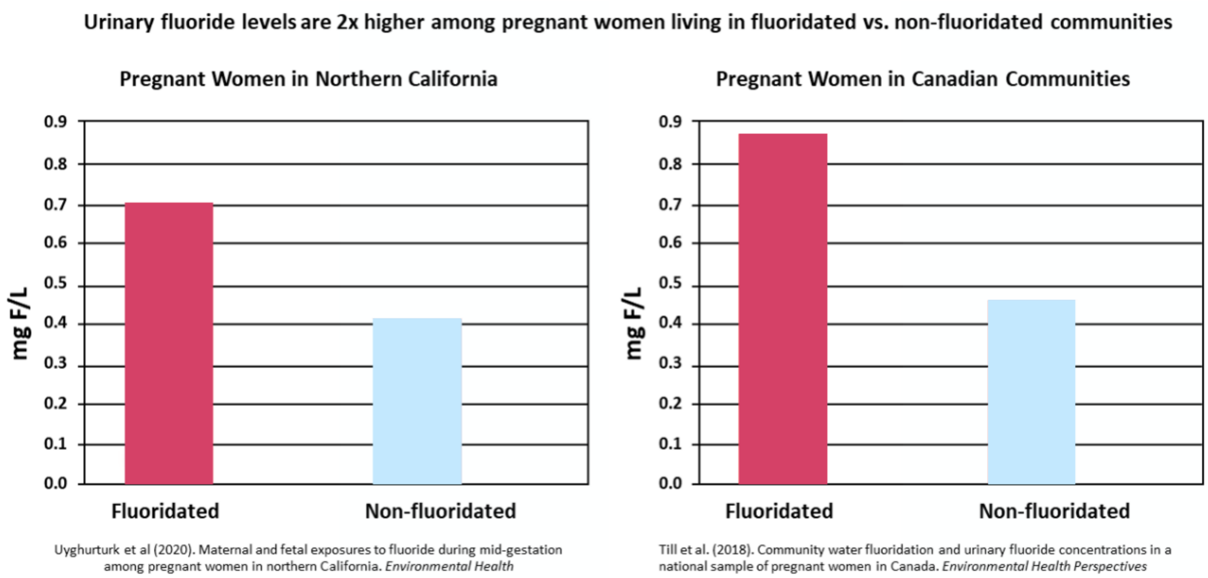



**Figure 1.** Comparison of urinary fluoride levels among pregnant women in California (left), and Canada (right). Red bars represent urinary fluoride levels of those women residing in fluoridated communities, while blue bars represent those women residing in non-fluoridated communities. In both California and Canada, the urinary fluoride concentrations were higher in women from fluoridated communities compared to non-fluoridated.

A Benchmark Dose Analysis is used to identify a dose that would likely cause a defined amount of harm, in this case a loss of 1 IQ point. This benchmark (loss of one IQ point) has been used by the Environmental Protection Agency (EPA) in other risk assessments. It is well established that a loss of one IQ point leads to a reduced lifetime earning ability of $18,000. It is estimated that over 70% of drinking water systems in America are fluoridated, thus millions of pregnant women are currently being exposed to levels of fluoride that has the potential to lower their children's IQ by at least 4 points.

**Former director of National Toxicology Program warns pregnant women to avoid fluoridated water.**

The former director of the NIH National Institute of Environmental Health Sciences (NIEHS), Dr. Linda Birnbaum, along with leading experts in the study of fluoride's neurotoxic effects, including Dr. Bruce Lanphear and Dr. Christine Till, have jointly authored a significant Op-ed. In this piece, they underscore the growing body of evidence suggesting fluoride may be impeding brain development and diminishing the IQ of infants and children, saying: "Given the weight of evidence that fluoride is toxic to the developing brain, it is time [to] protect pregnant women and their children [and recommend they] reduce their fluoride intake."


**World-renowned neuroscientists consider fluoride's effect size (on the brain) to be on par with lead.**

The issue of fluoride exposure and its potential impact on cognitive abilities has garnered significant attention from experts and researchers in the medical and scientific communities.

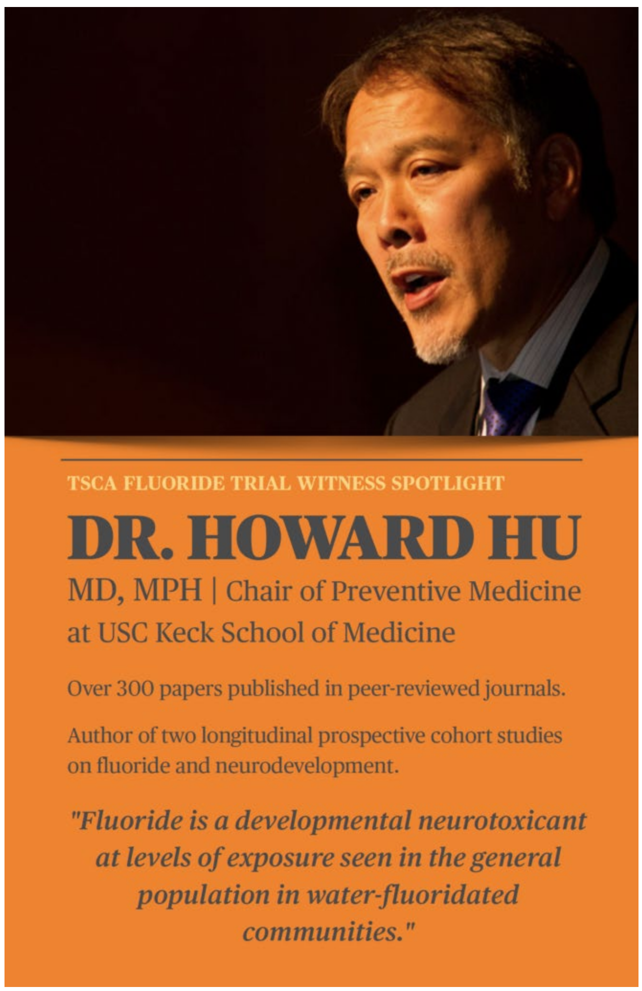
- Editors from the Journal of the American Medical Association (JAMA) described the IQ drop of 4.5 IQ points in one study (Green et al. 2019): "An effect size which is sizeable – on par with lead" (Feder & Connor, 2019).

- David Bellinger, author of over 400 epidemiology papers on neurotoxic chemicals, including over 100 on lead, said "It's actually very similar to the effect size that's seen with childhood exposure to lead" (Harris, 2019).

- Christine Till, leader of a research team that has published rigorous studies of fluoride neurotoxicity funded by the National Institutes of Health (NIH) says [Dunham, Canada CTV, 2019]: “4.5 points is a dramatic loss of IQ, comparable to what you’d see with lead exposure.”

- And [Farmus et al., 2021]: “A 2- to 4-point decrement in PIQ [Performance IQ] may seem like a small difference at the individual level. However, a small shift in the mean of IQ scores at the population level translates to millions of lost IQ points given the ubiquity of fluoride exposure.”

- Philippe Grandjean, editor-in-chief of the journal Environmental Health, and author of over 500 peer-reviewed papers on toxicity of fluoride, lead, mercury, perfluorinated compounds (like PFAS), and other chemicals says [Grandjean, 2013 book & website]: “Fluoride seems to fit in with lead, mercury and other poisons that cause chemical brain drain.”



This comprehensive collection of expert opinions serves as a stark reminder of the imperative to rigorously examine the potential risks linked to fluoride exposure. Given its profound implications for cognitive health across the population, urgent and meticulous examination of fluoride's effects is not just advisable but essential for informed public health policies.

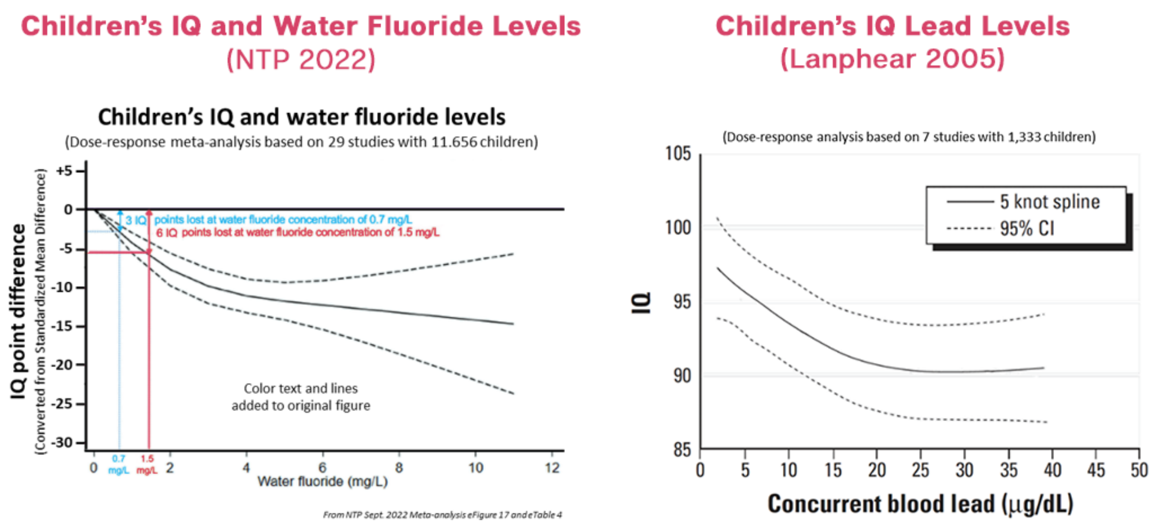
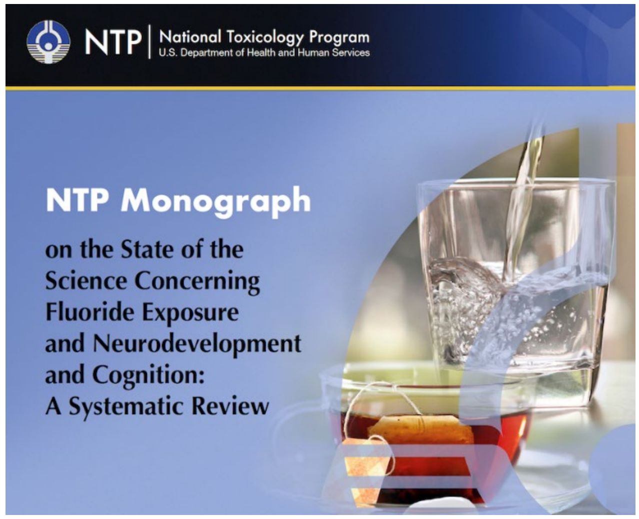



**Figure 2.** Left: Children's IQ loss with increased fluoride concentration in water, based on 29 studies. Right: Children's IQ loss with increased lead concentration in blood, based on 7 studies. This comparison serves to highlight the similarities between the potential effects of fluoride and lead on child IQ.

**The National Toxicology Program (NTP) has confirmed fluoride's neurotoxicity and shown consistent inverse association between fluoride exposure and a child's IQ.**

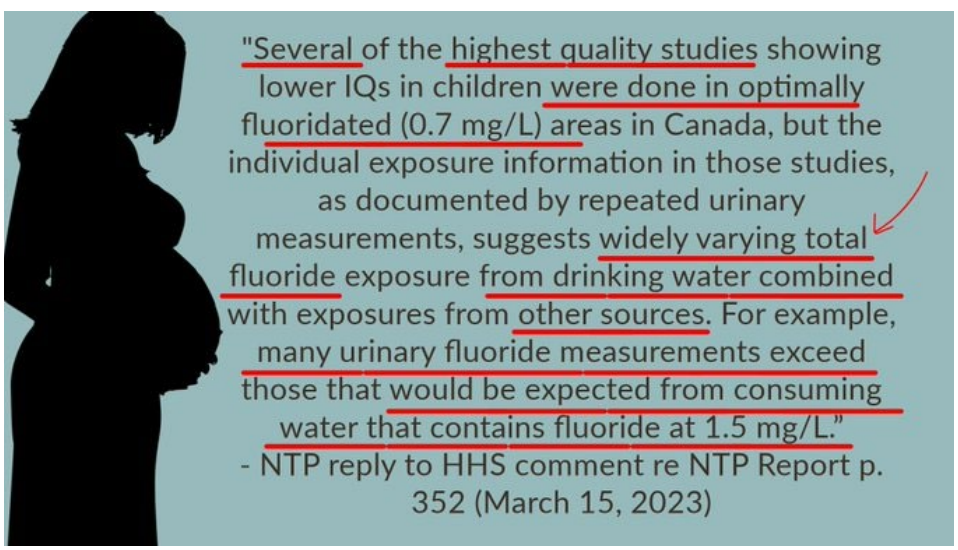
The comprehensive 8-year National Toxicology Program investigation into the neurotoxicity of fluoride culminated in a final report that comprised two components: a monograph (NTP, 2024) and a meta-analysis (Taylor et al., 2025).

The comprehensive 8-year National Toxicology Program investigation into the neurotoxicity of fluoride culminated in a final report that comprised two components: a monograph (NTP, 2024) and a meta-analysis (Taylor et al., 2025). The NTP found "with moderate confidence, that higher estimated fluoride exposures are consistently associated with lower IQ in children." The NTP reported that out of 72 human studies assessing the association between fluoride exposure and cognitive impairment in children, 64 linked higher fluoride exposures with significantly lower IQs in children, an 89% consistency. Out of the 19 highest-quality studies, 18 found neurotoxicity – 7 of those studies at levels present in "optimally" fluoridated communities.




In the NTP Monograph, authors stated clearly on page 84 of the report that "because people receive fluoride from multiple sources (not just drinking water), individuals living in areas with optimally fluoridated water can have total fluoride exposures higher than the concentration of their drinking water." They continue, "The moderate confidence conclusion may also be relevant to people living in optimally fluoridated areas of the United States depending on the extent of their additional exposures to fluoride…"

The NTP published their meta-analysis in the Journal of the American Medical Association (JAMA) Pediatrics in January of 2025. The average loss NTP found after combining information from 59 studies was 7 points. Reduced IQ was also found in meta-analyses that combined seven high-quality studies having exposures below 1.5 milligrams fluoride per liter of water (mg/L), the range directly relevant to fluoridated areas. The report's dose-response analyses had studies with concentrations as low as 0.3 mg/L finding loss of IQ. Seven studies had concentrations below 1.5 mg/L and an average IQ loss of about 3 points.



The authors emphasized the finding's 'consistency' and 'robustness.' The report also found a clear trend between studies, with IQ losses increasing as study fluoride levels increased. This dose-response relationship strengthens the NTP's conclusion that the effect is real and not an artifact of confounding factors or chance.

The authors warned that:

> "*Although the estimated decreases in IQ … may seem small … research on other neurotoxicants has shown that subtle shifts in IQ at the population level can affect people who fall within the high and low ranges of the population's IQ distribution. For context, a 5-point decrease in a population's IQ would nearly double the number of people classified as intellectually disabled*."

The dose-response curve calculated by NTP provides evidence of a relationship between fluoride exposure and reduced IQ, as illustrated in the reproduced figure below (**Figure 3**).

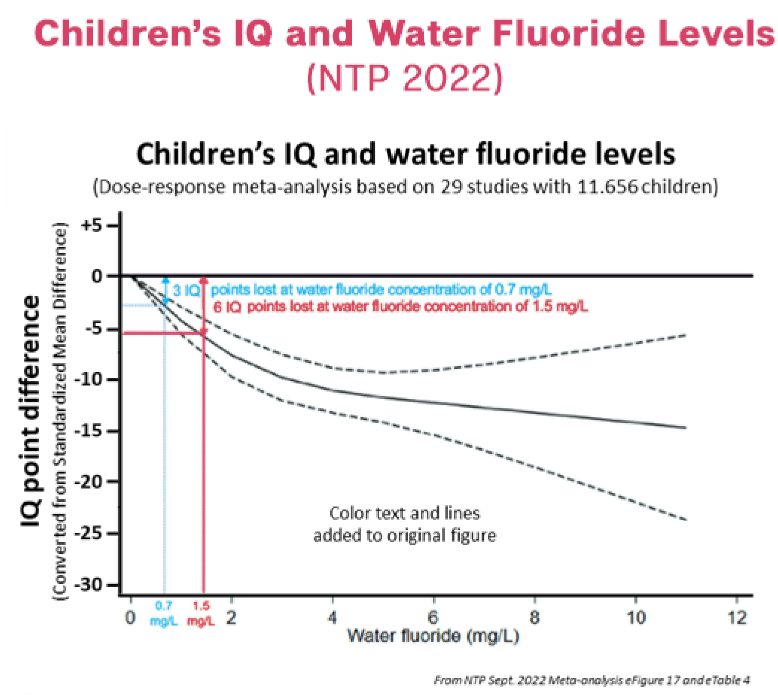



**Figure 3.** Results of the National Toxicology Program's (2022) meta-analysis of 29 studies investigating the relationship between child IQ and fluoride concentration in water. These results indicate a decline in child IQ with increased fluoride concentration.

**A federal court has ruled that fluoridation poses an unreasonable risk to human health.** A lawsuit was brought under the Toxic Substances Control Act of 1976 (TSCA) which allows citizens to petition the Environmental Protection Agency (EPA) to evaluate whether a chemical presents an unreasonable risk to public health and should be regulated. It also empowers citizen groups to challenge the EPA in court after denial of a petition. TSCA gives EPA the authority to prohibit "the particular use" of a chemical substance if it's found to present an unreasonable risk to the general public or susceptible subpopulations.

FAN submitted a Citizens Petition under Section 21 of TSCA to the EPA in November 2016 requesting a ban on the addition of fluoridation chemicals to water. When the EPA denied our Petition, FAN filed suit in federal court in 2017, joined by consumer advocacy groups, Food and Water Watch and Moms Against Fluoridation, public health associations, the American Academy of Environmental Medicine, and the International Academy of Oral Medicine and Toxicology, as well as several individuals representing themselves and/or their children.

After a precedent-setting 7-year legal battle in federal court, an historic ruling by the United States District Court of the Northern District of California has ordered the U.S. Environmental Protection Agency (EPA) to take regulatory action to eliminate the "unreasonable risk" to the health of children posed by the practice of water fluoridation.


The court found that the claims of safety made for over 75 years by the promoters of fluoridation like the American Dental Association and the US Centers For Disease Control were in fact not supported by evidence.

Senior Judge Edward Chen wrote:

> "The Court finds that fluoridation of water at 0.7 milligrams per liter ("mg/L") – the level presently considered "optimal" in the United States – poses an unreasonable risk of reduced IQ in children…the Court finds there is an unreasonable risk of such injury, a risk sufficient to require the EPA to engage with a regulatory response." [page 2]

> "In all, there is substantial and scientifically credible evidence establishing that fluoride poses a risk to human health; it is associated with a reduction in the IQ of children and is hazardous at dosages that are far too close to fluoride levels in the drinking water of the United States…Reduced IQ poses serious harm. Studies have linked IQ decrements of even one or two points to, e.g., reduced educational attainment, employment status, productivity, and earned wages." [page 2]
>
> "The pooled benchmark dose analysis concluded that a 1-point drop in IQ of a child is to be expected for each 0.28 mg/L of fluoride in a pregnant mother's urine. This is highly concerning, because maternal urinary fluoride levels for pregnant mothers in the United States range from 0.8 mg/L at the median and 1.89 mg/L depending upon the degree of exposure. Not only is there an insufficient margin between the hazard level and these exposure levels, for many, the exposure levels exceed the hazard level of 0.28 mg/L." [page 2] "The EPA's default margin of error requires a factor of 10 between the hazard level and exposure level due to variability in human sensitivities…Here, an even greater margin (100x) is owed because the methodology (which yields the 4 mg/L hazard level) uses the lowest observed adverse effect level ("LOAEL"); this methodology adds an additional level of uncertainty (and hence the application of a 100x rather than 10x margin). But even if only the default 10x margin is required, the safe level of fluoride exposure would be 0.4 mg/L (4 mg/L (hazard level) divided by 10). The "optimal" water fluoridation level in the United States of 0.7 mg/L is nearly double that safe level of 0.4 mg/L for pregnant women and their offspring." [page 2]
>
> "The size of the affected population is vast. Approximately 200 million Americans have fluoride intentionally added to their drinking water at a concentration of 0.7 mg/L. Other Americans are indirectly exposed to fluoridated water through consumption of commercial beverages and food manufactured with fluoridated water... Approximately two million pregnant women, and over 300,000 exclusively formula-fed babies are exposed to fluoridated water." [page 76]

**The silica fluorides may increase the uptake of lead into children's blood.**
Research conducted by Masters and Coplan (1999, 2000, 2007), and to a somewhat lesser extent Macek (2006), has consistently revealed a noteworthy association between the use of fluorosilicic acid (and its sodium salt) for water fluoridation and an increased uptake of lead into children's blood. This correlation received some strong biochemical support from an animal study by Sawan et al. (2010). The study demonstrated that rats exposed to a combination of fluorosilicic acid and lead in their drinking water exhibited a staggering threefold rise in lead absorption into their bloodstream compared to exposure to lead alone. These findings are particularly disconcerting, given the well-documented capacity of lead to damage the developing brain. Nevertheless, this subject is being largely overlooked by countries that continue to implement water fluoridation practices.

**Fluoride's neurotoxic effects extend well beyond lowering IQ.**

Reduced IQ is not the sole neurotoxic effect that may result from fluoride exposure. Multiple human studies have reported an association between fluoride exposure and impaired visual-spatial organization (Calderon et al., 2000; Li, 2004; Rocha-Amador et al., 2009). Other studies have found an association between prenatal fluoride exposure and fetal brain damage

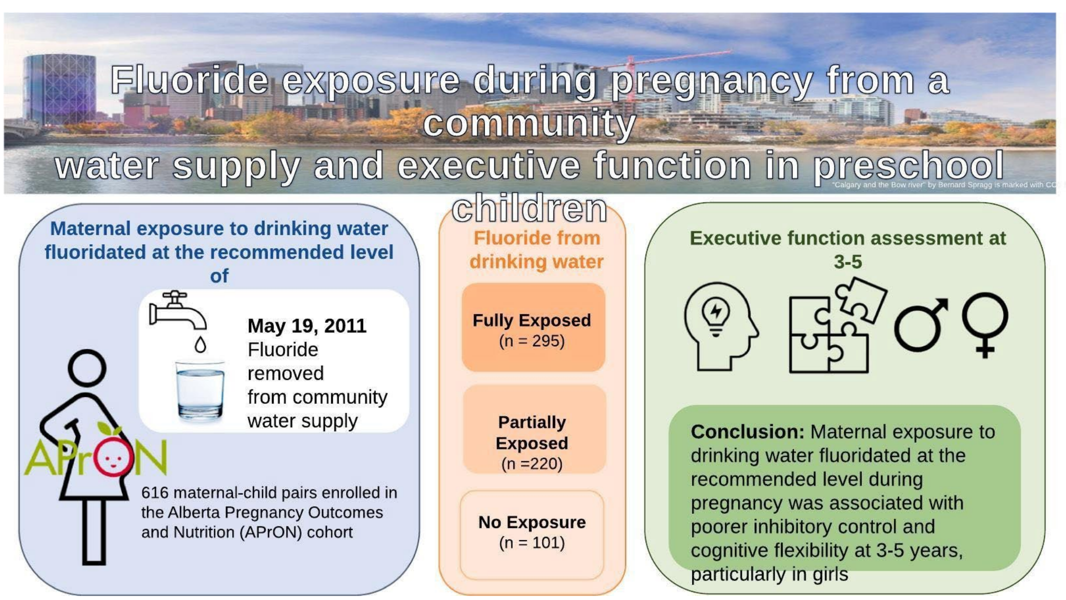
(Han et al., 1989; Du, 1992; Dong et al., 1993; Yu et al., 1996).A study (Malin et al., 2024) published in the Journal of the American Medical Association (JAMA) in May of 2024 found that in fluoridated Los Angeles, the children of mothers with higher fluoride exposures during pregnancy had double the odds of several neurobehavioral problems compared to mothers with lower exposures. Funding for the study was provided by the National Institutes of Health (NIH) and the US Environmental Protection Agency (EPA), reports the Fluoride Action Network (FAN).

Children exposed to more fluoride had significantly more problems with emotional reactivity, somatic complaints (such as headaches), anxiety, and symptoms linked to autism.

In addition to these findings, several studies have reported an increased diagnosis of Attention Deficit Hyperactivity Disorder (ADHD) in areas with fluoridated water (Riddell et al., 2019; Malin & Till, 2015; Bashash et al., 2018).

In the Riddell study, which was conducted in fluoridated Canada, they "…found that higher water fluoride levels and fluoridation of municipal water supplies were associated with a higher risk of an ADHD diagnosis as well as increased symptoms of hyperactivity and inattention, especially among adolescents. These findings, which point to a potential cumulative effect of fluoride exposure, highlight the need for further investigation of the potential for fluoride-mediated developmental neurotoxicity in populations with water fluoridation."

Further, there is evidence of a link between exposure to "optimally" fluoridated tap water and diminished inhibitory control and cognitive flexibility (Dewey et al., 2023). These diverse studies underscore the importance of continued research and assessment of the potential neurological effects associated with fluoride exposure.




A graphical abstract from (Dewey et al., 2023) summarizing the study's findings that a mother's exposure to optimally fluoridated water during pregnancy was associated with cognitive impairment for the child.

## II. Fluoride Adversely Impacts Human Health Beyond Neurotoxicity.

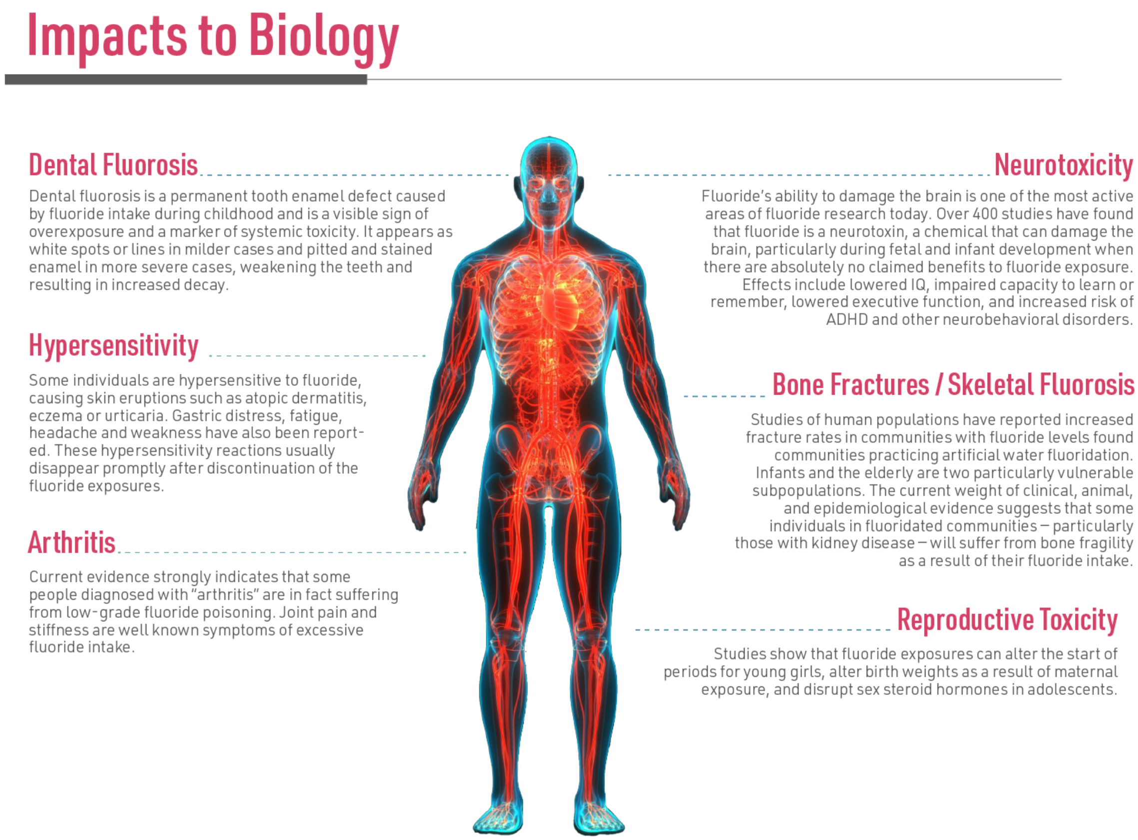



**Figure 4.** There are many systemic effects of fluoride ingestion beyond dental fluorosis and neurotoxicity. This figure explores the various impacts that fluoride may have on the human body, including to the skin, bones, and reproductive system.

Not a single biological process has been shown to require fluoride. No disease, including tooth decay, can be attributed to a "fluoride deficiency" (National Research Council (NRC), 1993; Institute of Medicine, 1997; NRC, 2006). Furthermore, there is no Recommended Dietary Allowance for fluoride as nutritional requirements have never been established (Harvard T.H. Chan School of Public Health, 2023). Furthermore, there is increasing evidence that fluoride is an enzymatic poison that results in oxidative stress, hormonal disruptions and more. Considering this understanding, large populations are being exposed to fluoridation compounds that have been implicated in a host of diseases, not the least of which is thyroid dysfunction. Fluoride has been implicated in adversely impacting bone remodeling, disrupting melatonin production (and thereby sleep cycles), and accelerating the onset of puberty. At the same time, subsets of the general population are at increased risk, including the elderly and those suffering from kidney disease. The young are at risk as well, as substantiated by the FDA's requirement that all toothpaste sold in the USA be labeled with a poison warning and that it should be kept out of reach of children under 6 years of age.

**The FDA mandates a poison warning for all fluoride toothpaste.**
The Food and Drug Administration (FDA) requires all fluoride toothpaste sold in the USA to be labeled with a poison warning, instructing those that swallow more than is used for brushing to contact the Poison Control Center. The FDA's Code of Federal Regulations [Title 21](#) (2023); Subchapter D – Drugs for Human Use reads: "**Keep out of reach of children under 6 years of age. If more than used for brushing is accidentally swallowed, get medical help or contact a Poison Control Center right away.**"


**Figure 5.** Toothpaste drug fact label showing a warning of ingestion beyond that which is used for brushing teeth.

**There is extensive, longstanding evidence that fluoride interferes with many important biological processes.**

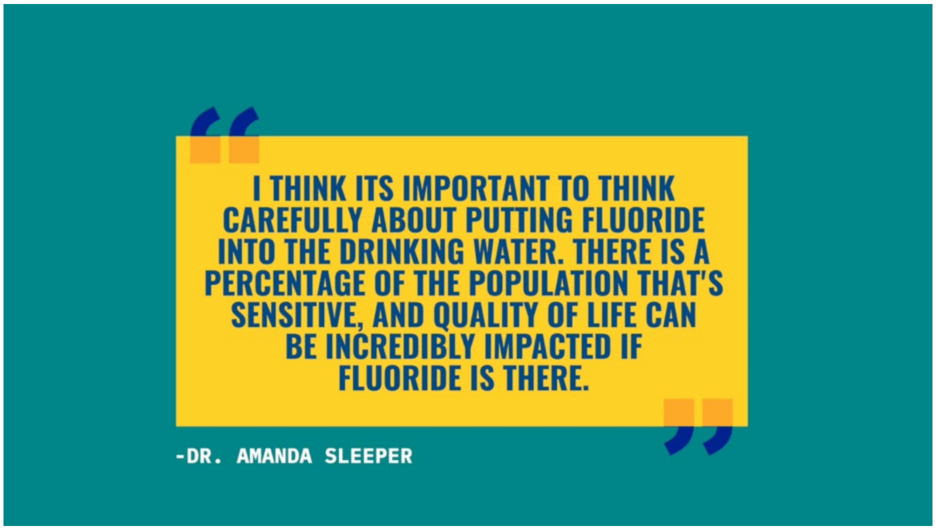
Studies increasingly indicate that fluoride can interfere with biochemistry in fundamental ways (Barbier, 2010). One way in which fluoride can interfere, is with:

- Enzymes: Since 1978, researchers have been aware of fluoride's potential interference with various enzymes (Waldbott, 1978). Research by Ewa Admaek et al. in 2005 provided insights into how fluoride ions may impact enzymes involved in essential cellular metabolic processes such as energy production, and carbohydrate and lipid metabolism. A 2020 meta-analysis conducted by Anna Strunecka and Otakar Strunecky presented compelling evidence indicating that fluoride acts as an enzymatic poison, leading to oxidative stress, hormonal disruptions, and neurotoxic effects.

- G-proteins: Since the 1980s, researchers have known that the combination of fluoride and aluminum disrupts G-proteins (Bigay, 1985; 1987). Recent analysis by Strunecka and Strunecky indicates that fluoride, when combined with aluminum, generates false signals in G-protein cascades responsible for hormonal and neuronal regulations. This occurs at much lower concentrations than when fluoride acts alone. They propose a shift in research focus within the scientific community towards understanding fluoride's toxicity on integrated networks, suggesting that fluoride's diverse toxic effects could potentially contribute to unforeseen future epidemics.

- Hormones and neurotransmitters: Interactions between fluoride and aluminum have been recognized since the 1990s for their potential to disrupt biological signals, impacting growth, hormones, and neurotransmitters (Strunecka & Patocka, 1999; Li, 2003). This interference is compounded by exposure to aluminum fluoride, which can occur through various avenues, including industrial settings such as emissions from aluminum reduction processes (DHHS, 2003). Human exposure to aluminum fluoride can arise from ingesting fluoride sources (e.g., drinking water or residue from fluoride-based pesticides) alongside aluminum sources, such as drinking water, tea, food residues, infant formula, aluminum-containing antacids or medications, deodorants, cosmetics, and glassware (NRC, 2006). Additionally, fluoridation chemicals might contain aluminum fluoride (Mullenix, 2014). Information on the potential neurotoxic effects of chronic exposure to aluminum in water is limited (Carson, 2000). However, many neurotoxic effects associated with fluoride stem from the creation of aluminum fluoride complexes, which mimic the chemical structure of phosphate, influencing ATP phosphohydrolases and phospholipase D activity. Remarkably, only small concentrations of aluminum are required to form aluminum fluoride (NRC, 2006). Repeated or prolonged inhalation exposure to these compounds might lead to asthma and can affect the bone and nervous system, resulting in bone alterations (fluorosis) and nervous system impairment (ILO & WHO, 2012).

**Subsets of the population are both highly sensitive and vulnerable to fluoride's toxicity.** Some individuals are highly sensitive to even the lowest levels of fluoride as demonstrated by case studies and double-blind studies (Waldbott, 1958, 1959; Feltman & Kosel, 1961; Shea et al., 1967; Grimbergen, 1974). One 13-year study showed that approximately 1% of patients given 1 mg of fluoride daily developed negative reactions (Feltman & Kosel, 1961). Related to this, many individuals have reported suffering from symptoms such as fatigue, headaches, rashes and stomach and gastrointestinal tract problems, which disappear when they avoid fluoride in their water and diet. (Shea, 1967; Waldbott et al., 1978; Moolenburgh 1987) Frequently, the symptoms reappear when they are unwittingly exposed to fluoride again (Spittle, 2008). Yet, no government in countries where fluoridating water takes place has conducted scientific studies to take this issue beyond these anecdotal reports. Without the willingness of governments to investigate these reports scientifically, it begs the question of whether we as a society should be forcing these people to ingest fluoride?




In addition to people suffering from impaired kidney function (as discussed previously), fluoride's toxicity can disproportionately affect other subsets of the population as well. According to the Agency for Toxic Substances and Disease Registry (ATSDR, 2010), these include: infants, pregnant women, the elderly, and those with renal problems or diabetes mellitus. Also vulnerable are those who suffer from malnutrition (e.g., calcium, magnesium, vitamin C, vitamin D and iodine deficiencies and protein-poor diets) and those who have diabetes insipidus. See: Massler & Schour, 1952; Greenberg et al., 1974; Klein, 1975; Marier & Rose, 1977; Seow & Thomsett, 1994; Lin et al., 1991; Chen et al., 1997; Teotia et al., 1998.

**Dental fluorosis may be an indicator of wider systemic damage.**
There have been many suggestions as to the possible biochemical mechanisms underlying the development of dental fluorosis (DenBesten, 1999; Matsuo et al., 1998; Sharma et al., 2008; Duan et al., 2011; Tye et al., 2011). While promoters of fluoridation are content to dismiss mild dental fluorosis as merely a cosmetic effect, it is rash to assume that fluoride is not impacting other tissues ￼(Colquhoun, 1997). Moreover, ingested fluoride causes dental fluorosis during the period of tooth enamel formation, which occurs before the permanent teeth have erupted (typically around age 6 to 8); meaning other tissues are potentially susceptible to damage throughout life (and long before it may be realized). On a related note, fluorosis is endemic in at least two dozen countries with millions of people in India, China, and Africa suffering from skeletal fluorosis in particular (a fluoride-induced bone and joint disease).

**Fluoride damages bone, especially in those suffering from kidney disease.**
Unsurprisingly, fluoride can also damage bone. An early fluoridation trial (Newburgh-Kingston 1945–55) found a significant, two-fold increase in cortical bone defects among children in the fluoridated community (Schlesinger et al., 1956). The cortical bone is the outside layer of the bone and is important to protect against fracture. While this result was not considered important at the time with respect to bone fractures, it did prompt questions about a possible link to osteosarcoma (Caffey, 1955; Groth, 1973). In 2001, Alarcon-Herrera and co-workers reported a linear correlation between the severity of dental fluorosis and the frequency of bone fractures in both children and adults in a high fluoride area in Mexico.

Notably, individuals with kidney disease, due to their potential difficulty in effectively excreting fluoride, are prone to accumulating high levels of fluoride in their bones and bloodstream, (Schiffl, 2008). As a result of this high fluoride body burden, kidney patients have an elevated risk for developing skeletal fluorosis. In one of the few U.S. studies investigating the matter, crippling skeletal fluorosis was documented among patients with severe kidney disease drinking water with just 1.7 ppm fluoride (Johnson et al., 1979). Given severe skeletal fluorosis in kidney patients has been detected in small case studies, it is possible that larger, systematic studies would detect skeletal fluorosis at even lower fluoride levels.

**Fluoride may adversely impact bone density and bone remodeling and put the elderly at risk of osteoporosis and fractures, including hip fractures.**

Several studies have investigated the effect of fluoride concentration on patients with osteoporosis, expecting higher doses to reduce fracture rates. Instead, researchers observed the opposite effect, with higher doses associated with greater numbers of fractures, particularly hip fractures (Inkovaara et al., 1975; Gerster et al., 1983; Dambacher et al., 1986; O'Duffy et al., 1986; Hedlund et al., 1989; Bayley et al., 1990; Gutteridge et al., 1990, 2002; Orcel et al., 1990; Riggs et al., 1990; Schnitzler et al., 1990). Hip fractures are a serious issue for older adults, often leading to a loss of independence and/or a shortened lifespan.

Since 1990, more than a dozen studies have investigated a possible relationship between hip fractures and long-term consumption of artificially fluoridated water or water with naturally high fluoride levels. However, the findings have been somewhat mixed, with some studies reporting an association while others have not. Interestingly, some have even claimed a protective effect (Sowers et al., 1991; Karagas et al., 1996; Kurttio et al., 1999; Hillier et al., 2000; Phipps et al., 2000; Li et al., 2001).

One important study conducted in China, which investigated hip fractures across six Chinese villages, observed what appears to be a dose-dependent increase in hip fractures as fluoride concentrations rose from 1 ppm to 8 ppm (Li et al., 2001). This discovery provides little comfort for individuals who regularly consume fluoridated water.

Furthermore, the only human epidemiological study to evaluate bone strength as a function of bone fluoride concentration, conducted by researchers from the University of Toronto, found that (consistent with animal studies) the strength of bone declined with increasing fluoride content (Chachra et al., 2010). Another study from Iowa published data suggesting that even low-level fluoride exposure may have an adverse effect on cortical bone density in girls (Warren et al., 2009). This effect on cortical bone density has been repeatedly documented in clinical trials and has been proposed as an important mechanism by which fluoride may increase bone fracture rates (Levy et al., 2009). Finally, a recent high-quality study from Sweden investigating the relationship between fluoride and hip fractures found a 50% higher rate of hip fractures associated with a 1 mg/L increase in urine fluoride levels (Helte et al., 2021; Nicole, 2021).

**Fluoride may cause bone cancer (osteosarcoma).**
A government-funded animal study conducted in the United States found a dose-dependent increase in bone cancer (osteosarcoma) in male rats treated with fluoride (NTP, 1990). Following the results of this study, the National Cancer Institute (NCI) reviewed national cancer data in the U.S. and found a significantly higher rate of osteosarcoma in young men in fluoridated versus unfluoridated areas (Hoover et al., 1991a). Despite the NCI's conclusion, which, due to statistical limitations, did not definitively attribute fluoridation as the cause (Hoover et al 1991b), it failed to provide an explanation for the heightened rates in the fluoridated areas.

A smaller-scale study conducted in New Jersey (Cohn, 1992) further underscored these concerns by demonstrating that osteosarcoma rates in young men living in fluoridated areas were up to six times higher than those in unfluoridated areas.

While it is essential to acknowledge that various epidemiological studies, differing in size and quality, have not consistently substantiated this fluoride-osteosarcoma association (a comprehensive summary of these can be found in Bassin, 2001 and Connett et al., 2005), there are three reasons why such a connection remains plausible:

1) Fluoride accumulates to a high level in bone.

2) Fluoride stimulates bone growth and at the same time disrupts bone remodeling.

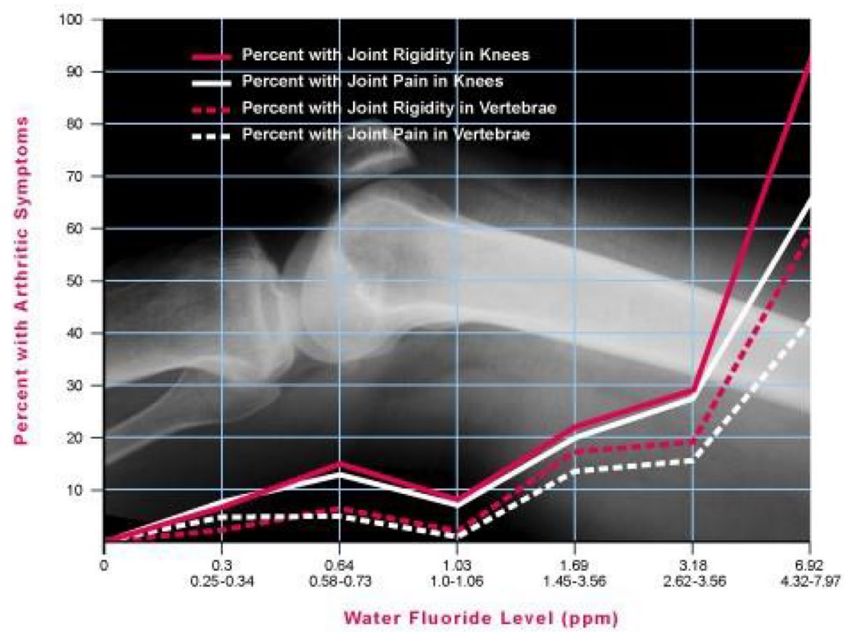
3) Fluoride can interfere with the genetic apparatus of bone cells in several ways. Fluoride has been shown to be mutagenic, cause chromosome damage, and interfere with the enzymes involved with DNA repair in both cell and tissue studies (Tsutsui et al., 1984; Caspary et al., 1987; Kishi & Ishida, 1993; Mihashi & Tsutsui, 1996; Zhang et al., 2009).

In addition to cell and tissue studies, a correlation between fluoride exposure and chromosome damage in humans has also been reported (Sheth et al., 1994; Wu & Wu, 1995; Meng & Zhang, 1997; Joseph et al., 2000).

**Fluoride causes clinical symptoms that mimic arthritis, and as such, leads to misdiagnoses.** Some of the early symptoms of skeletal fluorosis often resemble those of arthritis (Singh, 1963; Franke et al., 1975; Teotia et al., 1976; Carnow & Conibear, 1981; Czerwinski et al., 1988; DHHS, 1991). A review paper published in Chemical & Engineering News underlines this similarity by stating, "Because some of the clinical symptoms mimic arthritis, the first two clinical phases of skeletal fluorosis could be easily misdiagnosed" (Hileman 1988). There have been few, if any, comprehensive studies conducted to determine the extent of these misdiagnoses and whether the high prevalence of arthritis in America (where 1 in 3 Americans have some form of arthritis – CDC, 2002) and other fluoridated countries is related to growing fluoride exposure.

Even when individuals in the U.S. develop advanced forms of skeletal fluorosis, it is not uncommon for them to endure years of misdiagnoses before finally receiving an accurate diagnosis. This underscores the urgent need for further research and awareness in this critical area.

**Prevalence of Arthritic Symptoms in Communities**
**Based on Fluoride Level in Drinking Water**




Ge X, et al. (2006). Investigations on the occurrence of osteoarthritis in middle-aged and elderly persons in fluorosis-afflicted regions of Gaomi City with high fluoride concentration in drinking water. *Preventive Medicine Tribune* 12(1):57-58.

**Fluoride adversely affects the pineal gland, leading to reduced melatonin production and early onset of puberty.**

Evidence suggests that elevated levels of fluoride can accumulate within the human pineal gland (Luke, 2001). Moreover, there exists a significant correlation between this phenomenon and animal studies revealing fluoride's potential to inhibit melatonin production, a crucial factor that is integral to the 'sleep cycle' and that can also trigger the premature onset of puberty (Luke, 1997).

Consistent with these findings, one of the earliest fluoridation trials conducted in the U.S. (Schlesinger et al., 1956) reported that, on average, girls in the fluoridated community reached menstruation 5 months earlier than girls in the non-fluoridated community. Astonishingly, no fluoridating country has attempted to replicate either Luke's or Schlesinger's findings or to undertake a more comprehensive exploration of this issue.

**Fluoride depletes iodine levels and adversely affects thyroid function.**

Fluoride blocks iodine receptors, preventing iodine from being absorbed (and used by your body). Unlike fluoride, iodine is an essential nutrient that our bodies need to make thyroid hormones. According to the U.S. National Research Council (2006), "several lines of information indicate an effect of fluoride exposure on thyroid function." In the Ukraine, Bachinskii et al. (1985) observed a decrease in thyroid function among individuals exposed to 2.3 ppm fluoride in their water, despite being otherwise healthy. During the mid-20th century, fluoride was prescribed by a number of European doctors to reduce the activity of the thyroid gland for those suffering from hyperthyroidism (overactive thyroid) (Stecher, 1960; Waldbott et al., 1978). According to a clinical study by Galletti and Joyet (1958), the thyroid function of hyperthyroid patients was effectively reduced at just 2.3 to 4.5 mg/day due to fluoride ions.

To put this into context, the Department of Health and Human Services (DHHS, 1991) estimated that the total fluoride exposure in fluoridated communities ranged from 1.6 to 6.6 mg daily. This is a remarkable fact, particularly when considering the escalating issue of hypothyroidism (underactive thyroid) in the United States and other fluoridated countries. Symptoms of hypothyroidism include depression, fatigue, weight gain, muscle and joint pains, increased cholesterol levels, and heart disease. In 2010, the second most prescribed drug of the year was Synthroid® (sodium levothyroxine), a hormone replacement medication used to treat underactive thyroid conditions. Recent research has further emphasized this concern, demonstrating that a half-milligram-per liter increase in drinking water fluoride levels (roughly equivalent to the difference in exposure level between the fluoridated and non-fluoridated communities) was associated with a 1.65 increase in the likelihood of a hypothyroidism diagnosis during pregnancy (Hall, 2023). This adds to a growing body of evidence indicating that fluoride exposures from artificially fluoridated water can indeed impair thyroid function. Prior studies that observed an effect include a study encompassing nearly the entire population of England (Peckham et al., 2015), a large nationally representative sample from Canada using the CHMS survey (Malin et al., 2018), a case-control study in Iran (Kheradpisheh et al., 2018); and a substantial analysis of children in China, where mean water and urine fluoride levels were found to be only slightly higher than in areas with artificial fluoridation (Wang et al., 2020)

**Fluoride may cause reproductive and related hormonal problems.**
Fluoride, when administered to animals in high doses, has been shown to have detrimental effects on the male animal's reproductive system. It damages sperm and increases the rate of infertility across several different species (Kour & Singh, 1980; Chinoy & Sequeria, 1989; Chinoy et al., 1991; Susheela & Kumar, 1991; Kumar & Susheela, 1994; Narayana & Chinoy, 1994a; Narayana & Chinoy, 1994b; Zhao et al., 1995; Elbetieha et al., 2000; Ghosh et al., 2002; Zakrzewska et al., 2002).

However, certain animal studies conducted by FDA researchers have failed to find conclusive evidence of reproductive toxicity in fluoride-exposed rats (Sprando et al., 1996, 1997, 1998). Despite this, the National Research Council (2006) has recommended that "the relationship between fluoride and fertility requires additional study."

In line with this, an epidemiological study conducted from the United States discovered higher rates of infertility among couples residing in areas with water containing 3 ppm or more of fluoride (Freni, 1994). Conversely, two separate studies observed increased fertility among men living in regions with high –fluoride levels in China and India (Liu et al., 1988; Neelam et al., 1987). Additionally, four studies have reported reduced levels of circulating testosterone in males living in high-fluoride areas (Barot, 1998; Chen et al., 1997a; Susheela & Jethanandani, 1996; Hao et al., 2010), and a study involving fluoride-exposed workers documented a "subclinical reproductive effect" (Ortiz-Perez et al., 2003). These findings collectively suggest a need for further investigation into the potential reproductive implications of fluoride exposure.

Potentially related to reproductive and hormonal problems, several studies, including one using CDC data, have found changes to fetal development/ birthweight at fluoride exposure levels typically found in fluoridated communities (Arun et al., 2022; Ortiz-Garcia et al., 2022; Kampouri et al., 2022). Interestingly, the effects of fluoride were seen across all three trimesters.

## III. Fluoridation Is Unnecessary.

The debate surrounding water fluoridation as a method to combat dental decay has been a topic of discussion for decades. Contrary to expectations, ingestion of fluoridation chemicals in water does not correlate with reduced tooth decay in fluoridating countries. In fact, between 1970 and 2010, non-fluoridating countries have witnessed similar declines in tooth decay rates as their fluoridating counterparts. Today, according to data from the World Health Organization (WHO), there is no discernible difference in tooth decay between the minority of developed countries that fluoridate water and the majority that do not.

These findings raise questions about the efficacy of water fluoridation in improving oral health. Additionally, fluoridation's purported benefits are overstated and based predominantly on outdated studies that are heavily criticized for their poor methodology and flawed selection of control communities and thus are deemed irrelevant by today's standards. The scientific consensus today is that the benefits of fluoride are derived predominantly when applied topically, making ingestion unnecessary. As we delve further into the evidence, it becomes increasingly apparent that the relationship between fluoridation and dental decay is far more complex than previously thought, prompting a reconsideration of the conventional approach to fluoride delivery.

**Top 20 Countries with the Best Dental Health for Children, According to World Health Organization Data**

16 out of the 20 countries do not practice water fluoridation, including the top 3 countries and 8 out of the top 10

| COUNTRY | FLUORIDATION STATUS | DMFT* | COUNTRY | FLUORIDATION STATUS | DMFT* |
|---|---|---|---|---|---|
| Denmark | NO WATER FLUORIDATION | 0.4 | New Zealand | 50% WATER FLUORIDATION | 0.7 |
| Germany | NO WATER FLUORIDATION | 0.4 | Netherlands | NO WATER FLUORIDATION | 0.8 |
| Bermuda | NO WATER FLUORIDATION | 0.5 | Malaysia | 75% WATER FLUORIDATION | 0.8 |
| United Kingdom | 10% OF POPULATION | 0.5 | Belgium | NO WATER FLUORIDATION | 0.8 |
| Japan | NO WATER FLUORIDATION | 0.6 | Norway | NO WATER FLUORIDATION | 0.8 |
| Spain | NO WATER FLUORIDATION | 0.6 | Finland | NO WATER FLUORIDATION | 0.8 |
| Switzerland | NO WATER FLUORIDATION | 0.6 | Luxembourg | NO WATER FLUORIDATION | 0.8 |
| Trinidad and Tobago | NO WATER FLUORIDATION | 0.6 | France | NO WATER FLUORIDATION | 0.8 |
| Singapore | 100% OF POPULATION | 0.6 | Barbados | NO WATER FLUORIDATION | 0.8 |
| Sweden | NO WATER FLUORIDATION | 0.7 | Antigua and Barbuda | NO WATER FLUORIDATION | 0.8 |

*DMFT: average decayed, missing, or filled teeth in 12-year-olds

*World Health Organization (WHO), Collaborating Centre for Education, Training, and Research in Oral Health, Malmo University, Sweden. DMFT in 12-year-olds. https://capp.mau.se/country-areas/ (accessed April 2024).

**Figure 6.** List of the top 20 countries with the best dental health measured by average Decayed, Missing, and Filled Permanent Teeth (DMFT) in 12-year-olds.

**Fluoride acts topically, so swallowing it maximizes risk and minimizes potential benefit.** The Centers for Disease Control and Prevention (CDC, 1999, 2001) has acknowledged that fluoride's benefits are derived mainly from its topical use, and not from systemic ingestion. The most recent relevant study found no significant correlation between ingested fluoride and cavity reduction, further validating a 2009 study that stated: "Achieving a caries-free status may have relatively little to do with fluoride intake ...recommending an 'optimal' fluoride intake is problematic." (Warren et al., 2009; Curtis et al., 2018).

In other words, the available evidence suggests there is insufficient justification for the widespread consumption of fluoridated water for the purpose of protecting one's teeth. This is especially pertinent when considering that the benefit of fluoride relates to its topical application, while the most significant concerns center around potential systemic effects. Considering this, it appears more reasonable to administer fluoride directly to the teeth through toothpaste, as opposed to mandating its ingestion through the water supply. This approach would align more closely with the principle of targeted and informed dental care while minimizing the potential risks associated with systemic exposure to fluoride.

**NIH-funded study on individual fluoride ingestion and tooth decay found no significant correlation.**
A multi-million dollar, U.S. National Institutes of Health (NIH)-funded study found no significant relationship between tooth decay and fluoride intake among children (Warren, 2009). In fact, the report's conclusion stated that "firmly recommending an 'optimal' fluoride intake is problematic." This was the first time that tooth decay was investigated as a function of individual exposure as opposed to mere residence in a fluoridated community.

**Non-fluoridating countries have experienced the same level of decline in dental decay as fluoridating countries (between 1965 and 2021).**
Most western, industrialized countries have not only rejected water fluoridation, but also have experienced the same decline in childhood dental decay as seen in countries that fluoridate their water, as evidenced in **Figure** *7.*

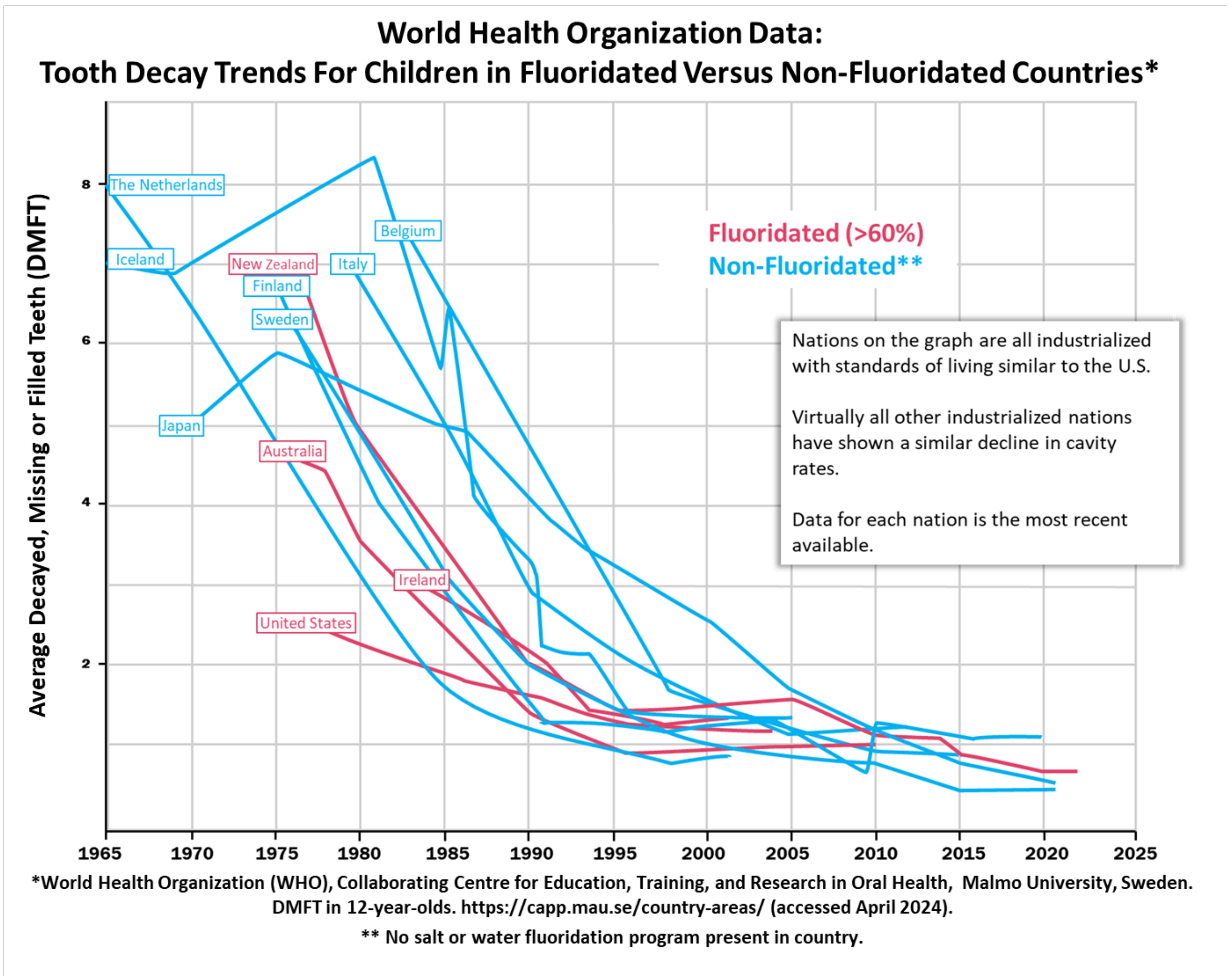



**Figure 7.** Trends of tooth decay in 12-year-olds from fluoridated (red) and non-fluoridated (blue) countries from 1965-2021. Data was collated from the World Health Organization (WHO). The non-fluoridated countries have generally seen the same decline in childhood tooth decay trends over this period as the fluoridating countries.

**Tooth decay was declining before fluoridation started.**
Research indicates that tooth decay rates were already declining in Australia and New Zealand before the introduction of fluoridation. Remarkably, this decline has persisted even beyond the point at which the full benefits of fluoridation would have been expected to take effect (Colquhoun 1997; Diesendorf 1986).

As **Figure 8** indicates, it is evident that multiple factors are inextricably associated with the reduction in tooth decay rates, and these include better diets and better dental care to name just a few. These findings are consistent with a broader pattern observed across the western world, emphasizing that the decline in tooth decay cannot be attributed solely to fluoridation, but rather is influenced by a range of interconnected factors.

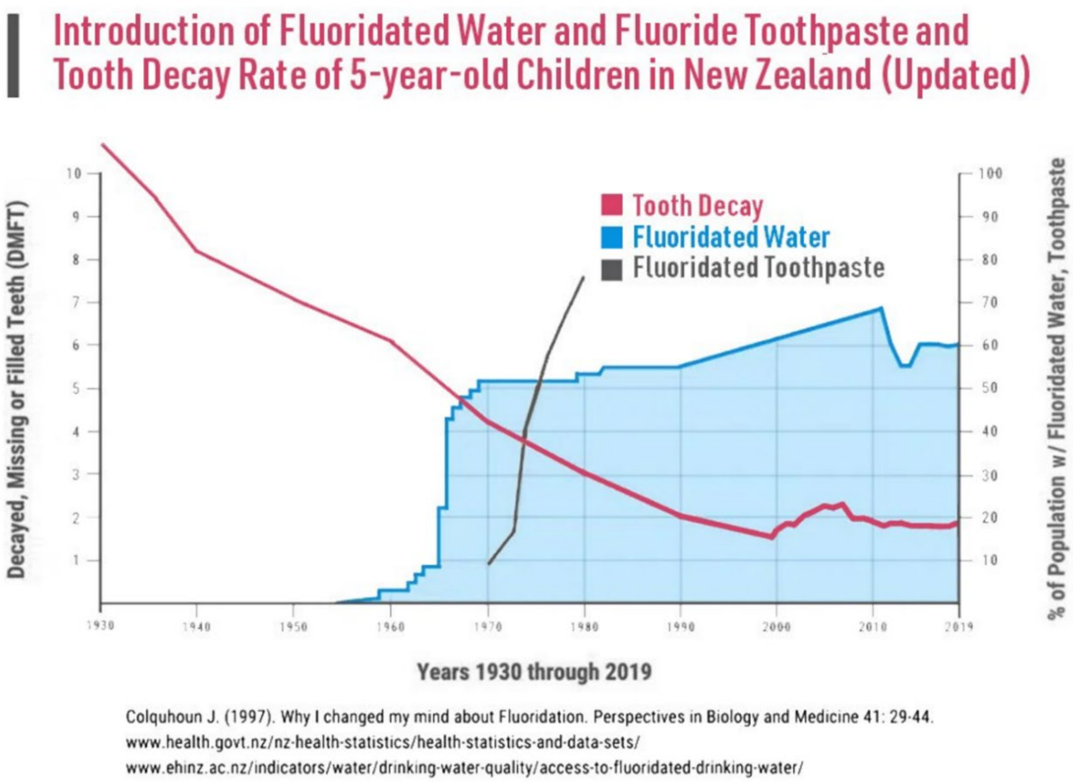



**Figure 8.** 50-year decline in tooth decay of 5-year-olds in New Zealand. Compiled from Health Department records of 5-year-olds' tooth decay, 1930-1990 fluoridation, and fluoride toothpaste sales. Tooth decay (red) was declining prior to the introduction of fluoridated water (blue).

**Tooth decay does not increase when fluoridation is stopped.**
In communities across Canada, Germany, Cuba and Finland where fluoridation has been discontinued, dental decay rates have not exhibited an increase as might be expected. Instead, they have generally continued their declining trend (Maupomé 2001; Kunzel & Fischer, 1997, 2000; Kunzel et al., 2000; Seppa et al., 2000, Iheozor-Ejiofor, 2015). These findings provide compelling evidence that the cessation of fluoridation does not necessarily lead to a resurgence in dental decay, and at the same time reinforces the notion that a range of factors are at play in influencing oral health outcomes.

**U.S. Government data suggest that there is no association between fluoridation and childhood dental decay.**

The CDC's data on the "Percentage of Students with Caries Experience–treated or untreated tooth decay" revealed some interesting findings regarding dental decay rates and fluoridation in various states (CDC, 2013). It should be noted that the reference can no longer be found on the CDC website; however, its findings are summarized in the paragraph that follows.

In Vermont, children exhibited the second-lowest overall rate of dental decay in the nation, despite the state ranking 39th for the percentage of the population receiving fluoridated water. Similarly, New Hampshire ranked third in low dental decay rates, despite ranking 43rd in terms of population fluoridation. Specifically, Vermont's rate of children's dental decay was 35%, while New Hampshire's was slightly higher at 35.5%. These statistics are particularly significant when compared to states, such as Kentucky, with some of the highest rates of dental decay among children, despite having the highest fluoridation rates in the nation for decades: At best, fluoridation results in a reduction of only one-half cavity per child and one cavity per adult (over a 40-year period).

| State | Percentage of Population with Fluoridated Water | Dental Decay Rate |
|---|---|---|
| Kentucky | 99.9% | 59.6% |
| Minnesota | 98.8% | 54.9% |
| Illinois | 98.5% | 52.4% |

According to multiple highly reputable studies, the effectiveness of fluoridation in preventing cavities is, at most, an average reduction of one-half cavity per child, with some low-end estimates finding no statistically significant reduction. The Cochrane Collaboration, known for its rigorous evaluations, has questioned the applicability of previous findings showing benefit, because they were "based predominantly on old studies and may not be applicable today." All of these studies also studied effects at higher fluoridation levels than we have presently, studying levels of 1.0 or 1.2 ppm. The Cochrane Collaboration also highlighted that "Over 97% of the 155 studies were at a high risk of bias, which reduces the overall quality of the results... We did not identify any evidence... to determine the effectiveness of water fluoridation for preventing caries in adults... There is insufficient evidence to determine whether water fluoridation results in a change in disparities in caries levels across socio-economic status" (Iheozor-Ejiofor, 2015).

| Study / Findings | Year | Finding |
|---|---|---|
| Cochrane Collaboration | 2015 | 0.5 fewer cavities per child and no evidence of fluoridation's effectiveness in adults. In aggregate, the data shows that children aged 6-17 average 2.1 cavities in their permanent teeth. |
| CDC (Slade et al.) | 2018 | 0.5 fewer cavities per child |
| Iowa Fluoride Study | 2018 | No significant reduction |
| Warren et al. | 2009 | "...caries-free status may have relatively little to do with fluoride intake." |
| World Health Organization data | 2005 | No evidence of fluoridation's effectiveness |

For adults, the strongest studies all found that fluoridation, at most, resulted in a one-cavity reduction over a 40-year period (Slade et al., 2013; Do et al., 2017; Slade et al., 2018), aligning with Cochrane's assertion of insufficient evidence for fluoridation's efficacy in preventing adult caries. Cochrane stated, "We did not identify any evidence . . . to determine the effectiveness of water fluoridation for preventing caries in adults."

Indeed, there is a consensus among organizations, including the CDC, National Research Council, Cochrane Collaboration, Iowa Fluoride Study and others that fluoride's primary effectiveness comes from topical contact with teeth, rather than ingestion (NRC, 2006; Cheng et al., 2007; Charone et al., 2012; Iheozor-Ejiofor, 2015; Curtis et al., 2018). Robust scientific evidence is lacking for the benefit of swallowing fluoride compared to targeted topical applications.

Notably, the largest U.S. survey conducted by the National Institute of Dental Research (NIDR) involving over 39,000 children from 84 communities, found a meager difference in tooth decay among children in fluoridated and non-fluoridated communities (Hileman 1989). The study found an average difference of only 0.6 DMFS (Decayed, Missing, and Filled Surfaces) in the permanent teeth of children aged 5-17 residing their entire lives in either fluoridated or unfluoridated areas (Brunelle & Carlos, 1990). This difference is less than one tooth surface, and less than 1% of the 100+ tooth surfaces available in a child's mouth.

The LOTUS study of over 6 million adults in England, published in January 2024 was the largest, strongest study of fluoridation effectiveness in adults ever done and found virtually no benefit: a lifetime reduction in decay of only 2%. The LOTUS study authors concluded:

> "This study suggests that exposure to optimal water fluoridation between 2010 and 2020 resulted in 'exceedingly small' health effects, 'very small' reductions in NHS dental service utilization, and no meaningful reduction in social inequalities." [Moore 2024, p. 7]

An accompanying economic analysis for the LOTUS study found the meager dental bill savings would be worth only about $1 a year per person; not enough to buy a single cup of coffee. Furthermore, the analysis did not consider the capital costs of new fluoridation schemes, let alone the cost of adverse effects, such as reduced IQ and dental fluorosis.

A large 10-year fluoridation study in the northwest of England concluded that fluoridation's effects on tooth decay in children are "very modest" and "much smaller than previous studies have reported (Goodwin, 2022). The authors summed up their findings by writing:

> "The 4% difference we found [in primary teeth] may not be large enough to convince communities to support water fluoridation schemes. Other ways of preventing tooth decay may be better now that use of fluoride toothpaste is so common and levels of tooth decay are much lower than they were 40 years ago."

Furthermore, the study results indicated that the benefit of fluoridation for permanent teeth was even smaller than that seen in deciduous teeth. Among 11-year-olds, there were only 3% fewer caries-free children in fluoridated communities than in non-fluoridated communities. Additionally, the study did not demonstrate any significant additional reduction in caries for fluoride-deprived children, thus indicating that fluoridation did not alleviate disparities. Large surveys from three Australian states have observed even less of a benefit, with decay reductions ranging from 0 to 0.3 of one permanent tooth surface (Spencer 1996; Armfield & Spencer 2004). None of these studies have allowed for the possible delayed eruption of the teeth that may be caused by exposure to fluoride, for which there is some evidence (Komarek 2005). A one-year delay in eruption of the permanent teeth would eliminate the very small benefit recorded in these modern studies.

## IV. An Unmet Burden of Proof: Fluoridation Has Not Been Proven Safe for Everyone.

The practice of water fluoridation has been a contentious issue for decades, marked by the periodic formation of review panels that often produce reports in favor of fluoridation. Recent examples of such panels are discussed in the sections below. It seems that, at least in certain instances, political considerations have taken precedence over scientific evidence and recommendations. This sets the stage for the following evaluation of fluoridation: delving into questions about its efficacy, the absence of randomized controlled trials, and concerns about the potential harms associated with fluoridation.

**There has never been a single randomized controlled trial to demonstrate fluoridation's effectiveness or safety.**

Despite the long-standing practice of adding fluoride to community water supplies for over 75 years, it is noteworthy that "there have been no randomized trials of water fluoridation" (Cheng et al., 2007) among the broader population. Randomized trials are a standard method for assessing the safety and efficacy of any proposed medical intervention, making their absence in this context a notable observation. Some fluoridation advocates say that "nature thought of fluoridation first". By this, they mean that fluoride occurs at naturally high levels in some water supplies. Lots of toxic substances, however, like lead, arsenic, and even some medicines, such as lithium, can occur at naturally high levels. This does not mean they are safe.

**Systemic fluoride supplementation has never been FDA approved to verify safety or effectiveness.**

The absence of rigorous randomized trials has led to the continued classification of fluoride by the U.S. Food and Drug Administration (FDA) as an "unapproved new drug." This classification underscores the need for further research and evaluation to better understand the potential benefits and risks associated with water fluoridation.

**The chemicals used for fluoridation have not been tested comprehensively.**
In animal studies, the chemical typically assessed is pharmaceutical grade sodium fluoride, rather than industrial grade fluorosilicic acid, which is typically the compound that is added to public water supplies. Advocates argue that once these silicon fluorides have been diluted at public water treatment facilities, they completely dissociate, resulting in the formation of free fluoride ions and hydrated silica. This, they claim, eliminates the need for toxicological examination of these compounds.

It is worth noting that a study conducted at the University of Michigan (Finney et al., 2006) demonstrated this complete dissociation (of silicofluorides) at a neutral pH, and it found that a stable complex in acidic conditions, comprising five fluoride ions, which contradicts the claim of complete dissociation in water. The possibility that such a complex could potentially reform in the sustained, highly acidic environment of the stomach (where the pH typically ranges between 1 and 2) warrants further investigation.

**Fluoridation chemicals may leach lead from pipes, brass fittings and soldered joints.**
In tightly controlled laboratory experiments, Maas et al (2007) have demonstrated that fluoridation chemicals in combination with chlorinating agents, such as chloramine, increase the leaching of lead (that is, releasing lead from the pipes and putting into the water) from brass fittings used in plumbing. While proponents may argue about the neurotoxic effects of low levels of fluoride, there is no argument that lead at very low levels lowers IQ in children.


**Endorsements do not represent scientific evidence.**
Numerous proponents of fluoridation often rely on a list of endorsements as part of their argument. The U.S. Public Health Service (PHS) first endorsed fluoridation in 1950, before any completed trials or significant health studies had been published (see chapters 9 and 10 in The Case Against Fluoride for the significance of this PHS endorsement for the future promotion of fluoridation). Many other endorsements swiftly followed with limited scientific justification. The continued use of these endorsements appears to be driven more by political considerations than rigorous medical science.

**The studies that launched fluoridation were methodologically flawed.**
The early trials conducted in North America between 1945 and 1955 that helped to launch fluoridation have faced substantial criticism for their poor methodology and flawed selection of control communities (De Stefano 1954; Sutton 1959, 1960, 1996; Ziegelbecker 1970). According to Dr. Hubert Arnold, a statistician from the University of California at Davis, these early fluoridation trials "are especially rich in fallacies, improper design, invalid use of statistical methods, omissions of contrary data, and just plain muddle-headedness and hebetude." Questions have also been raised concerning Trendley Dean's (the father of fluoridation) renowned 21-city study from 1942 (Ziegelbecker 1981).

**There is an absence of credible research with respect to fluoridation's efficacy.**
According to the well-known toxicologist, Dr. John Doull, who chaired the National Academy of Science's (NAS) review on fluoride, the safety of fluoridation remains "unsettled" and "we have much less information than we should, considering how long it has been going on." In 2006, Doull's committee at the National Academy of Sciences (NAS) published an exhaustive 500-page review of fluoride's toxicity. The report drafted by its central subcommittee, the National Research Council (NRC), concludes that fluoride is an "endocrine disruptor" and can adversely affect many things in the body, including the bones, the brain, the thyroid gland, the pineal gland, and even blood sugar levels.

Furthermore, in the January 2008 issue of Scientific American, Professor John Doull was quoted as highlighting the need for a fresh perspective on fluoride (Fagin, 2008). He stated:

"What the committee found is that we've gone with the status quo regarding fluoride for many years—for too long really—and now we need to take a fresh look . . . In the scientific community people tend to think this is settled. I mean, when the U.S. surgeon general comes out and says this is one of the top 10 greatest achievements of the 20th century, that's a hard hurdle to get over. But when we looked at the studies that have been done, we found that many of these questions are unsettled and we have much less information than we should, considering how long this [fluoridation] has been going on."

Meanwhile, in 2000, the British Government's "York Review" did not grant any fluoridation trial a Grade A classification, despite 50 years of research (McDonagh et al., 2000).

It is important to recognize that the absence of credible research on a particular topic should not automatically be interpreted as evidence of the absence of harm. Such an assumption can be irresponsible and potentially misleading. Responsible research and policymaking should take a precautionary approach when there is uncertainty about potential risks or harm. Public health and safety should always be paramount, and decision-makers should base their actions on a well-rounded evaluation of the available evidence, considering both potential benefits and potential harm.

**Review panels hand-picked to deliver a pro-fluoridation result.**
Periodically, governments that have promoted fluoridation as safe and effective for decades form selective panels to produce reports that publicly reaffirm water fluoridation, particularly when the practice is faced with new science showing harm or opposition from scientific professionals and the public. This tactic has been acknowledged even by proponents of fluoridation, such as Alan Freeze and Jay Lehr in their 2009 book "Fluoride Wars" when they write:

> "There is one anti-fluoridationist charge that does have some truth to it. Anti-fluoride forces have always claimed that the many government-sponsored review panels set up over the years to assess the costs and benefits of fluoridation were stacked in favor of fluoridation. A review of the membership of the various panels confirms this charge. The expert committees that put together reports by the American Association for the Advancement of Science in 1941, 1944 and 1954; the National Academy of Sciences in 1951, 1971, 1977 and 1993; the World Health Organization in 1958 and 1970; and the U.S. Public Health Service in 1991 are rife with the names of well-known medical and dental researchers who actively campaigned on behalf of fluoridation or whose research was held in high regard in the pro-fluoridation movement. Membership was interlocking and incestuous."

Recent examples of this trend can be seen in the reports by the Irish Fluoridation Forum (2002), the National Health and Medical Research Council (NHMRC, 2007), and Health Canada (2008, 2010). In the latter case, a panel of six experts reviewed the health literature, with four being pro-fluoridation dentists and the other two lacking demonstrated expertise on fluoride. However, there was a notable exception to this pattern when the U.S. National Research Council's appointed a balanced, expert panel to examine fluoride's toxicity in the U.S. This panel of twelve reviewed the US EPA's safe drinking water standards for fluoride. After three and half years, the panel concluded in a 507- page report that the safe drinking water standard was not protective of health and a new maximum contaminant level goal (MCLG) should be determined (NRC, 2006).

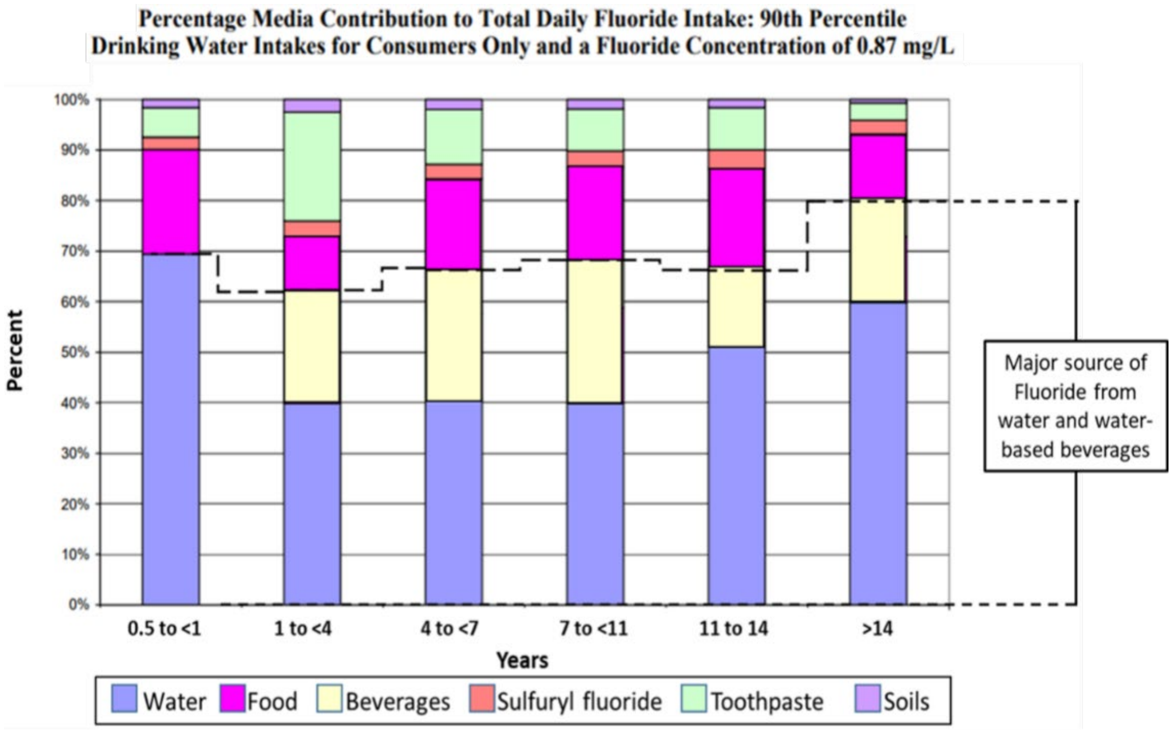
Despite the expectation that standard toxicological procedures and appropriate safety margins would lead to the end to water fluoridation based on their findings, the U.S. EPA Office of Water, in January 2011, indicated they would not determine a value for the MCLG that might jeopardize the water fluoridation program (EPA press release, Jan 7, 2011). Once again, political consideration appeared to outweigh scientific evidence and recommendations.

## V. There is Widespread Overexposure to Fluoride, and It Bioaccumulates.

There are several important dimensions to consider when discussing fluoridation in relation to human health. Firstly, fluoride, once ingested, accumulates in the body. Studies reveal that healthy adult kidneys excrete only a fraction (60%) of the fluoride they consume, and infants and children retain a significant portion in their bones and calcifying tissues, including the pineal gland. Secondly, fluoride exposure does not merely originate from fluoridated water; it stems from various sources, including food and beverages processed with fluoridated water, dental products, tea, etc. Moreover, concerns emerge about the potential leaching of lead from pipes due to the presence of fluoridating agents in water, with lead exposure at very low levels being associated with lower IQ in children. Lastly, the dental consequences of water fluoridation present significant issues, with the prevalence of dental fluorosis, a defect of tooth enamel caused by fluoride's interference with the tooth-forming cells, reaching alarming levels. These crucial concerns underscore the need for comprehensive assessment and transparency in the practice of water fluoridation to ensure public health and safety.

**Water Is primary source of exposure, but other sources add to the problem.**
Fluoridated water is by far the most significant, making up upwards of 70% of exposures for infants, but not the only source of fluoride exposure for most U.S. citizens (EPA 2010). Other sources of fluoride include food and beverages processed with fluoridated water (Kiritsy et al., 1996; Heilman et al., 1999), fluoridated dental products (Bentley et al., 1999; Levy & Guha-Chowdhury, 1999), mechanically deboned meat (Fein & Cerklewski, 2001), tea (Levy & Guha-Chowdhury, 1999), pharmaceuticals (O'Hagan, 2010), food packaging, Teflon pans (Full & Parkins, 1975), workplace exposures (Hodge & Smith, 1977), and pesticide residues (e.g., from cryolite) on food (Stannard et al., 1991; Burgstahler & Robinson, 1997). It is now widely acknowledged that exposure to non-water sources of fluoride has significantly increased since the water fluoridation program first began (NRC, 2006). In fact, when fluoridation first began, there was not a single tube of toothpaste that contained fluoride. Today, over 95% of toothpastes are fluoridated (CDC, 2023). The concern today, therefore, is not only the safety of fluoridated water itself, but the safety of fluoridated water in combination with all the other sources to which we are now exposed. And yet, no regular measurements are being made of the levels of fluoride in urine, blood, bones, hair, or nails of either the general population or sensitive subparts of the population (e.g., individuals with kidney disease).

**Figure 9.** The percentage contributed by each of the media (water, food, beverages, sulfuryl fluoride, toothpaste, and soils) to daily total fluoride intake. It is apparent that, for most individuals in the population, the contribution from drinking water is substantially less than the 100% assumed in the EPA 1986 derivation of the MCLG for crippling skeletal fluorosis. However, the contribution from drinking water for adults who are not at risk for dental fluorosis (60%) is greater than the limiting value for children (40%), who are susceptible to severe dental fluorosis.




**Tens-of-Millions of children have visible signs of overexposure to fluoride (dental fluorosis).**

The fluoridation program has notably fallen short of achieving one of its primary objectives: reducing dental decay rates while minimizing a side-effect of overexposure to fluoride from ingestion during early childhood development, called dental fluorosis. It is characterized by permanent staining and discoloration of tooth enamel due to fluoride causing alterations in the mineralization process. Initially, the proponents of fluoridation aimed to restrict dental fluorosis (in its very mild form) to only 10% of children (NRC, 1993, pp. 6-7).

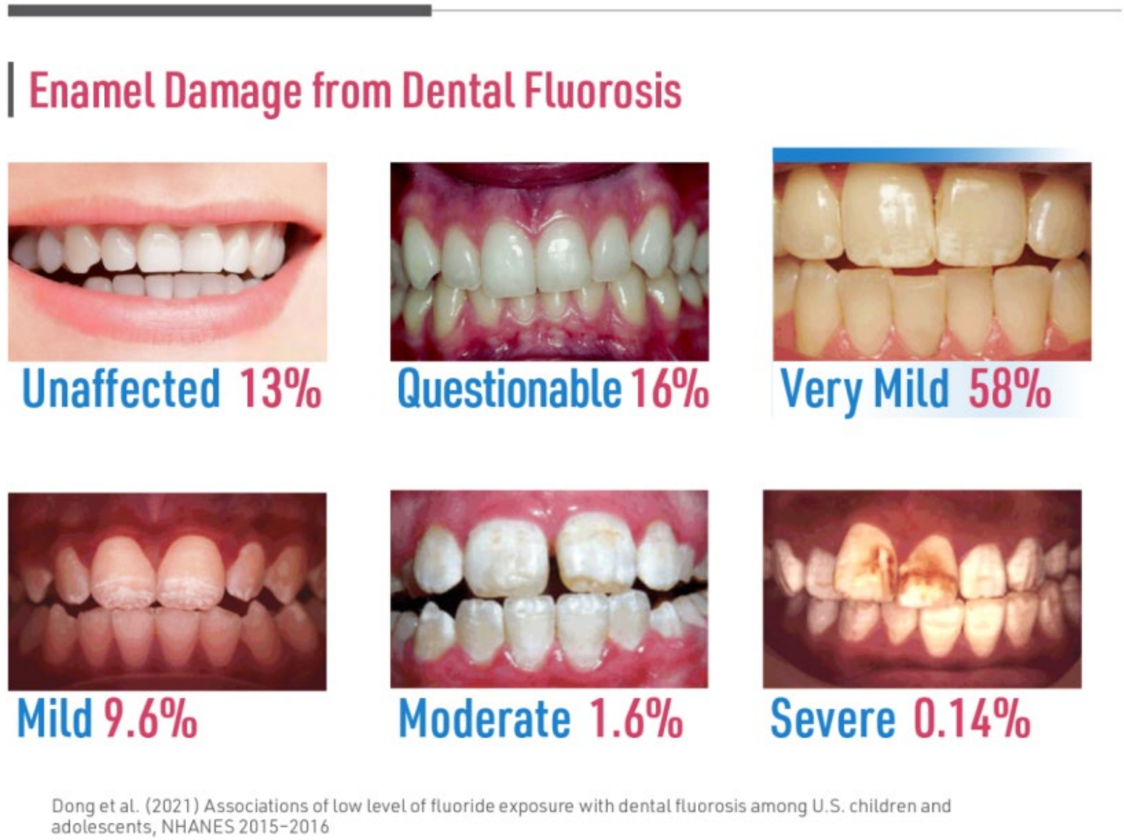



**Figure 10.** Pictorial representations of various severity levels of dental fluorosis. Percentages pertain to the proportion of the sampled population (n=2098) that exhibited a certain severity level of fluorosis. Statistics from Dong et al., 2021.

However, as of 2023, the US Centers For Disease Control and Prevention's (CDC) National Health and Nutrition Examination Survey (NHANES) reported that between 70% and 87.3% of adolescents aged 12 to 15 in the U.S. now exhibit dental fluorosis (Hung et al., 2023). This condition primarily results from ingestion of fluoride in water and beverages originating from fluoridated communities, especially among children up to the age of 8 (i.e., long before their permanent teeth have fully erupted). The CDC collected the aforementioned data in 2013–14, marking an increase from the 65% reported in 2011–2012 (Neurath et al., 2019) and the 41% reported in data generated between 1999 and 2004 (Beltrán-Aguilar et al., 2010).

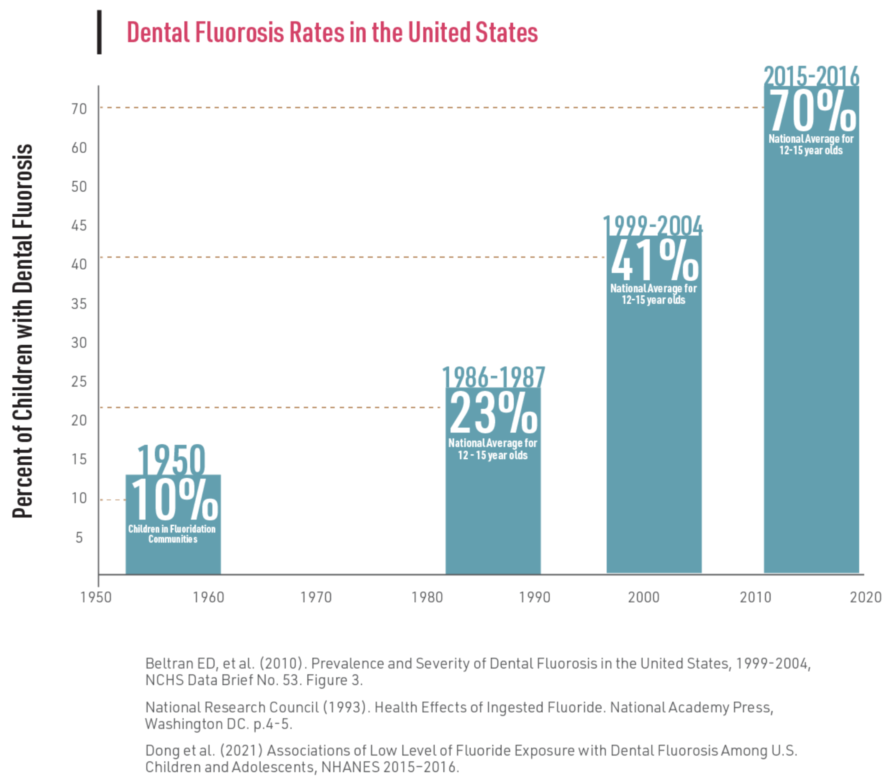



**Figure 11.** Dental fluorosis rates in the United States from 1950-2016. In 1950, 10% of children **in fluoridated communities** exhibited dental fluorosis. From 1986-1987, 23% of 12–15-year-olds in the U.S. (including those in fluoridated and non-fluoridated communities) exhibited dental fluorosis. From 1999-2004, 41% of 12-15-year-olds exhibited dental fluorosis. From 2015-2016, 70% of 12-15-year-olds exhibited dental fluorosis.

In 2000, the British Government's York Review estimated that up to 48% of children in fluoridated areas worldwide experienced dental fluorosis in all forms, with 12.5% having fluorosis of aesthetic concern (McDonagh, 2000). It is reasonable to assume that this figure has likely risen over the past two decades, mirroring the trend observed in the U.S.

**The highest doses of fluoride are going to babies fed formula prepared with fluoridated water.**

The concentration of fluoride in human breastmilk is low (0.004 ppm, NRC, 2006) compared to the range typically found in fluoridated water (0.6 to 1.0 ppm). Infants who consume formula made with fluoridated tap water consume up to 700 to 1,200 micrograms of fluoride, or about 100 times more than the recommended amount (Levy & Guha-Chowdhury, 1999; EWG, 2006; NRC, 2006). Moreover, not only do bottle-fed infants consume substantially higher levels of fluoride compared to their breast-fed counterparts, but they also exhibit the highest fluoride exposure in terms of their body weight within the entire population (NRC, 2006).

According to the CDC, these early spikes of fluoride exposure during infancy provide no known advantage to teeth (Frieden, 2012). Extensive research has consistently identified infant exposure to fluoridated water as a major risk factor for cognitive impairment and development of dental fluorosis later in life (Marshall et al., 2004; Hong et al., 2006; Levy et al., 2010; Till et al., 2019). In 2020, a study funded by the National Institute of Health (NIH) and published in the journal Environment International further underscored these concerns. The study suggested that infants fed formula prepared with fluoridated water exhibited average IQ scores 6 points lower than those mixed with non-fluoridated water. Notably, the losses in non-verbal IQ were even more substantial, averaging 13 points lower.

Considering these alarming risk factors, several dental researchers have recommended against using fluoridated water when reconstituting formula (Ekstrand 1996; Pendrys & Katz, 1998; Fomon et al., 2000; Brothwell & Limeback, 2003; Marshall 2004; Till et al., 2020). Even the American Dental Association (ADA), the most ardent institutional proponent of fluoridation, sent an email alert to its members on November 6, 2006, recommending that parents be advised to prepare formula with "low or no-fluoride water." However, the dissemination of this crucial information to parents has been limited, leaving many unaware of the risk of fluorosis from infant exposure to fluoridated water.

Today, the Institute of Medicine (1997) recommends that babies consume a minuscule 10 micrograms of fluoride per day. This is roughly the equivalent of what babies ingest from breast milk, which contains virtually no fluoride (Ekstrand et al., 1981)

**Fluoride accumulates in the body.**

Healthy adult kidneys excrete only 60% of the fluoride ingested daily (Buzalaf & Whitford, 2011). Infants and children excrete less fluoride from their kidneys and absorb up to 80% of ingested fluoride into their bones (Ekstrand et al., 1994). The remainder accumulates in the body, primarily in calcifying tissues, such as the bones and pineal gland (Luke, 1997, 2001). The fluoride concentration in bone steadily increases over a lifetime (NRC 2006). Recent studies have shown that fluoride accumulation can weaken bone, increase hip fractures in elderly women and arm fractures in children, as well as increase arthritic inflammation (Helte et al 2021; Lindsay et al., 2023; Meng et al., 2023).

## VI. Health Injustice: Mandated Fluoride Ingestion from Cradle to Grave has Socioeconomic Implications.

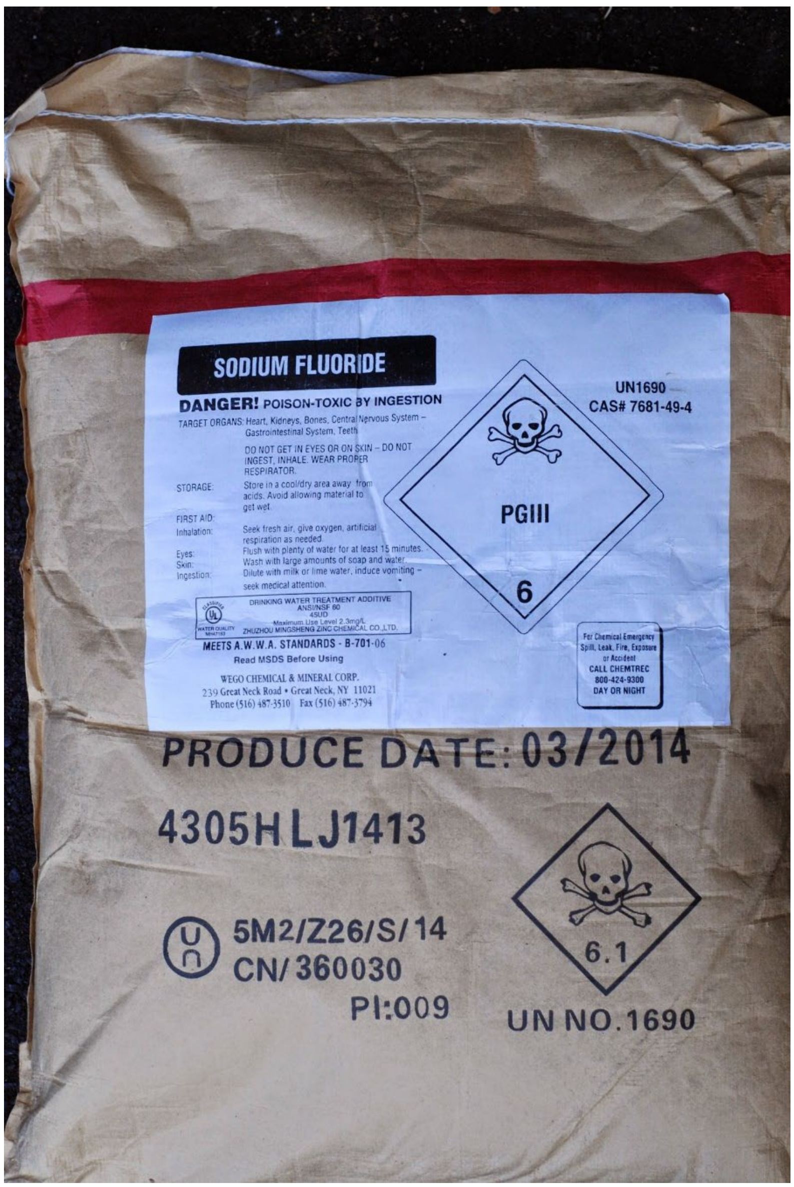
The ethical dimensions of water fluoridation present a profound concern, as the practice raises critical issues related to informed consent, precision in dosage, and the quality of chemicals used in the process. Informed consent, a fundamental principle in healthcare, stands at the heart of the debate, as it entails permitting governments to impose medication on entire communities without their individual consent. The inability to provide individualized care in water fluoridation further complicates the matter, as varying water consumption among different individuals leads to inconsistent dosage. The potential absence of a safety margin for several health effects and disparities in the dental health of low-income communities further deepen the debate, leading to concerns about health injustice and the heightened vulnerability of minority populations. The ethical, scientific, and socioeconomic implications of water fluoridation underscore the necessity of a comprehensive reevaluation of this public health practice.

**Fluoride is administered without informed consent when put into public water supplies.**
Although fluoride advocates sometimes claim that fluoride is a "nutrient", the National Academy of Sciences has repeatedly confirmed that this is not the case (1989). Because fluoride is not a nutrient, the FDA has defined fluoride as a medication when used to prevent disease (Plaisier, 2000). Since tooth decay is a disease, adding fluoride to water to prevent tooth decay is – as a matter of logic – a form of medication. Informed consent is a fundamental principle in the administration of medication, and it stands as one of the core reasons why the majority of Western European countries have rejected water fluoridation. Fluoridation essentially permits governments to impose on entire communities what individual healthcare professionals are ethically prohibited from doing to individual patients—namely, compelling them to undergo medical treatment without their informed consent. Put another way: Should a voter possess the authority to mandate that their neighbor ingest a certain medication, even when it goes against that neighbor's will and consent? With other medications, it is the patient, not the doctor, who has the right to decide which drug to take (AMA Council on Ethical and Judicial Affairs, 2012). Fluoridation denies people this right.

**Fluoridation equates to a lack of individualized care.**
While regulating the dosage of an individual's medication is a common practice, achieving this precision with fluoride is unattainable. Once water undergoes fluoridation, maintaining a consistent dose for each person becomes impossible due to the varying amounts of water people consume. Disparities arise as some individuals, such as manual laborers, athletes, diabetics, and those with kidney disease, ingest significantly larger volumes of water compared to others. According to Dr. Arvid Carlsson, the 2000 Nobel Laureate in Medicine and Physiology and one of the scientists who helped keep fluoridation out of Sweden: "Water fluoridation goes against

leading principles of pharmacotherapy, which is progressing from a stereotyped medication — of the type 1 tablet 3 times a day — to a much more individualized therapy as regards both dosage and selection of drugs. The addition of drugs to the drinking water means exactly the opposite of an individualized therapy" (Carlsson, 1978).

**The chemicals used to fluoridate water are not pharmaceutical grade.**
Surprisingly, the chemicals used to fluoridate water are not pharmaceutical grade. Instead, they primarily come from the wet scrubber systems of the phosphate fertilizer industry. These chemicals (90% of which are sodium fluorosilicate and fluorosilicic acid) are classified as hazardous wastes contaminated with various impurities (Mullenix, 2014). Recent testing by the National Sanitation Foundation suggests that the levels of arsenic in these silicon fluorides are relatively high (up to 1.6 ppb after dilution into public water) and of potential concern (NSF 2000; Weng et al,, 2000). Arsenic is a well-known human carcinogen for which there is no safe level. This one contaminant alone could be increasing cancer rates – and unnecessarily so.



**There is no margin of safety for a number of significant health effects.**
The evidence demonstrating the adverse effects of high natural fluoride levels on health is incontrovertible. In well over 15 countries with known fluoride-rich regions spanning from the United States to the Middle East and the Far East, millions of individuals suffer from compromised health due to excessive fluoride exposure (Undee et al., 2018).

The crucial question at hand revolves around whether there exists an adequate safety margin between the doses of fluoride that have been shown to cause harm in published studies and the total dose people are exposed to from various sources, including water and non-water sources. This margin of safety should consider the wide range of individual sensitivity expected within a large population. Typically, a safety factor of 10 is applied to the lowest observed level causing harm.

Additionally, it's essential to account for the wide spectrum of fluoride doses to which individuals are exposed. Alarmingly, there appears to be no discernable margin of safety for dental fluorosis (Beltrán-Aguilar et al., 2010; Neurath et al., 2019; Hung et al., 2023). Moreover, based on numerous studies, the evidence suggests that there is nowhere near an adequate margin of safety for concerns related to lowered IQ (Xiang et al., 2003 a,b; Ding et al., 2011; Choi et al., 2012; Bashash et al., 2017; Green et al., 2019), reduced thyroid function (Galletti & Joyet, 1958; Bachinskii et al., 1985; Lin et al., 1991), bone fractures in children (Alarcon-Herrera et al., 2001), hip fractures in the elderly (Kurttio et al., 1999; Li et al., 2001; Helte et al., 2021), reproductive health, kidney and liver function. For more information, see the 2006 NRC Review.

**Tooth decay is high in low-income communities that have been fluoridated for years.**
Contrary to some assertions, water fluoridation alone cannot address the oral health crises stemming from inadequate nutrition and limited access to dental care, particularly prevalent in impoverished communities. There have been numerous reports of severe dental crises in low-income neighborhoods of fluoridated U.S. cities that have persisted for over two decades (e.g., Boston, Cincinnati, New York City, and Pittsburgh) (Kozol, 1991; Kong, 1999; Solvig, 2002; Law, 2005).

In addition, research consistently demonstrates that fluoridation is ineffective in preventing one of the most pressing oral health issues facing economically disadvantaged children—early childhood caries, commonly known as "baby bottle tooth decay" (Barnes et al., 1992; Shiboski et al., 2003).

Kentucky, a state that has mandated fluoridation for all communities serving 3,000 citizens or more for the past three decades, boasts the second-highest percentage of its population receiving fluoridated water (CDC, 2020). Despite this, Kentucky currently leads the nation in adult tooth loss (Benefield, 2023).

Considering dental decay disproportionately affects impoverished communities, our focus should be directed towards expanding access to dental care for low-income families. Presently, the most severe rates of tooth decay today are found in low-income areas that have been fluoridated for an extended period.

The true “Oral Health Crisis” confronting the United States today does not stem from a deficiency of fluoride, but rather from issues of poverty and a lack of dental insurance. The Surgeon General has estimated that approximately 80% of dentists in the U.S. do not provide treatment to children covered by Medicaid.

**Low-income families penalized by fluoridation.**
Fluoridation appears to be promoted within our most vulnerable communities primarily for economic reasons, potentially subjecting minorities and low-income families, along with their children, to unproven fluoridation practices. The conditions that make people more vulnerable to fluoride toxicity are more prevalent in poor communities than affluent ones (e.g., nutrient deficiencies, infant formula consumption, kidney disease, and diabetes) (Massler & Schour, 1952). Due to their limited economic and potentially political power, these groups find themselves categorized under the broader umbrella of those suffering from health injustices.

Moreover, disadvantaged families often lack the financial means to avoid fluoride exposure, and there is a notable absence of financial support to help them avoid it or to cover the costs of treating dental fluorosis. Despite claims that fluoridation can prevent the high rates of tooth decay seen in poor areas, the vast majority of poor urban communities have been fluoridated for over 30 years, and yet are still suffering from a severe oral health crisis (Solvig, 2002; Gerth, 2005; Conger, 2011). The simple fact is that poor populations need education on nutrition, proper home dental habits, and professional dental care, not fluoridation chemicals in their water. The millions of dollars spent each year promoting fluoridation would be better spent advocating for policies that provide real help to impoverished communities.

### Rev. Alveda King

Dr. Alveda King, the niece of Dr. Martin Luther King, Jr., wrote the following on her blog on June 22, 2011:

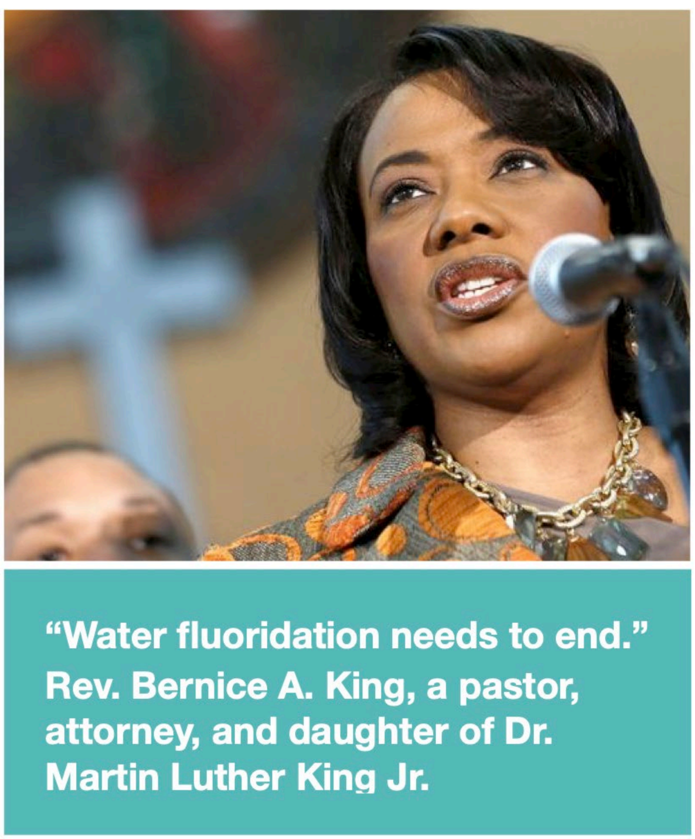
> “The Fluoridegate scandal continues to unravel. All water fluoridation legislation should be repealed in all states that enact fluoridation. Generally people with built-in biases in support of fluoridation have been controlling the discussion about harm from fluorides. The Centers for Disease Control has clearly been trying to preserve fluoridation at all costs, but the facts about fluoride harm are coming out anyway.
>
> This is a civil rights issue. No one should be subjected to drinking fluoride in their water, especially sensitive groups like kidney patients and diabetics, babies in their milk formula, or poor families that cannot afford to purchase unfluoridated water. Black and Latino families are being disproportionately harmed.”

Dr. Alveda King

**Black and Hispanic children are more vulnerable to fluoride's toxicity.**
According to the CDC's national survey of dental fluorosis, Black and Mexican-American children have significantly higher rates of dental fluorosis than White children (Beltrán-Aguilar et al., 2010). The recognition that minority children appear to be more vulnerable to toxic effects of fluoride, combined with the fact that low-income families are less able to avoid drinking fluoridated water, has prompted prominent leaders in the environmental-justice movement to oppose mandatory fluoridation in Georgia. In a statement issued in May 2011, Andrew Young, a colleague of Martin Luther King, Jr., and former Mayor of Atlanta and former US Ambassador to the United Nations, stated:

> "I am most deeply concerned for poor families who have babies: if they cannot afford unfluoridated water for their babies' milk formula, do their babies not count? Of course they do. This is an issue of fairness, civil rights, and compassion. We must find better ways to prevent cavities, such as helping those most at risk for cavities obtain access to the services of a dentist…My father was a dentist. I formerly was a strong believer in the benefits of water fluoridation for preventing cavities. But many things that we began to do 50 or more years ago we now no longer do, because we have learned further information that changes our practices and policies. So it is with fluoridation."

Notably, these vulnerable populations are not only more at risk, but the CDC also refrains from notifying Black and Mexican-American children about their elevated dental fluorosis rates compared to White children. This extra vulnerability may extend to other toxic effects of fluoride. Black Americans have higher rates of lactose intolerance, kidney problems, and diabetes, all of which may exacerbate fluoride's toxicity.



## VII. Proponents' Dubious Tactics

Many scientists, doctors, and dentists who have spoken publicly on the issue of water fluoridation have been subjected to censorship and intimidation (Martin & Groth, 1991). A notable case is that of Dr. Phyllis Mullenix who lost her position as the Chair of Toxicology at Forsythe Dental Center due to her publication of research findings regarding the effects of fluoride on the brain (Mullenix et al., 1995). Similarly, Dr. William Marcus was terminated from his position at the EPA for raising questions about the government's management of the National Toxicology Program's (NTP's) study on fluoride and its potential link to cancer (Bryson, 2004). "A particularly nasty example of this political effort to derail science was a letter sent to Dr. Christine Till's University in an effort to have her reprimanded or dismissed for unprofessional conduct, when her only offence was to publish top quality studies on fluoride's neurotoxicity. This blatant form of intimidation should have no place in science" (Lennon et al. 2020; Connett, 2023).

Paul Connett, PhD was asked as an outside expert to present to the NRC subcommittee on the subject of fluoride in drinking water, and toward this end he submitted a written statement to the Board of Scientific Councilors (BSC) that opened up by saying, "This sad history has culminated in the most extreme example [of duplicitous actions] to date, namely the best review of fluoride's neurotoxicity ever undertaken which is currently being undermined by pro-fluoridation forces within the US department of Health and Human Services (HHS) which goes all the way up to Deputy Administer Rachel Levine who prevented the NTP's final report due for release on May 18, 2022 (which was six years in the making) from being published.

A particularly nasty example of this political effort to derail science was a letter sent to Dr. Christine Till's University in an effort to have her reprimanded or dismissed for unprofessional conduct, when her only offence was to publish top quality studies on fluoride's neurotoxicity. This blatant form of intimidation should have no place in science. (Lennon et al., 2020)."

In private conversations, many dentists and even medical doctors express their opposition to water fluoridation. However, they often refrain from voicing their concerns publicly due to peer pressure and fear of recrimination. Tactics like this would not be necessary if those advocating for water fluoridation were confident in the solid scientific and ethical foundation of their position.

**Proponents have failed to refute the Bassin-Osteosarcoma study.**
In 2001, Elise Bassin, a dentist, successfully defended her doctoral thesis at Harvard. Her research revealed a troubling correlation: young boys who consumed fluoridated water during their mid-childhood growth spurt (age 6 to 8) faced a five-to-seven-fold increased risk of developing osteosarcoma by the age of 20. The results of this study were published in 2006 (Bassin et al., 2006). However, fluoridating countries have largely dismissed these findings. This skepticism was due to her thesis adviser, Chester Douglass, an advocate of fluoridation and a consultant for Colgate. He had promised a more extensive study that he claimed would refute Bassin's thesis (Douglass & Joshipura, 2006).

After a 5-year wait, the Douglass study was finally published in 2011 (Kim et al., 2011). However, contrary to expectations, this study did not invalidate Bassin's findings in any significant way. Notably, the Douglass study used far fewer controls than Bassin's analysis and did not even attempt to assess the age-specific window of risk that Bassin had identified. Furthermore, by the author's own admission, the study lacked the capacity to assess the risk of osteosarcoma among children and adolescents—the precise population of concern. For a critique of the Douglass study, click here.

**Proponents usually refuse to defend fluoridation in open debate.**
While pro-fluoridation officials continue to promote fluoridation with undiminished fervor, they often refuse to engage in open public debates – even when invited to do so by moderate organizations, such as the Association for Science in the Public Interest, the American College of Toxicology, or the U.S. EPA (Bryson, 2004). According to Dr. Michael Easley, a prominent lobbyist for fluoridation in the US, "Debates give the illusion that a scientific controversy exists when no credible people support the fluorophobics' view" (Easley, 1999). In light of proponents' refusal to debate this issue, Dr. Edward Groth, a Senior Scientist at Consumers Union, observed that, "the political pro-fluoridation stance has evolved into a dogmatic, authoritarian, essentially anti-scientific posture, one that discourages open debate of scientific issues" (Martin & Groth, 1991).

# Conclusion

Proponents of fluoridation have long asserted that opposition to the practice comes exclusively from non-legitimate scientists, even though the earliest opponents of fluoridation were biochemists. Today, a large and increasing number of professionals, including doctors and dentists, are reading the primary literature themselves instead of relying on biased statements from organizations, such as the ADA and CDC. And while there has been a shortage of sound clinical research conducted to exam the potential efficacy of fluoridation, there is a mounting body of evidence generated from sound clinical research highlighting the adverse effects of fluoridation. As a result, these professionals are now realizing that both they and the general public have been inadequately informed by their respective professional bodies on this matter. As of January 2024, more than 5,500 of these professionals have signed a statement calling for an end to water fluoridation worldwide. This statement and a list of signatories can be found on the Fluoride Action Network (FAN) website. To grasp the caliber of those opposing fluoridation, one can watch the 28-minute video titled "Professional Perspectives on Water Fluoridation," available for viewing on the same FAN site

In this context, the recurring pattern emerges, where vested interests have sought to undermine studies and cast doubt on epidemiological findings in controversies concerning toxic chemicals. Political pressures have often caused government agencies to delay regulating hazardous substances such as asbestos, benzene, DDT, PCBs, tetraethyl lead, tobacco, and dioxins in the past. With fluoridation, this delay has endured over seventy years.

Unfortunately, government officials and dental leaders have staked much of their credibility on defending fluoridation. Worse, this stance is also partly driven by the potential liabilities they could face if they acknowledge that fluoridation may have contributed to an increase in hip fractures, arthritis, bone cancer, brain disorders, or thyroid problems. These concerns make it challenging for them to address the matter candidly. Nevertheless, we stress the ever-growing importance of the need for honesty when it comes to fluoridation. Their responsibility ought to be safeguarding millions from needless harm and upholding the principle that public health policies must rest on solid science rather than political convenience.

Government officials and dental leaders have a tool with which to accomplish this: The Precautionary Principle. Simply put: If in doubt, leave it out. This approach has been adopted by most European countries, and their children's teeth have not suffered, while the public's trust in them has been strengthened.

Just how much doubt is necessary on just one of the health concerns identified in this document to outweigh only a potential benefit to teeth that, when quantified in the largest survey ever conducted in the US (Yiamouyiannis, 1990), amounts to a dental decay reduction impacting less than one tooth surface (out of 128) in a child's mouth!

Experts in environmental toxicology have stated that because over 200 million U.S. residents are exposed to fluoridated water daily, the population impact of adverse effects from fluoride may be even greater than for other toxic elements, including lead, mercury, and arsenic (Nilsen et al. 2020). Leading neuroscientists have also compared the impact on the developing brain from fluoridated water to that of lead. However, this environmental toxin and the harm it causes remains one of the simplest to curtail. Ceasing fluoridation is as easy as turning off a spigot in the public water works. But, achieving this requires political resolve, which in turn demands widespread awareness and organization. Kindly share these reasons with all your friends and encourage them to eliminate fluoride from their communities and contribute to a global ban of this practice.

# Afterward - *History Repeating Itself*

Lead (Pb) has been recognized for its detrimental effects on the human body since the Roman era. Historically, the Romans identified lead carbonate [$PbCO_3$] as the specific compound responsible for these harms. They deduced this in part based on their observations of laborers who exhibited a pallid complexion due to inhaling fumes emitted during the melting process of lead. Additionally, the Romans understood that lead was detrimental to one's blood, leading them to advise against using leaden pipes for supplying water to their homes. Despite this, the Romans used aqueducts lined with lead sheets and frequently used lead for their cooking and food vessels. While the extent to which lead contributed to Rome's decline is debatable, the undeniable fact remains that the Romans had significant exposure to this element.

Today, our comprehension of the dangers posed by lead exposure is well established, particularly with respect to neurotoxicity and especially among infants and children. This comprehensive understanding was developed over thousands of years and became irrefutable by the early twentieth century. However, it wasn't until 1975 and 1978, respectively, that the relatively new Environmental Protection Agency (EPA) moved to phase out the use of lead in gasoline (for most motor vehicles) and paint. Unfortunately, these measures followed extensive lead contamination worldwide, stemming from its widespread use. To think of the morbidity alone that resulted in pervasive lead exposure in this last century is both incomprehensible and unconscionable.

Shifting focus from ancient Rome to 1945, the year that marked the introduction of fluoridating public water supplies. While thousands of years separate these two periods, the narratives of lead and fluoride exhibit striking parallels. First, lead and fluoride rarely occur in their elemental forms, but rather are by-products of mining. Lead emerges from silver mining, while fluoride is a result of phosphate mining. The harmful product of lead is lead carbonate, while the harmful product for fluoridation tends to be hexafluorosilicic acid, also known as hydrofluorosilicic acid ($H_2SiF_6$). This compound is composed of tetrafluorosiliciate gas and other species of fluorine gases, which are derived from pollution scrubbers, and it is corrosive to both metals and tissue. Furthermore, exposure to its fumes or the liquid form can cause severe burns.

While the Roman lead workers exhibited overt signs of lead poisoning, the story unfolded somewhat differently in the U.S. During the 1950s, gases and dust from phosphate manufacturing spewed over farmlands, impacting cattle and leading to symptoms like dental fluorosis (white or brown staining resulting from hypomineralization of tooth enamel) and bone deformities. Subsequent medical studies of phosphate workers showed clear evidence of excessive fluoride exposure through elevated levels in urine, hair, and nails.

## Postscript

Further arguments against fluoridation can be viewed at http://www.fluoridealert.org and in the book The Case Against Fluoridation (Connett, 2010). Follow us on Instagram @fluoridealert and X @FluorideAction

# References


Abduweli Uyghurturk, D., Goin, D. E., Martinez-Mier, E. A., Woodruff, T. J., & DenBesten, P. K. (2020). Maternal and fetal exposures to fluoride during mid-gestation among pregnant women in northern California. *Environ Health*, *19*(1), 38. https://doi.org/10.1186/s12940-020-00581-2

Alarcón-Herrera, M., Martin-Dominguez, I., Trejo, R., & Dozal, S. (2001). Well water fluoride, dental fluorosis, and bone fractures in the Guadiana Valley of Mexico. *Fluoride*, *34*, 139-149.

AMA Council on Ethical and Judicial Affairs. (2012). AMA Code of Medical Ethics. In (14 ed.): Virtual Mentor.

Armfield, J. M., & Spencer, A. J. (2004). Consumption of nonpublic water: implications for children's caries experience. *Community Dent Oral Epidemiol*, *32*(4), 283-296. https://doi.org/10.1111/j.1600-0528.2004.00167.x

Bachinskiĭ, P. P., Gutsalenko, O. A., Naryzhniuk, N. D., Sidora, V. D., & Shliakhta, A. I. (1985). Fluorine Effect on Function of the Pituitary-Thyroid System in the Bodies of Healthy Persons and Patients with Thyropathies [Deistvie ftora, soderzhashchegosya v organizme zdorovykhrovykh i bol'nykh tireopatiyami lyudei, na funktsional'noe sostoyanie sistemy gipofiz-shchitovidnaya zheleza]. *Probl Endokrinol (Mosk)*, *31*(6), 25-29. (Deĭstvie ftora, soderzhashchegosia v organizme zdorovykh i bol'nykh tireopatiiami liudeĭ, na funktsional'noe sostoianie gipofiz--shchitovidnaia zheleza.)

Barbier, O., Arreola-Mendoza, L., & Del Razo, L. M. (2010). Molecular mechanisms of fluoride toxicity. *Chem Biol Interact*, *188*(2), 319-333. https://doi.org/10.1016/j.cbi.2010.07.011

Barnes, G. P., Parker, W. A., Lyon, T. C., Jr., Drum, M. A., & Coleman, G. C. (1992). Ethnicity, location, age, and fluoridation factors in baby bottle tooth decay and caries prevalence of Head Start children. *Public Health Rep*, *107*(2), 167-173.

Barot, V. V. (1998). Occurrence of endemic fluorosis in human population of North Gujarat, India: human health risk. *Bull Environ Contam Toxicol*, *61*(3), 303-310. https://doi.org/10.1007/s001289900763

Bashash, M., Marchand, M., Hu, H., Till, C., Martinez-Mier, E. A., Sanchez, B. N., Basu, N., Peterson, K. E., Green, R., Schnaas, L., Mercado-García, A., Hernández-Avila, M., & Téllez-Rojo, M. M. (2018). Prenatal fluoride exposure and attention deficit hyperactivity disorder (ADHD) symptoms in children at 6-12 years of age in Mexico City. *Environ Int*, *121*(Pt 1), 658-666. https://doi.org/10.1016/j.envint.2018.09.017

Bashash, M., Thomas, D., Hu, H., Martinez-Mier, E. A., Sanchez, B. N., Basu, N., Peterson, K. E., Ettinger, A. S., Wright, R., Zhang, Z., Liu, Y., Schnaas, L., Mercado-García, A., Téllez-Rojo, M. M., & Hernández-Avila, M. (2017). Prenatal Fluoride Exposure and Cognitive Outcomes in Children at 4 and 6–12 Years of Age in Mexico. *Environmental Health Perspectives*, *125*(9), 097017. https://doi.org/doi:10.1289/EHP655

Bassin, E. B. (2001). *Association Between Fluoride in Drinking Water During Growth and Development and the Incidence of Osteosarcoma for Children and Adolescents* Harvard]. https://www.fluoridealert.org/wp-content/uploads/bassin-2001.pdf

Bassin, E. B., Wypij, D., Davis, R. B., & Mittleman, M. A. (2006). Age-specific fluoride exposure in drinking water and osteosarcoma (United States). *Cancer Causes Control*, *17*(4), 421-428. https://doi.org/10.1007/s10552-005-0500-6Bayley, T. A., Harrison, J. E., Murray, T. M., Josse, R. G., Sturtridge, W., Pritzker, K. P., Strauss, A., Vieth, R., &

Goodwin, S. (1990). Fluoride-induced fractures: relation to osteogenic effect. *J Bone Miner Res*, *5 Suppl 1*, S217-222. https://doi.org/10.1002/jbmr.5650051333
Beltrán-Aguilar, E. D., Barker, L., & Dye, B. A. (2010). *Prevalence and severity of dental fluorosis in the United States, 1999-2004* (NCHS data brief, no 53, Issue. https://www.cdc.gov/nchs/products/databriefs/db53.htm#citation
Beltrán-Aguilar, E. D., Barker, L. K., Canto, M. T., Dye, B. A., Gooch, B. F., Griffin, S. O., Hyman, J., Jaramillo, F., Kingman, A., Nowjack-Raymer, R., Selwitz, R. H., & Wu, T. (2005). Surveillance for dental caries, dental sealants, tooth retention, edentulism, and enamel fluorosis--United States, 1988-1994 and 1999-2002. *MMWR Surveill Summ*, *54*(3), 1-43.
Benefield, C. (2023). Kentucky Leads the Nation in the Number of Toothless Adults. *WBKR*. https://wbkr.com/kentucky-leads-nation-in-toothless-adults/
Bentley, E. M., Ellwood, R. P., & Davies, R. M. (1999). Fluoride ingestion from toothpaste by young children. *Br Dent J*, *186*(9), 460-462. https://doi.org/10.1038/sj.bdj.4800140
Bigay, J., Deterre, P., Pfister, C., & Chabre, M. (1985). Fluoroaluminates activate transducin-GDP by mimicking the gamma-phosphate of GTP in its binding site. *FEBS Lett*, *191*(2), 181-185. https://doi.org/10.1016/0014-5793(85)80004-1
Bigay, J., Deterre, P., Pfister, C., & Chabre, M. (1987). Fluoride complexes of aluminum or beryllium act on G-proteins as reversibly bound analogues of the gamma phosphate of GTP. *The EMBO Journal*, *6*(10), 2907-2913. https://doi.org/https://doi.org/10.1002/j.1460-2075.1987.tb02594.x
Brothwell, D., & Limeback, H. (2003). Breastfeeding is protective against dental fluorosis in a nonfluoridated rural area of Ontario, Canada. *J Hum Lact*, *19*(4), 386-390. https://doi.org/10.1177/0890334403257935
Brunelle, J. A., & Carlos, J. P. (1990). Recent trends in dental caries in U.S. children and the effect of water fluoridation. *J Dent Res*, *69 Spec No*, 723-727; discussion 820-723. https://doi.org/10.1177/00220345900690s141
Bryson, C. (2004). *The Fluoride Deception*. Seven Stories Press. https://books.google.com/books?id=q3v_JgjZ6fsC
Burgstahler, A. W., & Robinson, M. A. (1997). AW Burgstahler and MA Robinson. *Fluoride*, *30*(3), 142-146.
Buzalaf, M. A. R., & Whitford, G. M. (2011). Fluoride metabolism. *Monogr Oral Sci*, *22*, 20-36. https://doi.org/10.1159/000325107
Caffey, J. (1955). On Fibrous Defects in Cortical Walls of Growing Tubular Bones: Their Radiologic Appearance, Structure, Prevalence, Natural Course, and Diagnostic Significance. *Advances in Pediatrics*, *7*(1), 13-51. https://doi.org/https://doi.org/10.1016/S0065-3101(22)00436-4
Calderon, J., Machado, B., Navarro, M., Carrizales, L., Ortiz, M., & Diaz-Barriga, F. (2000). Influence of Fluoride exposure on reaction time and visuospatial organization in children. *Epidemiology*, *11*(4). https://journals.lww.com/epidem/fulltext/2000/07000/influence_of_fluoride_exposure_on_reaction_time.417.aspxCarlsson, A. (1978). [Current problems of the pharmacology and toxicology of fluorides]. *Lakartidningen*, *75*(14), 1388-1392. (Aktuella problem rörande fluoriders farmakologi och toxikologi).
Carnow, B. W., & Conibear, S. A. (1981). Industrial Fluorosis. *Fluoride*, *14*, 172-181. https://fluoridealert.org/studies/carnow-1981/

Carson, B. L. (2000). *Aluminum Compounds Review of Toxicological Literature Abridged Final Report* (Integrated Laboratory Systems, Issue. https://ntp.niehs.nih.gov/sites/default/files/ntp/htdocs/chem_background/exsumpdf/aluminum_508.pdf

Caspary, W. J., Myhr, B., Bowers, L., McGregor, D., Riach, C., & Brown, A. (1987). Mutagenic activity of fluorides in mouse lymphoma cells. *Mutat Res*, *187*(3), 165-180. https://doi.org/10.1016/0165-1218(87)90084-x

Centers for Disease Control and Prevention (CDC). (2020). *2020 Fluoridation Statistics* U.S. Department of Health & Human Services. https://www.cdc.gov/fluoridation/statistics/2020stats.htm

Centers for Disease Control and Prevention (CDC). (1999). Achievements in public health, 1900-1999: fluoridation of drinking water to prevent dental caries. *Mortality and Morbidity Weekly Report*, *48*(41), 933-940. https://www.cdc.gov/mmwr/preview/mmwrhtml/mm4841a1.htm

Centers for Disease Control and Prevention (CDC). (2001). Recommendations for using fluoride to prevent and control dental caries in the United States. *MMWR Recomm Rep*, *50*(Rr-14), 1-42. https://www.cdc.gov/mmwr/preview/mmwrhtml/rr5014a1.htm

Centers for Disease Control and Prevention (CDC). (2002). Prevalence of self-reported arthritis or chronic joint symptoms among adults--United States, 2001. *MMWR Morb Mortal Wkly Rep*, *51*(42), 948-950. Chachra, D., Limeback, H., Willett, T. L., & Grynpas, M. D. (2010). The long-term effects of water fluoridation on the human skeleton. *J Dent Res*, *89*(11), 1219-1223. https://doi.org/10.1177/0022034510376070

Centers for Disease and Prevention (CDC). (2023). *Other Fluoride Products*. U.S. Department of Health and Human Services. Retrieved 06/14/2023 from https://www.cdc.gov/fluoridation/basics/fluoride-products.html

Charone, S., Bertolini, M., Gonçalves, R. M., loivos, A. C., Grizzo, L., Buzalaf, M., & Groisman, S. (2012). Lack of a significant relationship between toenail fluoride concentrations and caries prevalence. *Fluoride*, *45*, 133-137.

Chen, P., Meng, X., He, J., Yun, Z., Qin, Y., GE, X., Jiang, Y., Chen, Y., & Han, J. (1997). Effects of hyperfluoride on reproduction-endocrine system of male adults. *Endemic Diseases Bulletin 12*(2), 57-58. https://www.fluoridealert.org/wp-content/uploads/chen-1997.pdf

Chen, Y., Lin, M., Xiao, Y., Gan, W., & Min, D. (1997). Nutrition survey in dental fluorosis-afflicted areas. *Fluoride*, *30*(2), 77-80. https://fluoridealert.org/studytracker/17180/

Cheng, K. K., Chalmers, I., & Sheldon, T. A. (2007). Adding fluoride to water supplies. *Bmj*, *335*(7622), 699-702. https://doi.org/10.1136/bmj.39318.562951.BE

Chinoy, N. J., Rao, M. V., Narayana, M. V., & Neelakanta, E. (1991). Microdose vasal injection of sodium fluoride in the rat. *Reprod Toxicol*, *5*(6), 505-512. https://doi.org/10.1016/0890-6238(91)90022-8Chinoy, N. J., & Sequeira, E. (1989). Effects of fluoride on the histoarchitecture of reproductive organs of the male mouse. *Reprod Toxicol*, *3*(4), 261-267. https://doi.org/10.1016/0890-6238(89)90020-8

Choi, A. L., Sun, G., Zhang, Y., & Grandjean, P. (2012). Developmental Fluoride Neurotoxicity: A Systematic Review and Meta-Analysis. *Environmental Health Perspectives*, *120*(10), 1362-1368. https://doi.org/doi:10.1289/ehp.1104912

Cohn, P. D. (1992). An Epidemiologic Report on Drinking Water and Fluoridation. *New Jersey Department of Health*.

https://www.nj.gov/health/ceohs/documents/eohap/haz_sites/regional_state/drinking_water/drinkingwater_fluoridation.pdf
Colquhoun, J. (1997). Why I changed my mind about water fluoridation. *Perspect Biol Med*, *41*(1), 29-44. https://doi.org/10.1353/pbm.1997.0017
Conger, J. (2011). Added to our drinking water: A chemical more toxic than lead? *KENS5*.
Connett, P. (2023). Paul Connett's statement for the BSC meeting May 4, 2023. In *A ringside view of the battle between science and politics over fluoride's neurotoxicity*.
Connett, P., Beck, J., Micklem, S., & Burgstahler, A. W. (2010). *The Case against Fluoride: How Hazardous Waste Ended Up in Our Drinking Water and the Bad Science and Powerful Politics That Keep It There*. Chelsea Green Publishing. https://books.google.com/books?id=DEqDaoNTo2IC
Connett, P. H., Neurath, C., & Connett, M. (2005). Revisiting the Fluoride-Osteosarcoma connection in the context of Elise Bassin's findings: Part II.
Coplan, M. J., Patch, S. C., Masters, R. D., & Bachman, M. S. (2007). Confirmation of and explanations for elevated blood lead and other disorders in children exposed to water disinfection and fluoridation chemicals. *Neurotoxicology*, *28*(5), 1032-1042. https://doi.org/10.1016/j.neuro.2007.02.012
Curtis, A. M., VanBuren, J., Cavanaugh, J. E., Warren, J. J., Marshall, T. A., & Levy, S. M. (2018). Longitudinal associations between dental caries increment and risk factors in late childhood and adolescence. *J Public Health Dent*, *78*(4), 321-328. https://doi.org/10.1111/jphd.12275
Czerwinski, E., Nowak, J., Dabrowska, D., Skolarczyk, A., Kita, B., & Ksiezyk, M. (1988). Bone and joint pathology in fluoride-exposed workers. *Arch Environ Health*, *43*(5), 340-343. https://doi.org/10.1080/00039896.1988.9934945
Dambacher, M. A., Ittner, J., & Ruegsegger, P. (1986). Long-term fluoride therapy of postmenopausal osteoporosis. *Bone*, *7*(3), 199-205. https://doi.org/10.1016/8756-3282(86)90018-9
Davis, N. (2016). Is Fluoridated Drinking Water Safe? *Harvard Public Health Magazine*.
De Stefano, T. M. (1954). The fluoridation research studies and the general practitioner. *Bulletin of Hudson County Dental Society*.
DenBesten, P. K. (1999). Biological mechanisms of dental fluorosis relevant to the use of fluoride supplements. *Community Dent Oral Epidemiol*, *27*(1), 41-47. https://doi.org/10.1111/j.1600-0528.1999.tb01990.x
Dewey, D., England-Mason, G., Ntanda, H., Deane, A. J., Jain, M., Barnieh, N., Giesbrecht, G. F., & Letourneau, N. (2023). Fluoride exposure during pregnancy from a community water supply is associated with executive function in preschool children: A prospective ecological cohort study. *Science of The Total Environment*, *891*, 164322. https://doi.org/https://doi.org/10.1016/j.scitotenv.2023.164322Department of Health & Human Services (DHHS). (1991). *Review of Fluoride: Benefits and Risks* (Report of the Ad Hoc Committee on Fluoride, Committee to Coordinate Environmental Health and Related Programs, Issue.
Diesendorf, M. (1986). The mystery of declining tooth decay. *Nature*, *322*(6075), 125-129. https://doi.org/10.1038/322125a0
Ding, Y., Yanhui, G., Sun, H., Han, H., Wang, W., Ji, X., Liu, X., & Sun, D. (2011). The relationships between low levels of urine fluoride on children's intelligence, dental

fluorosis in endemic fluorosis areas in Hulunbuir, Inner Mongolia, China. *J Hazard Mater*, *186*(2-3), 1942-1946. https://doi.org/10.1016/j.jhazmat.2010.12.097

Do, L., Ha, D., Peres, M. A., Skinner, J., Byun, R., & Spencer, A. J. (2017). Effectiveness of water fluoridation in the prevention of dental caries across adult age groups. *Community Dentistry and Oral Epidemiology*, *45*(3), 225-232. https://doi.org/https://doi.org/10.1111/cdoe.12280

Dong, H., Yang, X., Zhang, S., Wang, X., Guo, C., Zhang, X., Ma, J., Niu, P., & Chen, T. (2021). Associations of low level of fluoride exposure with dental fluorosis among U.S. children and adolescents, NHANES 2015-2016. *Ecotoxicol Environ Saf*, *221*, 112439. https://doi.org/10.1016/j.ecoenv.2021.112439

Dong, Z., Wan, C., & Liu, J. (1993). Determination of the contents of amino-acid and monoamine neurotransmitters in fetal brains from a fluorosis-endemic area. *Journal of Guiyang Medical College*, *18*(4), 241-245. https://fluoridealert.org/studytracker/15211/

Douglass, C. W., & Joshipura, K. (2006). Caution needed in fluoride and osteosarcoma study. *Cancer Causes Control*, *17*(4), 481-482. https://doi.org/10.1007/s10552-006-0008-8

Du, L. (1992). [The effect of fluorine on the developing human brain]. *Zhonghua Bing Li Xue Za Zhi*, *21*(4), 218-220.

Duan, X., Mao, Y., Wen, X., Yang, T., & Xue, Y. (2011). Excess fluoride interferes with chloride-channel-dependent endocytosis in ameloblasts. *J Dent Res*, *90*(2), 175-180. https://doi.org/10.1177/0022034510385687

Dunham, J. (2019, 08/19/2019). *Higher fluoride levels during pregnancy may be linked with lower IQ scores in kids: study*. CTVNews; BellMedia. https://www.ctvnews.ca/health/higher-fluoride-levels-during-pregnancy-may-be-linked-with-lower-iq-scores-in-kids-study-1.4555550

Easley, M. (1999). *Community fluoridation in America: the unprincipled opposition*. Dental Watch. http://www.dentalwatch.org/fl/opposition.pdf

Ekstrand, J. (1996). Fluoride Intake. In O. Fejerskov, J. Ekstrand, & B. Burt (Eds.), *Fluoride in Dentistry* (2 ed., pp. 40-52). John Wiley & SOns.

Ekstrand, J., Boreus, L. O., & de Chateau, P. (1981). No evidence of transfer of fluoride from plasma to breast milk. *British Medical Journal (Clinical research ed.)*, *283*(6294), 761-762. https://doi.org/10.1136/bmj.283.6294.761

Ekstrand, J., Fomon, S. J., Ziegler, E. E., & Nelson, S. E. (1994). Fluoride pharmacokinetics in infancy. *Pediatr Res*, *35*(2), 157-163. https://doi.org/10.1203/00006450-199402000-00006

Elbethia, A., Darmani, H., & Al-Hiyasat, A. (2000). Fertility effects of sodium fluoride in male mice. *Fluoride*, *33*(3), 128-134.

Environmental Working Group (EWG). (2006). EWG Analysis of Government Data Finds Babies Over-Exposed to Fluoride in Most Major U.S. Cities.Fagin, D. (2008). Second Thoughts about Fluoride. *Scientific American*, *298*(1), 74-81. http://www.jstor.org/stable/26000378

Farmus, L., Till, C., Green, R., Hornung, R., Martinez Mier, E. A., Ayotte, P., Muckle, G., Lanphear, B. P., & Flora, D. B. (2021). Critical windows of fluoride neurotoxicity in Canadian children. *Environmental Research*, *200*, 111315. https://doi.org/https://doi.org/10.1016/j.envres.2021.111315

Feder, S., & Connor, T. (2019, 08/19/2019). *Study Links Fluoridated Water During Pregnancy to Lower IQs*. The Daily Beast. https://www.thedailybeast.com/fluoridated-water-during-pregnancy-linked-to-lower-iqs-study-published-by-jama-pediatrics-says?ref=scroll

Fein, N. J., & Cerklewski, F. L. (2001). Fluoride Content of Foods Made with Mechanically Separated Chicken. *Journal of Agricultural and Food Chemistry*, *49*(9), 4284-4286. https://doi.org/10.1021/jf0106300

Feltman, R., & Kosel, G. (1961). Prenatal and postnatal ingestion of fluorides – Fourteen years of investigation – Final report. *Journal of Dental Medicine*, *16*, 190-199.

Finney, W. F., Wilson, E., Callender, A., Morris, M. D., & Beck, L. W. (2006). Reexamination of hexafluorosilicate hydrolysis by 19F NMR and pH measurement. *Environ Sci Technol*, *40*(8), 2572-2577. https://doi.org/10.1021/es052295s

Fiore, G., Veneri, F., Di Lorenzo, R., Generali, L., Vinceti, M., & Filippini, T. (2023). Fluoride Exposure and ADHD: A Systematic Review of Epidemiological Studies. *Medicina (Kaunas)*, *59*(4). https://doi.org/10.3390/medicina59040797

Fomon, S. J., Ekstrand, J., & Ziegler, E. E. (2000). Fluoride intake and prevalence of dental fluorosis: trends in fluoride intake with special attention to infants. *J Public Health Dent*, *60*(3), 131-139. https://doi.org/10.1111/j.1752-7325.2000.tb03318.x

Forum, I. F. (2002). *Forum on Fluoridation*. https://www.ucc.ie/en/media/research/ohsrc/ReportoftheForumonFluoridation2002.pdf

Franke, J., Rath, F., Runge, H., Fengler, F., Auermann, E., & Lenart, G. (1975). Industrial fluorosis. *Fluoride*, *8*(2), 61-83.

Freeze, R. A., & Lehr, J. H. (2009). *The Fluoride Wars: How a Modest Public Health Measure Became America's Longest-Running Political Melodrama*. Wiley. https://books.google.com/books?id=Abh47vD7JTEC

Freni, S. C. (1994). Exposure to high fluoride concentrations in drinking water is associated with decreased birth rates. *J Toxicol Environ Health*, *42*(1), 109-121. https://doi.org/10.1080/15287399409531866

Frieden, T. R. (2012). CDC Letter to Barbara Boxer. In B. Boxer (Ed.). Atlanta, Georgia: Centers for Disease Control.

Full, C. A., & Parkins, F. M. (1975). Effect of cooking vessel composition on fluoride. *J Dent Res*, *54*(1), 192. https://doi.org/10.1177/00220345750540012501

G.W., G. (1974). A double blind test for determination of intolerance to fluoridated water (preliminary report). *Fluoride*, *7*, 146-152.

Galletti, P. M., & Joyet, G. (1958). Effect of fluorine on thyroidal iodine metabolism in hyperthyroidism. *J Clin Endocrinol Metab*, *18*(10), 1102-1110. https://doi.org/10.1210/jcem-18-10-1102

Gerster, J. C., Charhon, S. A., Jaeger, P., Boivin, G., Briancon, D., Rostan, A., Baud, C. A., & Meunier, P. J. (1983). Bilateral fractures of femoral neck in patients with moderate renal failure receiving fluoride for spinal osteoporosis. *Br Med J (Clin Res Ed)*, *287*(6394), 723-725. https://doi.org/10.1136/bmj.287.6394.723Gerth, U. (2005, 05/22/2005). Nothing to smile about. *Fosters Daily Democrat*.

Ghosh, D., Das Sarkar, S., Maiti, R., Jana, D., & Das, U. B. (2002). Testicular toxicity in sodium fluoride treated rats: association with oxidative stress. *Reprod Toxicol*, *16*(4), 385-390. https://doi.org/10.1016/s0890-6238(02)00038-2

Goodwin, M., Emsley, R., Kelly, M. P., Sutton, M., Tickle, M., Walsh, T., Whittaker, W., & Pretty, I. A. (2022). Evaluation of water fluoridation scheme in Cumbria: the CATFISH

prospective longitudinal cohort study. In: National Institute for Health and Care Research, Southampton (UK).
Grandjean, P. *Chemical Brain Drain*. https://braindrain.dk/
Grandjean, P. (2013). *Only One Chance: How Environmental Pollution Impairs Brain Development -- and How to Protect the Brains of the Next Generation*. Oxford University Press. https://books.google.com/books?id=c5ZpAgAAQBAJ
Grandjean, P., Hu, H., Till, C., Green, R., Bashash, M., Flora, D., Tellez-Rojo, M. M., Song, P. X. K., Lanphear, B., & Budtz-Jørgensen, E. (2021). A Benchmark Dose Analysis for Maternal Pregnancy Urine-Fluoride and IQ in Children. *Risk Analysis*, *42*(3), 439-449. https://doi.org/https://doi.org/10.1111/risa.13767
Green, R., Lanphear, B., Hornung, R., Flora, D., Martinez-Mier, E. A., Neufeld, R., Ayotte, P., Muckle, G., & Till, C. (2019). Association Between Maternal Fluoride Exposure During Pregnancy and IQ Scores in Offspring in Canada. *JAMA Pediatr*, *173*(10), 940-948. https://doi.org/10.1001/jamapediatrics.2019.1729
Greenberg, L. W., Nelsen, C. E., & Kramer, N. (1974). Nephrogenic diabetes insipidus with fluorosis. *Pediatrics*, *54*(3), 320-322.
Groth, E. (1973). *Two Issues of Science and Public Policy: Air Pollution Control in the San Francisco Bay Area and Fluoridation of Community Water Supplies* [Ph.D. Dissertation, Stanford University]. https://books.google.com/books?id=jdpsAAAAMAAJ
Gutteridge, D. H., Price, R. I., Kent, G. N., Prince, R. L., & Michell, P. A. (1990). Spontaneous hip fractures in fluoride-treated patients: potential causative factors. *J Bone Miner Res*, *5 Suppl 1*, S205-215. https://doi.org/10.1002/jbmr.5650051332
Gutteridge, D. H., Stewart, G. O., Prince, R. L., Price, R. I., Retallack, R. W., Dhaliwal, S. S., Stuckey, B. G., Drury, P., Jones, C. E., Faulkner, D. L., Kent, G. N., Bhagat, C. I., Nicholson, G. C., & Jamrozik, K. (2002). A randomized trial of sodium fluoride (60 mg) +/- estrogen in postmenopausal osteoporotic vertebral fractures: increased vertebral fractures and peripheral bone loss with sodium fluoride; concurrent estrogen prevents peripheral loss, but not vertebral fractures. *Osteoporos Int*, *13*(2), 158-170. https://doi.org/10.1007/s001980200008
Han, H., Cheng, Z., & Liu, W. (1989). Effects of fluorine on the human fetus. *Chinese Journal of Control of Endemic Diseases*, *4*, 136-138.
Hao, P., Ma, X., Cheng, X., Ba, Y., Zhu, J., & Cui, L. (2010). [Effect of fluoride on human hypothalamus-hypophysis-testis axis hormones]. *Wei Sheng Yan Jiu*, *39*(1), 53-55.
Harris, R. (2019, 08/19/2019). All Things Considered In *Can Maternal Fluoride Consumption During Pregnancy Lower Children's Intelligence?* https://www.npr.org/sections/health-shots/2019/08/19/752376080/can-maternal-fluoride-consumption-during-pregnancy-lower-childrens-intelligence
Harvard T.H. Chan School of Public Health. (2023). *Fluoride*. https://nutritionsource.hsph.harvard.edu/fluoride/

Health Canada. (2008). *Findings and Recommendations of the Fluoride Expert Panel (January 2007)*.
Health Canada. (2010). *Guidelines for Canadian Drinking Water Quality: Guideline Technical Document – Fluoride*.
Hedlund, L. R., & Gallagher, J. C. (1989). Increased incidence of hip fracture in osteoporotic women treated with sodium fluoride. *J Bone Miner Res*, *4*(2), 223-225. https://doi.org/10.1002/jbmr.5650040214
Heilman, J. R., Kiritsy, M. C., Levy, S. M., & Wefel, J. S. (1999). Assessing fluoride levels of carbonated soft drinks. *J Am Dent Assoc*, *130*(11), 1593-1599. https://doi.org/10.14219/jada.archive.1999.0098
Helte, E., Vargas, C., Kippler, M., Wolk, A., Michaëlsson, K., & Åkesson, A. (2021). Fluoride in Drinking Water, Diet, and Urine in Relation to Bone Mineral Density and Fracture Incidence in Postmenopausal Women. *Environmental Health Perspectives*, *129*(4), 047005. https://doi.org/doi:10.1289/EHP7404
Hileman, B. (1988, 08/01/1988). Fluoridation of water: Questions about health risks and benefits remain after more than 40 years. *Chemical and Engineering News*.
Hileman, B. (1989). New studies cast doubt on fluoridation benefits. *Chemical & Engineering News Archive*, *67*(19), 5-6. https://doi.org/10.1021/cen-v067n019.p005
Hillier, S., Cooper, C., Kellingray, S., Russell, G., Hughes, H., & Coggon, D. (2000). Fluoride in drinking water and risk of hip fracture in the UK: a case-control study. *Lancet*, *355*(9200), 265-269. https://doi.org/10.1016/s0140-6736(99)07161-5
Hodge, H. C., & Smith, F. A. (1977). Occupational fluoride exposure. *J Occup Med*, *19*(1), 12-39. https://doi.org/10.1097/00043764-197701000-00003
Hong, L., Levy, S. M., Broffitt, B., Warren, J. J., Kanellis, M. J., Wefel, J. S., & Dawson, D. V. (2006). Timing of fluoride intake in relation to development of fluorosis on maxillary central incisors. *Community Dent Oral Epidemiol*, *34*(4), 299-309. https://doi.org/10.1111/j.1600-0528.2006.00281.x
Hoover, R. N., Devesa, S., Cantor, K., & Fraumeni, J. F. (1991a). Time trends for bone and joint cancers and osteosarcomas in the Surveillance, Epidemiology and End Results (SEER) Program. *Public Health Service; Review of Fluoride: Risks and Benefits*, Appendix E.
Hoover, R. N., Devesa, S., Cantor, K., & Fraumeni, J. F. (1991b). Time trends for bone and joint cancers and osteosarcomas in the Surveillance, Epidemiology and End Results (SEER) Program. *Public Health Service; Review of Fluoride: Risks and Benefits*, Appendix F.
Hung, M., Hon, E. S., Mohajeri, A., Moparthi, H., Vu, T., Jeon, J., & Lipsky, M. S. (2023). A National Study Exploring the Association Between Fluoride Levels and Dental Fluorosis. *JAMA Network Open*, *6*(6), e2318406-e2318406. https://doi.org/10.1001/jamanetworkopen.2023.18406
Iheozor-Ejiofor, Z., Worthington, H. V., Walsh, T., O'Malley, L., Clarkson, J. E., Macey, R., Alam, R., Tugwell, P., Welch, V., & Glenny, A. M. (2015). Water fluoridation for the prevention of dental caries. *Cochrane Database of Systematic Reviews*(6). https://doi.org/10.1002/14651858.CD010856.pub2
Inkovaara, J., Heikinheimo, R., Jarvinen, K., Kasurinen, U., Hanhijarvi, H., & Iisalo, E. (1975). Prophylactic fluoride treatment and aged bones. *British Medical Journal*, *3*(5975), 73-74. https://doi.org/10.1136/bmj.3.5975.73Institute of Medicine Standing Committee on the Scientific Evaluation of Dietary Reference, I. (1997). The National Academies Collection: Reports funded by National Institutes of Health. In *Dietary Reference Intakes*

*for Calcium, Phosphorus, Magnesium, Vitamin D, and Fluoride*. National Academies Press (US). Copyright © 1997, National Academy of Sciences. https://doi.org/10.17226/5776

International Labour Organization (ILO) & World Health Organization (WHO). (2012). *Aluminum Fluoride (Anhydrous) International Chemical Safety Cards (ICSC)*. (ICSC: 1324; CAS #: 7784-18-1; EC Number: 232-051-1). International Labour Organization; World Health Organization Retrieved from https://www.ilo.org/dyn/icsc/showcard.display?p_lang=en&p_card_id=1324&p_version=2

Johnson, W. J., Taves, D. R., & Jowsey, J. (1979). Fluoridation and Bone Disease in Renal Patients. In E. Johansen, D. Taves, & T. Olsen (Eds.), *Continuing Evaluation Of The Use Of Fluorides* (1 ed.).

Karagas, M. R., Baron, J. A., Barrett, J. A., & Jacobsen, S. J. (1996). Patterns of fracture among the United States elderly: geographic and fluoride effects. *Ann Epidemiol*, *6*(3), 209-216. https://doi.org/10.1016/1047-2797(96)00006-3

Kheradpisheh, Z., Mirzaei, M., Mahvi, A. H., Mokhtari, M., Azizi, R., Fallahzadeh, H., & Ehrampoush, M. H. (2018). Impact of Drinking Water Fluoride on Human Thyroid Hormones: A Case- Control Study. *Scientific Reports*, *8*(1), 2674. https://doi.org/10.1038/s41598-018-20696-4

Kim, F. M., Hayes, C., Williams, P. L., Whitford, G. M., Joshipura, K. J., Hoover, R. N., Douglass, C. W., Gebhardt, M. C., Scarborough, M. T., Gitelis, S., Eckardt, J. J., Neff, J. R., Joyce, M. J., Malawer, M., McGuire, M., & Anderson, H. C. (2011). An Assessment of Bone Fluoride and Osteosarcoma. *Journal of Dental Research*, *90*(10), 1171-1176. https://doi.org/10.1177/0022034511418828

Kiritsy, M. C., Levy, S. M., Warren, J. J., Guha-Chowdhury, N., Heilman, J. R., & Marshall, T. (1996). Assessing fluoride concentrations of juices and juice-flavored drinks. *J Am Dent Assoc*, *127*(7), 895-902. https://doi.org/10.14219/jada.archive.1996.0347

Kishi, K., & Ishida, T. (1993). Clastogenic activity of sodium fluoride in great ape cells. *Mutat Res*, *301*(3), 183-188. https://doi.org/10.1016/0165-7992(93)90076-8

Klein, H. (1975). Dental fluorosis associated with hereditary diabetes insipidus. *Oral Surg Oral Med Oral Pathol*, *40*(6), 736-741. https://doi.org/10.1016/0030-4220(75)90441-7

Komárek, A., Lesaffre, E., Härkänen, T., Declerck, D., & Virtanen, J. I. (2005). A Bayesian analysis of multivariate doubly-interval-censored dental data. *Biostatistics*, *6*(1), 145-155. https://doi.org/10.1093/biostatistics/kxh023

Kong, D. (1999, 11/27/1999). City to launch battle against dental 'crisis'. *Boston Globe*.

Kour, K., & Singh, J. (1980). Histological Finding of Mice Testes Following Fluoride Ingestion. *Fluoride*, *13*(4), 160-162.

Kozol, J. (1991). Savage Inequalities. *Harper Perennial*.

Künzel, W., & Fischer, T. (1997). Rise and fall of caries prevalence in German towns with different F concentrations in drinking water. *Caries Res*, *31*(3), 166-173. https://doi.org/10.1159/000262393

Künzel, W., & Fischer, T. (2000). Caries prevalence after cessation of water fluoridation in La Salud, Cuba. *Caries Res*, *34*(1), 20-25. https://doi.org/10.1159/000016565Künzel, W., Fischer, T., Lorenz, R., & Brühmann, S. (2000). Decline of caries prevalence after the cessation of water fluoridation in the former East Germany. *Community Dent Oral Epidemiol*, *28*(5), 382-389. https://doi.org/10.1034/j.1600-0528.2000.028005382.x

Kurttio, P., Gustavsson, N., Vartiainen, T., & Pekkanen, J. (1999). Exposure to natural fluoride in well water and hip fracture: a cohort analysis in Finland. *Am J Epidemiol*, *150*(8), 817-824. https://doi.org/10.1093/oxfordjournals.aje.a010086

Law, V. (2005, 02/13/2005). Sink your teeth into health care. *Pittsburgh Tribune - Review*.

Lennon, M., Beal, J. F., Allukian, J. M., Tomar, S. L., Foley, M., Wolfe, J. O., Harding, M., Uribe, S., Horowitz, A. M., Perrott, K., Hennessy, T. W., Curtis, D., Meyer, J., & Fried, R. L. (2020). Letter sent to Till's University. In P. Tsaparis (Ed.).

Levy, S. M., Broffitt, B., Marshall, T. A., Eichenberger-Gilmore, J. M., & Warren, J. J. (2010). Associations between fluorosis of permanent incisors and fluoride intake from infant formula, other dietary sources and dentifrice during early childhood. *J Am Dent Assoc*, *141*(10), 1190-1201. https://doi.org/10.14219/jada.archive.2010.0046

Levy, S. M., & Guha-Chowdhury, N. (1999). Total fluoride intake and implications for dietary fluoride supplementation. *J Public Health Dent*, *59*(4), 211-223. https://doi.org/10.1111/j.1752-7325.1999.tb03272.x

Li, G. (2004). Pathogenesis of endemic fluorosis. *BeiJing: Science Press*, 4-25.

Li, L. (2003). The biochemistry and physiology of metallic fluoride: action, mechanism, and implications. *Crit Rev Oral Biol Med*, *14*(2), 100-114. https://doi.org/10.1177/154411130301400204

Li, Y., Liang, C., Slemenda, C. W., Ji, R., Sun, S., Cao, J., Emsley, C. L., Ma, F., Wu, Y., Ying, P., Zhang, Y., Gao, S., Zhang, W., Katz, B. P., Niu, S., Cao, S., & Johnston, C. C., Jr. (2001). Effect of long-term exposure to fluoride in drinking water on risks of bone fractures. *J Bone Miner Res*, *16*(5), 932-939. https://doi.org/10.1359/jbmr.2001.16.5.932

Lin, F. F., Aihaiti, Zhao, H. X., J., L., J.Y., J., Malmaiti, & Aiken. (1991). The relationship of a low-iodine and high-fluoride environment to subclinical cretinism in Xinjiang. *Iodine Deficiency Disorder Newsletter*, *7*(3), 24-25. https://fluoridealert.org/wp-content/uploads/lin-1991.pdf

Lindsay, S. E., Smith, S., Yang, S., & Yoo, J. (2023). Community Water Fluoridation and Rate of Pediatric Fractures. *JAAOS Global Research & Reviews*, *7*(10), e22.00221. https://doi.org/10.5435/JAAOSGlobal-D-22-00221

Liu, H., Li, X., Wang, X., Wang, Q., Ma, W., Chen, Z., & Yu, C. (1988). Analysis of the effect of fluoride on male infertility in regions with reported high level of fluoride (endemic fluorosis). *Journal of the Medical Institute of Suzhou* *8*(4), 297-299. https://www.fluoridealert.org/wp-content/uploads/liu-1988.pdf

Luke, J. (1997). The effect of fluoride on the physiology of the pineal gland.

Luke, J. (2001). Fluoride deposition in the aged human pineal gland. *Caries Res*, *35*(2), 125-128. https://doi.org/10.1159/000047443

Maas, R. P., Patch, S. C., Christian, A. M., & Coplan, M. J. (2007). Effects of fluoridation and disinfection agent combinations on lead leaching from leaded-brass parts. *Neurotoxicology*, *28*(5), 1023-1031. https://doi.org/10.1016/j.neuro.2007.06.006

Macek, M. D., Matte, T. D., Sinks, T., & Malvitz, D. M. (2006). Blood lead concentrations in children and method of water fluoridation in the United States, 1988-1994. *Environ Health Perspect*, *114*(1), 130-134. https://doi.org/10.1289/ehp.8319Malin, A. J., Riddell, J., McCague, H., & Till, C. (2018). Fluoride exposure and thyroid function among adults living in Canada: Effect modification by iodine status. *Environment International*, *121*, 667-674. https://doi.org/https://doi.org/10.1016/j.envint.2018.09.026

Malin, A. J., & Till, C. (2015). Exposure to fluoridated water and attention deficit hyperactivity disorder prevalence among children and adolescents in the United States: an ecological association. *Environmental Health*, *14*(1), 17. https://doi.org/10.1186/s12940-015-0003-1

Marier, J. R., & Rose, D. (1977). *Environmental Fluoride*. National Research Council of Canada. Associate Committee on Scientific Criteria for Environmental Quality. https://books.google.com/books?id=ke1pAAAAMAAJ

Marshall, T. A., Levy, S. M., Warren, J. J., Broffitt, B., Eichenberger-Gilmore, J. M., & Stumbo, P. J. (2004). Associations between Intakes of fluoride from beverages during infancy and dental fluorosis of primary teeth. *J Am Coll Nutr*, *23*(2), 108-116. https://doi.org/10.1080/07315724.2004.10719350

Martin, B., & Groth, E. (1991). *Scientific Knowledge in Controversy: The Social Dynamics of the Fluoridation Debate*. State University of New York Press. https://books.google.com/books?id=N2Jou7QeYIIC

Massler, M., & Schour, I. (1952). Relation of endemic dental fluorosis to malnutrition. *J Am Dent Assoc*, *44*(2), 156-165. https://doi.org/10.1016/s0002-8177(52)42007-3

Masters, R. D., & Coplan, M. J. (1999). Water treatment with silicofluorides and lead toxicity. *International Journal of Environmental Studies*, *56*(4), 435-449. https://doi.org/10.1080/00207239908711215

Masters, R. D., Coplan, M. J., Hone, B. T., & Dykes, J. E. (2000). Association of silicofluoride treated water with elevated blood lead. *Neurotoxicology*, *21*(6), 1091-1100.

Matsuo, S., Kiyomiya, K., & Kurebe, M. (1998). Mechanism of toxic action of fluoride in dental fluorosis: whether trimeric G proteins participate in the disturbance of intracellular transport of secretory ameloblast exposed to fluoride. *Arch Toxicol*, *72*(12), 798-806. https://doi.org/10.1007/s002040050576

Maupomé, G., Clark, D. C., Levy, S. M., & Berkowitz, J. (2001). Patterns of dental caries following the cessation of water fluoridation. *Community Dent Oral Epidemiol*, *29*(1), 37-47.

McDonagh, M., Whiting, P., Bradley, M., Cooper, J., Sutton, A., Chestnutt, I., Misso, K., Wilson, P., Treasure, E., & Kleijnen, J. (2000). *A systematic review of public water fluoridation*. University of York, NHS Centre for Reviews & Dissemination.

Meng, X., Wang, J., Liu, Y., Li, M., Guan, Z., Sowanoua, A., Yang, D., Pei, J., & Gao, Y. (2023). Relatively low fluoride in drinking water increases risk of knee osteoarthritis (KOA): a population-based cross-sectional study in China. *Environ Geochem Health*, *45*(11), 8735-8747. https://doi.org/10.1007/s10653-023-01742-1

Mihashi, M., & Tsutsui, T. (1996). Clastogenic activity of sodium fluoride to rat vertebral body-derived cells in culture. *Mutat Res*, *368*(1), 7-13. https://doi.org/10.1016/s0165-1218(96)90034-8

Moolenburgh, H. C. (1987). *Fluoride: The Freedom Fight*. Mainstream. https://books.google.com/books?id=rblpAAAAMAAJ

Mullenix, P. J. (2014). A new perspective on metals and other contaminants in fluoridation chemicals. *Int J Occup Environ Health*, *20*(2), 157-166. https://doi.org/10.1179/2049396714y.0000000062Mullenix, P. J., Denbesten, P. K., Schunior, A., & Kernan, W. J. (1995). Neurotoxicity of sodium fluoride in rats. *Neurotoxicol Teratol*, *17*(2), 169-177. https://doi.org/10.1016/0892-0362(94)00070-t

Narayana, M. V., & Chinoy, N. J. (1994). Effect of fluoride on rat testicular steroidogenesis. *Fluoride*, *27*, 7-12.

Narayana, M. V., & Chinoy, N. J. (1994). Reversible effects of sodium fluoride ingestion on spermatozoa of the rat. *Int J Fertil Menopausal Stud*, *39*(6), 337-346.

National Health and Medical Research Council (NHMRC). (2007). *A Systematic Review of the Efficacy and Safety of Fluoridation*.

National Research Council (NRC). (1993). *Health Effects of Ingested Fluoride*. National Academy Press. https://books.google.com/books?id=CpZpAAAAMAAJ

National Research Council (NRC). (2006). *Fluoride in Drinking Water: A Scientific Review of EPA's Standards*. N. A. Press. https://nap.nationalacademies.org/catalog/11571/fluoride-in-drinking-water-a-scientific-review-of-epas-standards

National Research Council Subcommittee on the Tenth Edition of the Recommended Dietary, A. (1989). The National Academies Collection: Reports funded by National Institutes of Health. In *Recommended Dietary Allowances: 10th Edition*. National Academies Press (US). Copyright © 1989 by the National Academy of Sciences. https://doi.org/10.17226/1349

National Toxicology Program (NTP). (1990). NTP Toxicology and Carcinogenesis Studies of Sodium Fluoride (CAS No. 7681-49-4) in F344/N Rats and B6C3F1 Mice (Drinking Water Studies). *Natl Toxicol Program Tech Rep Ser*, *393*, 1-448.

National Toxicology Program (NTP). (2022). *Draft - NTP Monograph on the State of the Science Concerning Fluoride Exposure and Neurodevelopmental and Cognitive Health Effects: A Systematic Review* (2378-5144). https://ntp.niehs.nih.gov/sites/default/files/ntp/about_ntp/bsc/2023/fluoride/documents_provided_bsc_wg_031523.pdf

Neelam, K., Suhasini, R., & Sudhakar, R. (1987). Incidence of prevalence of infertility among married male members of endemic fluorosis district of Andhra Pradesh. *In: Abstract Proc Conf Int Soc for Fluoride Res. Nyon, Switzerland.*

Neurath, C., Limeback, H., Osmunson, B., Connett, M., Kanter, V., & Wells, C. R. (2019). Dental Fluorosis Trends in US Oral Health Surveys: 1986 to 2012. *JDR Clinical & Translational Research*, *4*(4), 298-308. https://doi.org/10.1177/2380084419830957

Nicole, W. (2021). Denser but Not Stronger? Fluoride-Induced Bone Growth and Increased Risk of Hip Fractures. *Environmental Health Perspectives*, *129*(7), 074001. https://doi.org/doi:10.1289/EHP9533

O'Duffy, D. J., Wahner, H. W., O'Fallon, W. M., Johnson, K. A., Muhs, J. M., Beabout, J. W., Hodgson, S. F., & Riggs, B. L. (1986). Mechanism of acute lower extremity pain syndrome in fluoride-treated osteoporotic patients. *The American Journal of Medicine*, *80*(4), 561-566. https://doi.org/https://doi.org/10.1016/0002-9343(86)90808-9

O'Hagan, D. (2010). Fluorine in health care: Organofluorine containing blockbuster drugs. *Journal of Fluorine Chemistry*, *131*(11), 1071-1081. https://doi.org/https://doi.org/10.1016/j.jfluchem.2010.03.003

Orcel, P., de Vernejoul, M. C., Prier, A., Miravet, L., Kuntz, D., & Kaplan, G. (1990). Stress fractures of the lower limbs in osteoporotic patients treated with fluoride. *J Bone Miner Res*, *5 Suppl 1*, S191-194. https://doi.org/10.1002/jbmr.5650051392Ortiz-Pérez, D., Rodríguez-Martínez, M., Martínez, F., Borja-Aburto, V. H., Castelo, J., Grimaldo, J. I., de la Cruz, E., Carrizales, L., & Díaz-Barriga, F. (2003). Fluoride-induced disruption of reproductive hormones in men. *Environ Res*, *93*(1), 20-30. https://doi.org/10.1016/s0013-9351(03)00059-8

Peckham, S., Lowery, D., & Spencer, S. (2015). Are fluoride levels in drinking water associated with hypothyroidism prevalence in England? A large observational study of GP practice data and fluoride levels in drinking water. *Journal of Epidemiology and Community Health*, *69*(7), 619. https://doi.org/10.1136/jech-2014-204971

Pendrys, D. G., & Katz, R. V. (1998). Risk factors for enamel fluorosis in optimally fluoridated children born after the US manufacturers' decision to reduce the fluoride concentration of infant formula. *Am J Epidemiol*, *148*(10), 967-974. https://doi.org/10.1093/oxfordjournals.aje.a009573

Phipps, K. R., Orwoll, E. S., Mason, J. D., & Cauley, J. A. (2000). Community water fluoridation, bone mineral density, and fractures: prospective study of effects in older women. *Bmj*, *321*(7265), 860-864. https://doi.org/10.1136/bmj.321.7265.860

Plaisier, M. K. (2000). FDA Letter to Ken Calvert, Chairman. In K. Calvert (Ed.). Rockville, MD: Department of Health & Human Services.

National Toxicology Program (NTP). (1990). NTP Toxicology and Carcinogenesis Studies of Sodium Fluoride (CAS No. 7681-49-4) in F344/N Rats and B6C3F1 Mice (Drinking Water Studies). *Natl Toxicol Program Tech Rep Ser*, *393*, 1-448.

National Toxicology Program (NTP). (2022). *Draft - NTP Monograph on the State of the Science Concerning Fluoride Exposure and Neurodevelopmental and Cognitive Health Effects: A Systematic Review* (2378-5144). https://ntp.niehs.nih.gov/sites/default/files/ntp/about_ntp/bsc/2023/fluoride/documents_provided_bsc_wg_031523.pdf

Riddell, J. K., Malin, A. J., Flora, D., McCague, H., & Till, C. (2019). Association of water fluoride and urinary fluoride concentrations with attention deficit hyperactivity disorder in Canadian youth. *Environ Int*, *133*(Pt B), 105190. https://doi.org/10.1016/j.envint.2019.105190

Riddell, J. K., Malin, A. J., McCague, H., Flora, D. B., & Till, C. (2021). Urinary Fluoride Levels among Canadians with and without Community Water Fluoridation. *International Journal of Environmental Research and Public Health*, *18*(12), 6203. https://www.mdpi.com/1660-4601/18/12/6203

Riggs, B. L., Hodgson, S. F., O'Fallon, W. M., Chao, E. Y. S., Wahner, H. W., Muhs, J. M., Cedel, S. L., & Melon, L. J. (1990). Effect of Fluoride Treatment on the Fracture Rate in Postmenopausal Women with Osteoporosis. *New England Journal of Medicine*, *322*(12), 802-809. https://doi.org/10.1056/nejm199003223221203

Rocha-Amador, D., Navarro, M., Trejo-Acevedo, A., Carrizales, L., Pérez-Maldonado, I., Díaz-Barriga, F., & Calderón, J. (2009). Use of the Rey-Osterrieth Complex Figure Test for neurotoxicity evaluation of mixtures in children. *Neurotoxicology*, *30*(6), 1149-1154. https://doi.org/10.1016/j.neuro.2009.09.003

Sawan, R. M. M., Leite, G. A. S., Saraiva, M. C. P., Barbosa, F., Tanus-Santos, J. E., & Gerlach, R. F. (2010). Fluoride increases lead concentrations in whole blood and in calcified tissues from lead-exposed rats. *Toxicology*, *271*(1), 21-26. https://doi.org/https://doi.org/10.1016/j.tox.2010.02.002Schiffl, H. (2008). Fluoridation of drinking water and chronic kidney disease: absence of evidence is not evidence of absence. *Nephrology Dialysis Transplantation*, *23*(1), 411-411. https://doi.org/10.1093/ndt/gfm663

Schlesinger, E. R., Overton, D. E., Chase, H. C., & Cantwell, K. T. (1956). Newburgh-Kingston caries-fluorine study. XIII. Pediatric findings after ten years. *J Am Dent Assoc*, *52*(3), 296-306. https://doi.org/10.14219/jada.archive.1956.0054

Schnitzler, C. M., Wing, J. R., Gear, K. A., & Robson, H. J. (1990). Bone fragility of the peripheral skeleton during fluoride therapy for osteoporosis. *Clin Orthop Relat Res*(261), 268-275.

Seow, W. K., & Thomsett, M. J. (1994). Dental fluorosis as a complication of hereditary diabetes insipidus: studies of six affected patients. *Pediatr Dent*, *16*(2), 128-132.

Seppä, L., Kärkkäinen, S., & Hausen, H. (2000). Caries trends 1992-1998 in two low-fluoride Finnish towns formerly with and without fluoridation. *Caries Res*, *34*(6), 462-468. https://doi.org/10.1159/000016624

Sharma, R., Tsuchiya, M., & Bartlett, J. D. (2008). Fluoride induces endoplasmic reticulum stress and inhibits protein synthesis and secretion. *Environ Health Perspect*, *116*(9), 1142-1146. https://doi.org/10.1289/ehp.11375

Shiboski, C. H., Gansky, S. A., Ramos-Gomez, F., Ngo, L., Isman, R., & Pollick, H. F. (2003). The association of early childhood caries and race/ethnicity among California preschool children. *J Public Health Dent*, *63*(1), 38-46. https://doi.org/10.1111/j.1752-7325.2003.tb03472.x

Singh, A., Jolly, S. S., Bansal, B. C., & Mathur, C. C. (1963). Endemic fluorosis. Epidemiological, clinical and biochemical study of chronic fluorine intoxication in Panjab (India). *Medicine (Baltimore)*, *42*, 229-246.

Slade, G. D., Grider, W. B., Maas, W. R., & Sanders, A. E. (2018). Water Fluoridation and Dental Caries in U.S. Children and Adolescents. *J Dent Res*, *97*(10), 1122-1128. https://doi.org/10.1177/0022034518774331

Slade, G. D., Sanders, A. E., Do, L., Roberts-Thomson, K., & Spencer, A. J. (2013). Effects of fluoridated drinking water on dental caries in Australian adults. *J Dent Res*, *92*(4), 376-382. https://doi.org/10.1177/0022034513481190

Solvig, E. (2002, 08/06/2002). Cincinnati's dental crisis. *Cincinnati Enquirer*.

Sowers, M. F., Clark, M. K., Jannausch, M. L., & Wallace, R. B. (1991). A prospective study of bone mineral content and fracture in communities with differential fluoride exposure. *Am J Epidemiol*, *133*(7), 649-660. https://doi.org/10.1093/oxfordjournals.aje.a115940

Spencer, A. J., Slade, G. D., & Davies, M. (1996). Water fluoridation in Australia. *Community Dent Health*, *13*, 27-37.

Spittle, B. (2008). *Fluoride Fatigue: An Abridged Version Of, Fluoride Poisoning: is Fluoride in Your Drinking Water, and from Other Sources, Making You Sick?* Paua Press. https://books.google.com/books?id=zlcjLQAACAAJ

Sprando, R. L., Black, T. N., Ames, M. J., Rorie, J. I., & Collins, T. F. (1996). Effect of intratesticular injection of sodium fluoride on spermatogenesis. *Food Chem Toxicol*, *34*(4), 377-384. https://doi.org/10.1016/0278-6915(96)84542-x

Sprando, R. L., Collins, T. F., Black, T., Olejnik, N., & Rorie, J. (1998). Testing the potential of sodium fluoride to affect spermatogenesis: a morphometric study. *Food Chem Toxicol*, *36*(12), 1117-1124. https://doi.org/10.1016/s0278-6915(98)00085-4Sprando, R. L., Collins, T. F., Black, T. N., Rorie, J., Ames, M. J., & O'Donnell, M. (1997). Testing the potential of sodium fluoride to affect spermatogenesis in the rat. *Food Chem Toxicol*, *35*(9), 881-890. https://doi.org/10.1016/s0278-6915(97)88938-7

Stannard, J. G., Shim, Y. S., Kritsineli, M., Labropoulou, P., & Tsamtsouris, A. (1991). Fluoride levels and fluoride contamination of fruit juices. *J Clin Pediatr Dent*, *16*(1), 38-40.

Stecher, P. G. (1960). *The Merck index of chemicals and drugs* (7th ed.). Merck & Co., Inc. https://ci.nii.ac.jp/ncid/BA01339745

Strunecka, A., & Patocka, J. (1999). Pharmacological and toxicological effects of aluminofluoride complexes. *Fluoride*, *32*, 230-242.

Strunecka, A., & Strunecky, O. (2020). Mechanisms of Fluoride Toxicity: From Enzymes to Underlying Integrative Networks. *Applied Sciences*, *10*(20), 7100. https://www.mdpi.com/2076-3417/10/20/7100

Susheela, A. K., & Jethanandani, P. (1996). Circulating testosterone levels in skeletal fluorosis patients. *J Toxicol Clin Toxicol*, *34*(2), 183-189. https://doi.org/10.3109/15563659609013768

Susheela, A. K., & Kumar, A. (1991). A study of the effect of high concentrations of fluoride on the reproductive organs of male rabbits, using light and scanning electron microscopy. *J Reprod Fertil*, *92*(2), 353-360. https://doi.org/10.1530/jrf.0.0920353

Sutton, P. (1996). *The Greatest Fraud: Fluoridation*. Kurunda Pty, Ltd.

Sutton, P. R. N. (1959). *Fluoridation: Errors and Omissions in Experimental Trials* (1 ed.). Melbourne University Press. https://books.google.com/books?id=IN4sAAAAIAAJ

Sutton, P. R. N. (1960). *Fluoridation: Errors and Omissions in Experimental Trials* (2 ed.). Melbourne University Press. https://books.google.com/books?id=IN4sAAAAIAAJ

Taylor, K. W., Eftim, S. E., Sibrizzi, C. A., Blain, R. B., Magnuson, K., Hartman, P. A., Rooney, A. A., & Bucher, J. R. (2022). *Association between fluoride exposure and children's intelligence: A systematic review and meta-analysis - DRAFT*. https://fluoridealert.org/wp-content/uploads/NTP-2022-meta-analysis-manuscript-July-2022-draft-court-ordered.pdf

Teotia, M., Teotia, S. P., & Singh, K. P. (1998). Endemic chronic fluoride toxicity and dietary calcium deficiency interaction syndromes of metabolic bone disease and deformities in India: year 2000. *Indian J Pediatr*, *65*(3), 371-381. https://doi.org/10.1007/bf02761130

Teotia, S. P. S., Teotia, M., & Teotia, N. P. S. (1976). Symposium on the non-skeletal phase of chronic fluorosis: The Joints. *Fluoride*, *9*, 19-24.

Till, C., Green, R., Flora, D., Hornung, R., Martinez-Mier, E. A., Blazer, M., Farmus, L., Ayotte, P., Muckle, G., & Lanphear, B. (2019). Fluoride exposure from infant formula and child IQ in a Canadian birth cohort. *Environ Int*, *134*, 105315. https://doi.org/10.1016/j.envint.2019.105315

Till, C., Green, R., Flora, D., Hornung, R., Martinez-Mier, E. A., Blazer, M., Farmus, L., Ayotte, P., Muckle, G., & Lanphear, B. (2020). Fluoride exposure from infant formula and child IQ in a Canadian birth cohort. *Environ Int*, *134*, 105315. https://doi.org/10.1016/j.envint.2019.105315

Tsutsui, T., Suzuki, N., Ohmori, M., & Maizumi, H. (1984). Cytotoxicity, chromosome aberrations and unscheduled DNA synthesis in cultured human diploid fibroblasts induced by sodium fluoride. *Mutat Res*, *139*(4), 193-198. https://doi.org/10.1016/0165-7992(84)90127-1Tye, C. E., Antone, J. V., & Bartlett, J. D. (2011). Fluoride does not inhibit enamel protease activity. *J Dent Res*, *90*(4), 489-494. https://doi.org/10.1177/0022034510390043

Unde, M. P., Patil, R. U., & Dastoor, P. P. (2018). The Untold Story of Fluoridation: Revisiting the Changing Perspectives. *Indian J Occup Environ Med*, *22*(3), 121-127. https://doi.org/10.4103/ijoem.IJOEM_124_18

United States Department of Health and Human Services (DHHS). (2003). *Toxicological Profile for Fluorides, Hydrogen Fluoride, and Fluoride* (Public Health Service Agency for Toxic Substances and Disease Registry, Issue.

United States Environmental Protection Agency (EPA). (2010). *Fluoride: Exposure and Relative Source Contribution Analysis*. https://www.epa.gov/sites/default/files/2019-03/documents/fluoride-exposure-relative-report.pdf

United States Environmental Protection Agency (EPA). (2011, 01/07/2011). *EPA and HHS Announce New Scientific Assessments and Actions on Fluoride / Agencies working together to maintain benefits of preventing tooth decay while preventing excessive exposure* https://www.epa.gov/archive/epapages/newsroom_archive/newsreleases/86964af577c37ab285257811005a8417.html

United States Environmental Protection Agency (EPA). (2023, 01/09/2023). *Ground Water and Drinking Water National Primary Drinking Water Regulations*

United States Food and Drug Administration (FDA). (2023, 06/07/2023). *CFR - Code of Federal Regulations Title 21*. Department of Health and Human Services. https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfcfr/cfrsearch.cfm?fr=355.50

Waldbott, G. L. (1958). Allergic Reactions from Fluorides. *International Archives of Allergy*, *12*, 347-355.

Waldbott, G. L. (1959). Urticaria due to fluoride. *Acta Allergologica 13*, 456-468.

Waldbott, G. L., Burgstahler, A. W., & McKinney, H. L. (1978). *Fluoridation: The Great Dilemma*. Coronado Press. https://books.google.com/books?id=JOppAAAAMAAJ

Wang, M., Liu, L., Li, H., Li, Y., Liu, H., Hou, C., Zeng, Q., Li, P., Zhao, Q., Dong, L., Zhou, G., Yu, X., Liu, L., Guan, Q., Zhang, S., & Wang, A. (2020). Thyroid function, intelligence, and low-moderate fluoride exposure among Chinese school-age children. *Environment International*, *134*, 105229. https://doi.org/https://doi.org/10.1016/j.envint.2019.105229

Warren, J. J., Levy, S. M., Broffitt, B., Cavanaugh, J. E., Kanellis, M. J., & Weber-Gasparoni, K. (2009). Considerations on optimal fluoride intake using dental fluorosis and dental caries outcomes--a longitudinal study. *J Public Health Dent*, *69*(2), 111-115. https://doi.org/10.1111/j.1752-7325.2008.00108.x

Weng, C., Smith, D. B., & Huntley, G. M. (2000). Treatment Chemicals Contribute to Arsenic Levels. *Opflow (AWWA)*, 6-7. http://www.fluoridealert.org/uploads/opflow-2000.pdf

Xiang, Q., Liang, Y., Chen, L., Wang, C., Chen, B., Chen, X., & Zhaou, M. (2003). Effect of fluoride in drinking water on children's intelligence. *Fluoride*, *36*, 84-94.

Xiang, Q., Liang, Y., Zhou, M., & Zang, H. (2003). Blood lead of children in Wamiao-Xinhuai intelligence study. *36*, 198-199.

Yu, Y., Yang, W., Dong, Z., Wan, C., Zhang, J., Liu, J., Xiao, K., Huang, Y., & Lu, B. (1996). Neurotransmitter and receptor changes in the brains of fetuses from areas of endemic fluorosis. *Chinese Journal of Endemiology*, *15*, 257-259.Zakrzewska, H., Udała, J., & Błaszczyk, B. (2002). In vitro influence of sodium fluoride on ram semen quality and enzyme activities. *Fluoride*, *35*, 153-160.

Zhang, R., Niu, Y., Du, H., Cao, X., Shi, D., Hao, Q., & Zhou, Y. (2009). A stable and sensitive testing system for potential carcinogens based on DNA damage-induced gene expression in human HepG2 cell. *Toxicol In Vitro*, *23*(1), 158-165. https://doi.org/10.1016/j.tiv.2008.10.006

Zhao, Z. L., Wu, N., & Gao, W. (1995). The influence of fluoride on the content of testosterone and cholesterol in rat. *Fluoride*, *28*, 128-130.

Ziegelbecker, R. (1970). A critical review on the fluorine caries problem. *Fluoride*, *3*, 71-79.

Ziegelbecker, R. (1981). Fluoridated Water and Teeth. *Fluoride*, *14*(3), 123-128.

*"The evidence that fluoridation is more harmful than beneficial is now overwhelming."*

**Hardy Limeback, DDS, PhD**
**Former President of the Canadian Association for Dental Research**

*"Fluoridation goes against all principles of pharmacology. It's obsolete."*

**Arvid Carlsson, MD, PhD**
**Nobel Laureate in Medicine/Physiology**

*"In summary, we hold that fluoridation is an unreasonable risk."*

**U.S. Environmental Protection Agency's Headquarters Union of Scientists and Professionals (2001)**

*"We've gone with the status quo regarding fluoride for many years—for too long, really—and now we need to take a fresh look. In the scientific community, people tend to think this is settled. But when we looked at the studies that have been done, we found that many of these questions are unsettled and we have much less information than we should, considering how long this has been going on."*

**John Doull, MD, PhD**
**Chairman, National Research Council's Review on Fluoride in Drinking Water**

*"The Court finds that fluoridation of water at 0.7 milligrams per liter ("mg/L") – the level presently considered "optimal" in the United States – poses an unreasonable risk of reduced IQ in children…the Court finds there is an unreasonable risk of such injury, a risk sufficient to require the EPA to engage with a regulatory response."*

**United States District Court of the Northern District of California (2024)**