

Fluoride

Online Learning Video Activity Script

International Academy of Oral Medicine and Toxicology (IAOMT); www.iaomt.org
Last updated August 2020

PREFACE TO IAOMT’S FLUORIDE ONLINE LEARNING VIDEO ACTIVITY

Text on screen:

Welcome to IAOMT’s Fluoride Online Learning Video Activity. The “Materials” tab above this video, as well as the text box below this video, contain links to references and resources cited in this activity, scientific literature related to the topics presented, and a script for this entire video. The successful completion of a quiz at the end of this activity is required for individuals participating in an IAOMT course.

In offering this activity, the IAOMT’s intention is to present as much scientific information as possible on different dental materials, treatments, patient and dental staff safety, and other aspects of dentistry.

The objective of the Fluoride Online Learning Video is that at the conclusion of this activity, participants will be able to analyze the risks of using fluoride in water and dental products based on scientific findings and regulatory documents.

The IAOMT emphasizes that health care practitioners must make their own professional judgments for the benefit of themselves and their patients and staffs. You are responsible for exercising your own judgment concerning the specific treatment options to utilize in your practice; for complying with applicable laws and regulations including local dental practice acts and informed consent requirements; and for abiding by insurance requirements including written declarations of coverage.

Only proceed if you understand and agree with these statements.

If you are ready to proceed, the activity will begin with Steve Koral, DMD, MIAOMT, Griffin Cole, DDS, NMD, MIAOMT, and other IAOMT member dentists providing you with the coursework for this Fluoride Online Learning Video Activity.

INTRODUCTION

Welcome to the International Academy of Oral Medicine and Toxicology, the IAOMT, Fluoride training course.

In this course, we’ll review a bit of history, discuss a few of the high points of scientific literature concerning water fluoridation, examine fluoridated versus non-fluoridated data, and uncover the toxic effects of water fluoridation.



Community water fluoridation as a means of controlling tooth decay has been a deeply ingrained object of faith among the dental profession since the early 1950s. It has been called one of the top ten public health measures of the 20th century by the dental division of the American Centers for Disease Control and Prevention.

But what if the ongoing research fails to replicate the evidence for effectiveness claimed by the early foundational studies? And what if this happened with many well-known clinical interventions? And what if the ongoing examination of exposure to inherently, toxic elements, like lead, mercury, and in this case, fluoride, uncover adverse reactions at lower and lower concentrations? What happens to the safety factor for therapy, or therapeutic ratio, using such a toxic element?

If the dose makes the poison, and the poisonous dose is found to be much lower than previously thought, then the therapeutic ratio essentially disappears.

This, we contend, is the case with water fluoridation today.

BRIEF HISTORY OF WATER FLUORIDATION

The official story of fluoride in dentistry goes back to 1901, with Frederick McKay, a young dentist in Colorado Springs. He discovered unsightly brown stains on people's teeth and observed that they seemed unusually resistant to tooth decay. Over many years of arduous research, McKay and others concluded that the brown stains were caused by excess fluoride in water supplies but that the fluoride might have somehow conferred resistance to decay upon these people's teeth.

Let's stop and take a look at the early history of fluoride, as McKay's concepts spread and so did the uses of fluoride:



1886: Elemental fluorine was isolated by chemist Henri Moissan, and then industry began experimenting with fluorine compounds.

1930's: High levels of fluoride occurring naturally in water were linked to dental fluorosis as discovered and purported by Frederick S. McKay, DDS.





1942-45: Uranium fluoride and thorium fluoride were used in atomic bomb production.

1942: H. Trendley Dean, DDS suggested that lower levels of fluoride may result in lower rates of dental caries.



1944: A *Journal of the American Dental Association* editorial and other authorities offered warnings about fluoride dangers.

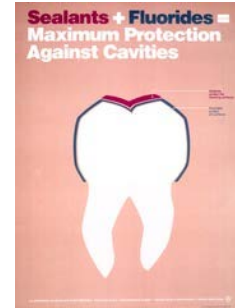
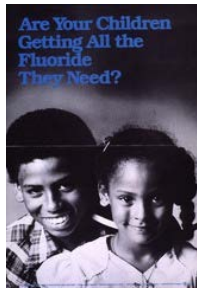
1945: Grand Rapids, Michigan, was the first city to be artificially fluoridated for dental purposes (even though the experiment was never completed with the Muskegon, Michigan, control group).



This interesting hypothesis was seized upon in the years just after World War II by a confluence of fluoride polluting industries. Armed with financial, legal, and political power, they co-opted the altruistic motives of the dental community to create an incredibly well-funded and aggressive drive to fluoridate community water supplies across the United States. They insisted that fluoride exposure was safe and non-toxic, even beneficial.

INSERT EXCERPT FROM United States Public Health Service. Division of Dental Health. *A Drop in the Bucket*. Washington, DC: Public Health Service; 1952. Available from U.S. National Library of Medicine at <https://collections.nlm.nih.gov/catalog/nlm:nlmuid-9702536-vid>.

Anyone who disagreed with this policy was denigrated. Academics who objected found their reputation smeared and research funding dried up. Doctors and dentists who had doubts were labeled as quacks, deviants, or communists by their peers. Nonetheless, evidence of problems with the concept of water fluoridation has continued to mount, and thoughtful observers have continued to press the case that water fluoridation is, at best, ineffective, and at worst, a serious health hazard to teeth.



While this malfeasance was occurring, the use of fluoride spread even further, as we can document by continuing our brief history of fluoride.

Circa 1950's: Fluoride "supplements" were introduced and prescribed. Perfluorinated chemicals were introduced for surface protection in certain products.

1960: Fluoridation of drinking water for alleged dental benefits had spread to over 50 million people in the US.

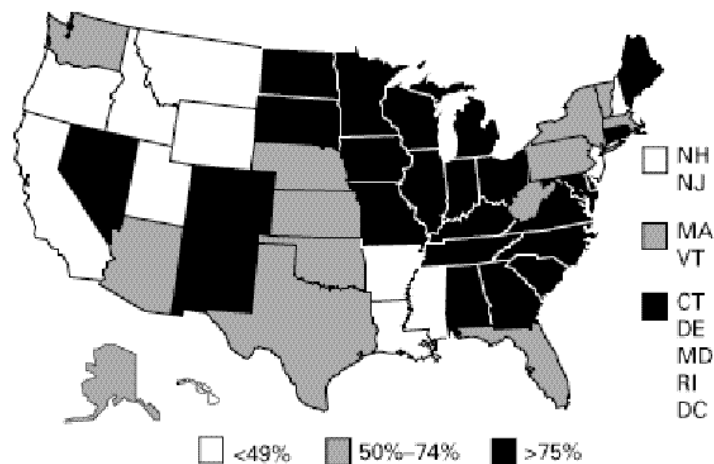
1960's: Fluoridated toothpaste was introduced. Glass ionomer cement was invented.

1970's: Fluoride sealants were introduced.

1980's: Fluoroquinolones (i.e. type of antibiotics) were introduced.

2016: More than 211 million people (over 72%) are known to be drinking fluoridated water (versus only 3% of western Europeans).

FIGURE 2. Percentage of state populations with access to fluoridated water through public water systems



Source: CDC, unpublished data, 2000.



Our timeline shows us that fluoride has continued to be used in more and more capacities even though there have been serious concerns raised about its safety. Part of the reason for this is that what could be classified as “propaganda” has been used to help convince people of fluoride’s safety. However, science has continued to offer mounting, undeniable evidence of the risk fluoride poses to environmental and public health.



INSERT IAOMT Video: [Fluoride Treatment, Fluoride Dangers? IAOMT Dental Advice](#)

FLUORIDE AND ITS POLLUTION

Let’s digress with a quick chemistry lesson on fluoride. The element fluorine (F) has the atomic number 9, it’s the 13th most abundant element on the earth, and it’s a highly toxic, pale yellow diatomic gas. Fluorine is the most reactive element; it combines with other elements readily because of high reactivity.

Fluoride (F-) is fluorine with an extra electron. It naturally exists in certain minerals and is chemically synthesized for industry and products. It is not essential for growth and development and has been identified as one of 12 industrial chemicals known to cause developmental neurotoxicity in humans.

Fluoride is chemically synthesized for use in community water fluoridation, other beverages, dental products, fertilizers, pesticides, and an array of other consumer items. Additionally, fluorinated compounds are present in a significant quantity of pharmaceutical drugs, and perfluorinated chemicals are used in carpets, cleaners, clothing, cookware, food packaging, paints, paper, and other products.

Some examples of industries that emit fluoride pollution include

- aluminum smelters
- blast furnace manufacturing
- cement and phosphate fertilizer units
- coal and fuel combustion
- enamel, pottery, glass, and brick works
- oil refineries
- plastic, pharmaceutical, toothpaste, chemical, and automobile industries
- steel and iron foundries
- welding, refrigeration, and rust removal activities
- zinc production

Source: Swarup D, Dwivedi SK. Environmental pollution and effects of lead and fluoride on animal health. New Delhi: Indian Council of Agricultural Research Krishi Anusandhan Bhavan Pusa. 2002: Pages 72 and 74.



Fluoride pollution can adversely impact wildlife, and industrial atmospheric emissions are known for their ability to contaminate the soil, water, and vegetation in both the immediate vicinity and distant areas. Harmful effects of fluoride that can result in species vulnerability have been reported in an array of animals.

A report about environmental fluoride from the National Research Council of Canada noted that evidence from industrial waste waters showed “large quantities of fluoride are being discharged to waterways.” In fact, the same report mentioned data from a study on fluoride releases into Narragansett Bay, Rhode Island, that demonstrated over one-third of the fluoride emitted into the bay was due to water fluoridation in nearby communities.



Source: Rose D, Marier JR. Environmental Fluoride, 1977. National Research Council of Canada, Associate Committee on Scientific Criteria for Environmental Quality; 1977.



Toxic exposures in birds have been associated with changes in egg quality and shell thickness and lower reproductive success.



Source: Pascoe GA, Zodrow J, Greutert E. Evaluating risks to terrestrial wildlife from environmental fluoride. *Human and Ecological Risk Assessment: An International Journal*. 2014 Jul 4;20(4):954.



Fluoride can be lethal to fish, and symptoms of acute fluoride toxicity in fish can include erratic movement and lethargy.

Sources:

Palczewska-Komsa M, Wilk A, Stogiera A, Chlubek D, Buczkowska-Radlinska J, Wiszniewska B. Animals in biomonitoring studies of environmental fluoride pollution. *Fluoride*. 2016 Jul 1;49(3):281.

World Health Organization. Environmental health criteria 227: fluorides. World Health Organization, Geneva. 2002. Section 1.8 Effects on other organisms in the laboratory and field. Available from <http://www.inchem.org/documents/ehc/ehc/ehc227.htm#1.8>

It can also adversely impact the migration and life expectancy of salmon.

Source: Foulkes RG, Anderson AC. Impact of artificial fluoridation on salmon species in the northwest USA and British Columbia, Canada. *Fluoride*. 1994 Oct 1;27(4):220-6.

In amphibians, studies have demonstrated that fluoride causes deformation of the skeletal structure of tadpoles.

Sources:

Goh EH, Neff AW. Effects of fluoride on *Xenopus* embryo development. *Food Chem Toxicol*. 2003;41(11):1501-8.

Palczewska-Komsa M, Wilk A, Stogiera A, Chlubek D, Buczkowska-Radlinska J, Wiszniewska B. Animals in biomonitoring studies of environmental fluoride pollution. *Fluoride*. 2016 Jul 1;49(3):279-92.



While research is seemingly limited for reptiles, an incident involving fluoride pollution in Australia resulted in less vegetation in the area and caused the forest lizard species in the region to decline.

Source: Taylor JE, Fox BJ. Assessing the disturbance impact on vegetation and lizard communities of fluoride pollution interacting with fire and mining in eastern Australia. *Austral Ecology*. 2001 Aug 1;26(4):321-37.

Invertebrates, too, are impacted by fluoride. For example, fluoride pollution has been linked to the die off and injury of bees.

Source: Carlson CE, Dewey JE. Environmental pollution by fluorides in Flathead National Forest and Glacier National Park. US Department of Agriculture, Forest Service, Northern Region Headquarters, Division of Forest and Private Forestry, Forest Insect and Disease Branch; 1971.



Field studies on mammals in the wild corroborate studies on fluoride in livestock, both of which report dental and skeletal lesions, lameness, appetite impairment (anorexia), reproductive effects, and behavioral changes.

Source: Pascoe GA, Zodrow J, Greutert E. Evaluating risks to terrestrial wildlife from environmental fluoride. *Human and Ecological Risk Assessment: An International Journal*. 2014 Jul 4;20(4):951.

The effects of fluoride on farm animals include dental fluorosis, susceptibility to environmental stresses, shortened life span, gastroenteritis, muscular weakness, pulmonary congestion, nausea, vomiting, diarrhea, chronic convulsions, necrosis of the mucosa of the digestive tract, anorexia, cramping, collapse, respiratory and cardiac failure, and death.



Source: Yu MH, Tsunoda H, Tsunoda M. Environmental toxicology: biological and health effects of pollutants. CRC Press; 2011 Nov 16: Page 167-9.



Cattle are recognized for being particularly susceptible. These photos by L. Mahin show the effects of fluoride exposure on cattle and were collected by using Mahin's contributions to public domain photos.



Horses exhibiting dental fluorosis and other crippling symptoms of fluoride toxicity have been studied in Colorado and Texas. In both cases, when artificial water fluoridation was replaced with low fluoride well water, the surviving horses experienced drastic health improvements. These photos are from the documentary *Poisoned Horses*, which is available online. The photos are courtesy of David Kennedy, DDS, MIAOMT.

Sources for studies on horses and water fluoridation:

Krook LP, Justus C. Fluoride poisoning of horses from artificially fluoridated drinking water. *Fluoride*. 2006 Mar;39(1):3-10.

Macicek P, Krook LP. Fluorosis in horses drinking artificially fluoridated water. *Fluoride*. 2008 Jul 1;41(3):177-83.

Domestic pets have also been subjects of reports raising concerns about fluoride exposure, especially through their water and food. The use of bone meal results in high levels of fluoride in dog food, and this has raised suspicions about dogs' high rates of osteosarcoma, a bone cancer that has been associated with fluoride exposure. Fluoride has also been suggested as a potential factor for the high rates of hyperthyroidism in cats.

Sources:

Environmental Working Group. Dog comparison shows high fluoride levels. Posted June 26, 2009. Available from <http://www.ewg.org/research/dog-food-comparison-shows-high-fluoride-levels>

This research includes a collection of independent laboratory test of popular dog food brands, commissioned by Environmental Working Group. They found that eight major national brands of dog food contained fluoride levels higher than the Environmental Protection Agency's maximum legal dose in drinking water.

Peterson M. Hyperthyroidism in cats: what's causing this epidemic of thyroid disease and can we prevent it? *Journal of Feline Medicine and Surgery*. 2012 Nov;14(11):812.

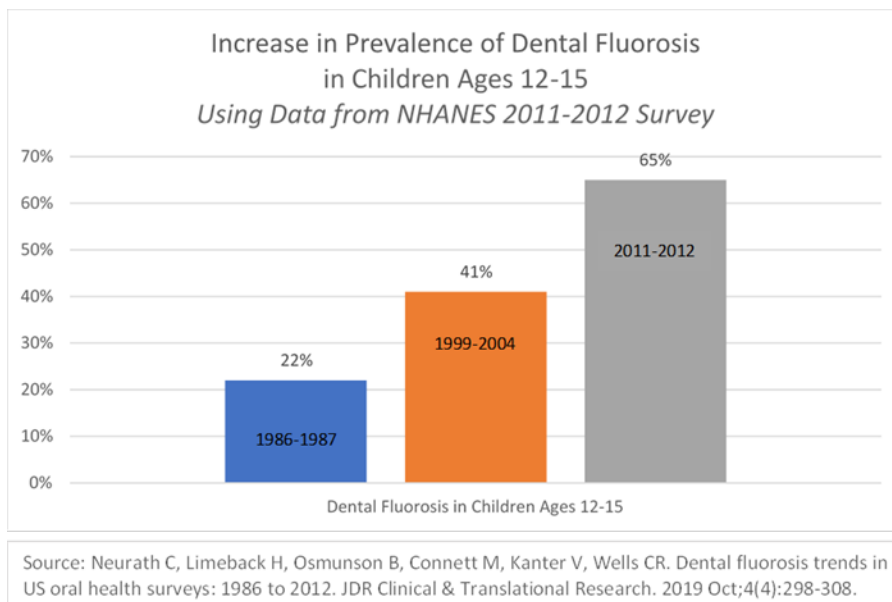
HUMAN HEALTH RISKS FROM FLUORIDE EXPOSURE

Fluoride exposure has also been linked to human health risks in both children and adults of all ages.

The CDC says that over-exposing bottle-fed babies to fluoride in their formula raises the risk that their permanent teeth will emerge with dental fluorosis. This is caused when fluoride deranges the metabolism of the enamel forming cells, and it creates mottling of the tooth enamel with brown and white defects.

When water fluoridation was first being introduced United States in the 1940s, its advocates suggested that, at most, 10% of children would be affected, and only in the mildest way. In actuality, by the beginning of the 21st century, over 40% of American children are affected, many severely, and the rates are still increasing.

INSERT IAOMT VIDEO: [Fluoride Toxicity and Human Health: Dental Advice](#)



Dental fluorosis was the first and most obvious toxic reaction we knew about from trace levels of fluoride in water. And if fluoride can cause metabolic derangement of dental enamel, which is among the most visible tissues in a person's body, we can easily imagine the damage to other less visible processes. It turns out that there is a lot of evidence of harm from fluoride exposure at levels similar to what is recommended for community water fluoridation.

In 2002, the US National Research Council was contracted by the Environmental Protection Agency to re-valuate its safety standard for fluoride that occurs naturally in drinking water sources. The level had been set at 4 parts per million.

The NRC panel of twelve scientists published their massive report in 2006. They concluded that the 4 parts per million standard was not low enough to protect the general public from health hazards, including severe dental fluorosis and bone fractures over a lifetime of drinking that water.

The 2006 report from the National Research Council concluded that the EPA's MCLG (maximum contaminant level goal) for fluoride should be lowered. In addition to recognizing the association between fluoride exposure and osteosarcoma (a bone cancer), the 2006 National Research Council report cited concerns about musculoskeletal effects, reproductive and developmental effects, neurotoxicity and neurobehavioral effects, genotoxicity and carcinogenicity, and effects on other organ systems.

Source: National Research Council. *Fluoride in Drinking Water: A Scientific Review of EPA's Standards*. The National Academies Press: Washington, D.C. 2006.

A notable quote from the National Research Council's report is the following: "Overall, there was consensus among the committee that there is scientific evidence that under certain conditions fluoride can weaken bone and increase the risk of fractures. The majority of the committee concluded that lifetime exposure to fluoride at drinking-water concentrations of 4 mg/L or higher is likely to increase fracture rates in the population, compared with exposure to 1 mg/L, particularly in some demographic subgroups that are prone to accumulate fluoride into their bones (e.g., people with renal disease)."

In support of the concerns raised by the National Research Council in 2006, scientific research has continued to link fluoride exposure with a wide range of health risks. Exposure to fluoride is suspected of impacting nearly every part of the human body, including the cardiovascular, central nervous, digestive, endocrine, immune, integumentary, renal, respiratory, and skeletal systems. Susceptible subpopulations, such as infants, children, and individuals with diabetes or renal problems, are known to be more severely impacted by intake of fluoride. Accurate fluoride exposure levels to consumers are unavailable; however, estimated exposure levels suggest that millions of people are at risk of experiencing the harmful effects of fluoride and even toxicity, the first visible sign of which is dental fluorosis. For citations to support all of the health conditions listed on the graphic, access the IAOMT's Position Paper against Fluoride Use. Also, in this next video, IAOMT dentists Dr. Tammy DeGregorio and Dr. David Kennedy discuss some of the health risks linked to water fluoridation.

Source: Kennedy D, Just A, Kall J, Cole G. International Academy of Oral Medicine and Toxicology (IAOMT) Position Paper against Fluoride Use in Water, Dental Materials, and Other Products for Dental and Medical Practitioners, Dental and Medical Students, Consumers, and Policy Makers. ChampionsGate, FL: IAOMT. 2017. Available from: <https://files.iaomt.org/wp-content/uploads/IAOMT-Fluoride-Position-Paper.pdf>

INSERT IAOMT VIDEO: [Fluoride Water: One Dose Fits All? Dentists Answer.](#)

FLUORIDE, IQ, AND NEUROTOXICITY

One area of fluoride research that has generated significant attention and concern in recent years is fluoride's potential adverse health impacts on children. Paul Connett, PhD, Director of the Fluoride Action Network (FAN), recently summarized the scientific evidence on this topic: "As of 2020 there have been 72 fluoride IQ studies, of which 64 found a lower IQ among children with higher fluoride exposure. Many of the earlier studies were in places with elevated natural fluoride levels. There is now very strong evidence that fluoride damages both the fetal and infant brain at the levels used in artificially fluoridated areas."

Dr. Connett added: "You only have to read four studies to realize that deliberately adding fluoride to drinking water unnecessarily endangers children's brains. Three of these four studies were funded by the National Institutes of Health."

The four studies Dr. Connett of the Fluoride Action Network is referring to are the following:

1) Bashash et al.'s "Prenatal fluoride exposure and cognitive outcomes in children at 4 and 6–12 years of age in Mexico" was published in *Environmental Health Perspectives* in 2017 and funded by NIH. This study, conducted in Mexico and covering 13 years, found that every one half milligram per liter (mg/L) increase in fluoride in pregnant women's urine – approximately the difference caused by ingestion of fluoridated water - was associated with a reduction of their children's IQ by about 3 points.

2) Green et al.'s "Association between maternal fluoride exposure during pregnancy and IQ scores in offspring in Canada" was published in *JAMA Pediatrics* in 2019 and funded by NIH. The physician editor of *JAMA Pediatrics* remarked about this study: "I would not have my wife drink fluoridated water" if she was pregnant.

3) Riddell et al.'s "Association of water fluoride and urinary fluoride concentrations with attention deficit hyperactivity disorder in Canadian youth" was published in *Environment International* in 2019. This Canadian study found a nearly 300% higher risk of ADHD for children living in fluoridated areas, which reinforced earlier studies linking fluoride to ADHD in Mexico and the U.S.

4) Till et al.'s "Fluoride exposure from infant formula and child IQ in a Canadian birth cohort" was published in *Environment International* in 2020 and funded by NIH. The following video offers Dr. Connett's comments on the importance of this research.

Sources:

Fluoride Action Network. Four Studies that Show Adding Fluoride to Drinking Water Unnecessarily Endangers Children's Brains. March 27, 2020. Available from: <https://fluoridealert.org/articles/four-studies/>

Connett E. Fluoride and IQ: The 65 Studies. Fluoride Action Network. September 3, 2019. Available from: <http://fluoridealert.org/studies/brain01/>.

Fluoride Neurotoxicity Flyer March 2020 Final 3.10.20. Fluoride Action Network. March 10, 2020. Available from: <http://fluoridealert.org/wp-content/uploads/FAN-Neurotoxicity-One-pager-3-10-20.-pdf.pdf>

Guarino B. Study raises questions about fluoride and children's IQ. *Washington Post*. August 19, 2019. Available from: <https://www.washingtonpost.com/science/2019/08/19/study-raises-questions-about-fluoride-childrens-iq/>

References for Fluoride Neurotoxicity One-Pager. Fluoride Action Network. March 11, 2020. Available from: <http://fluoridealert.org/articles/references3/>

INSERT FLUORIDE ACTION NETWORK (FAN)'S VIDEO: [Game-Changing Fluoride Neurotoxicity Study #4: Till 2020](#)

CONCERNS ABOUT LEVELS OF FLUORIDE

The IAOMT is concerned about the levels of fluoride people and wildlife are exposed to. In particular, it is alarming that there is no clear estimate of the amount of fluoride taken in by the "average" person from ALL sources other than the water supply. In other words, there is no estimate how much fluoride is being ingested overall. Furthermore, the same so-called safe "dosage" level is being used for children and adults, even though children are smaller and still developing. There is also no recognition of individualized response based on genetic factors, nutrient deficiencies, product usage, increased number of sources, etc. Additionally, there is an urgent need for special consideration of susceptible populations such as those who drink more water including athletes, military personnel, outdoor workers, pregnant and lactating women, as well as individuals with diabetes, renal problems, and other health conditions.

"Red flags" related to artificially fluoridated drinking water include the following:

- The EPA maximum contaminant level (MCL) is 4 mg/L for drinking water, but evidence has shown that some Americans exceed this level.
- The U.S. Public Health Service recommendation level for artificially fluoridated water was 0.7 mg/L – 1.2 mg/L from 1962-2015.
- The level was changed to 0.7 mg/L in 2015 due to other sources of fluoride exposure and an increase in dental fluorosis.

- American babies are often fed formula after birth, which is powder reconstituted with water.
- Bottled water can also contain fluoride.

Contemplating a so-called “safe” level of fluoride in dental products is quite the challenge:

- Many dental products vary in fluoride content by specific brand, and dental products used at the dental office are not included in intake estimates.
- Some fluoride-containing devices “recharge” with more fluoride.
- Prophy paste can contain 20 times more fluoride than toothpaste used at home. Gels and varnishes also contain high fluoride levels.
- Many of the options for filling materials contain fluoride, including all glass ionomer cements, all resin-modified glass ionomer cements, all giomers, all polyacid-modified composites (compomers), certain types of composites, and certain types of mercury amalgams.
- Many fluoride containing dental devices are not FDA approved for caries prevention. FDA regulations make the physician/dentist personally liable for off-label use of drugs.

Silver diamine fluoride is a relatively new treatment that was introduced for use despite the lack of guideline, protocol, and consent.

- This procedure was FDA approved in 2014 for treating tooth sensitivity but not dental caries.
- The brand used in the U.S. contains 5.0-5.9% fluoride.
- Concerns have been raised that it can permanently stain teeth black.

Sources:

Horst JA, Ellenikiotis H, Milgrom PM, UCSF Silver Caries Arrest Committee. UCSF Protocol for Caries Arrest Using Silver Diamine Fluoride: Rationale, Indications, and Consent. *Journal of the California Dental Association*. 2016 Jan;44(1):16.

Sarvas E, Karp JM. Silver diamine fluoride arrests untreated dental caries but has drawbacks [Internet]. *American Academy of Pediatrics News*. August 5, 2016.

There are also concerns about fluoride drugs:

- Many dentists prescribe fluoride tablets, drops, lozenges, and rinses, which are often referred to as fluoride “supplements” or “vitamins.”
- These products contain 0.25, 0.5, or 1.0 mg fluoride, and they are not approved as safe and effective for caries prevention by the FDA.
- There have been warnings that fluoride supplements can carry more risk than benefit to children.

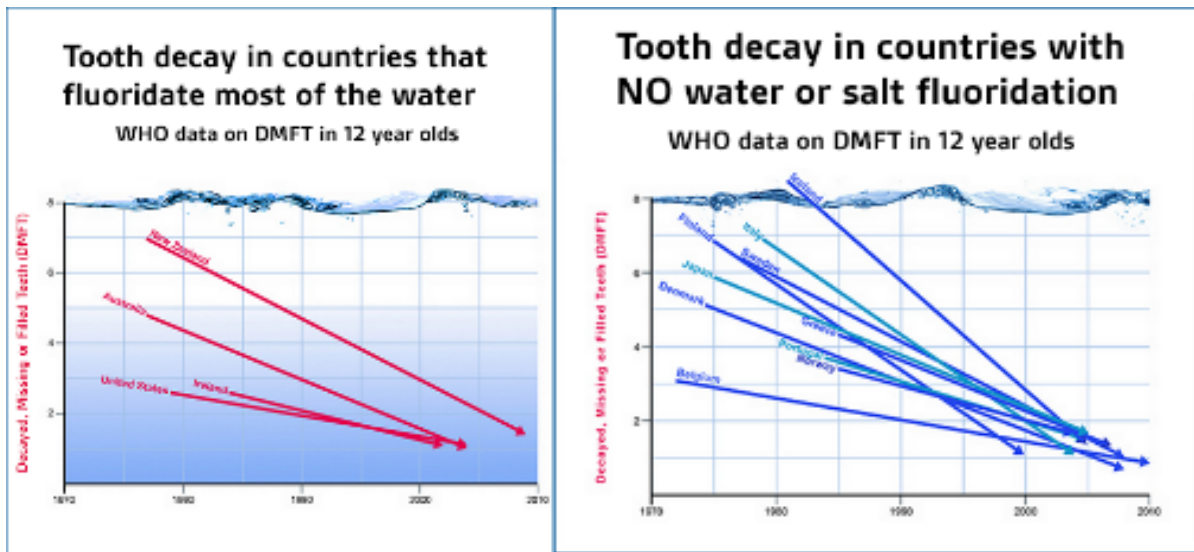
This video offers a more detailed discussion on fluoride drugs.

INSERT FLUORIDE ACTION NETWORK (FAN)'S VIDEO: [Dr. Griffin Cole: FDA Should Ban All Fluoride Supplements](#)

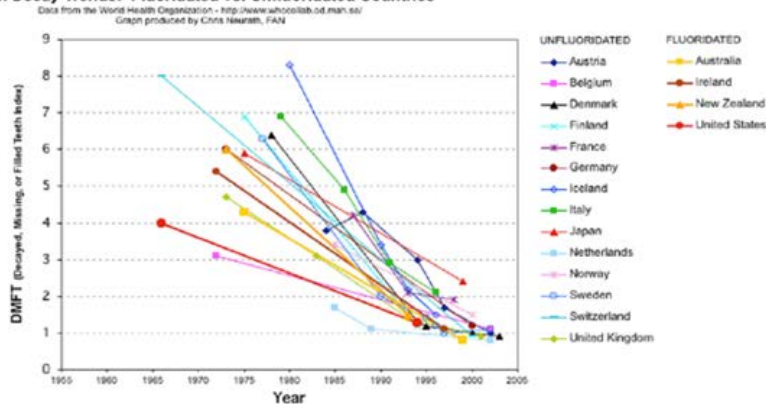
DOES FLUORIDE EVEN PREVENT TOOTH DECAY?

As data comes in from dental caries research around the world, it has become clear that tooth decay rates in the developed countries have been declining dramatically over the last two generations. But that decline appears to have nothing to do with whether the water is fluoridated or not.

For example, in western Europe, 97% of the population gets non-fluoridated water, although four countries have fluoridated salt available. When you compare tooth decay rates in the fluoridated countries with decay rates in non-fluoridated countries, the graphs are identical.



Tooth Decay Trends: Fluoridated vs. Unfluoridated Countries



SOURCE: Connett M. Tooth Decay Trends in Fluoridated vs. Unfluoridated Countries. Fluoride Action Network. July 2012. Available from: <https://fluoridealert.org/studies/caries01/>

Something's causing tooth decay rates in the prosperous parts of the world to decline, but it's not fluoride. It could be a combination of better diet, better hygiene, or better access to dental care.

Among poor people eating poor diets and with poor access to care, tooth decay rates are still high, despite years of exposure to fluoridated drinking water in many places.

When the socioeconomic variable is allowed for, child dental health appears to be better in the un-fluoridated areas.

SCREEN TO THE RIGHT:

Sources:

- Burt BA, Kolker JL, Sandretto AM, Yuan Y, Sohn W, Ismail AI. Dietary patterns related to caries in a low-income adult population. *Caries Research*. 2006;40(6):473-80.
- Colquhoun J. Influence of social class and fluoridation on child dental health. *Community Dentistry and Oral Epidemiology*. 1985 Feb;13(1):37-41.

See also:

- Tickner J, Coffin M. What does the precautionary principle mean for evidence-based dentistry? *Journal of Evidence Based Dental Practice*. 2006 Mar 31;6(1):6-15. Page 11.

There has never been a randomized, controlled clinical trial supporting benefits of water fluoridation, as you'd expect to see for any legitimate therapeutic agent. Not only that, but two important studies of water fluoridation in the United States, the largest study and the most precise study, both failed to show that water fluoridation could produce a clear reduction in decay rates. So, why do dental and public health authorities tell us that the concept of water fluoridation is supported by thousands of studies?



A large study was conducted by the National Institute of Dental Research (NIDR) in the 1980s, which collected data on 39,000 children in 84 randomly selected communities across the United States. The NIDR study was published in 1990 by Brunelle and Carlos. They analyzed a cherry-picked 10% of the available data and reported that children who always lived in fluoridated communities had 18% less tooth decay than those who had always lived in non-fluoridated communities.

Access the study: Brunelle JA, Carlos JP. Recent trends in dental caries in US children and the effect of water fluoridation. *Journal of Dental Research*. 1990 Feb;69(2_suppl):723-7.

But the absolute difference between the two groups was actually just 0.6 of a decayed surface. This was discovered upon further investigation which suggested fluoride exposure was causing a delay in the eruption of permanent teeth rather than protection from caries.



It was the monumental research of Dr. John A. Yiamouyiannis that implied water fluoridation could contribute to the delayed eruption of teeth. Such delayed eruption would result in the presence of fewer teeth and therefore, the absence of decay. This would mean that the lower rates of decayed and filled deciduous teeth (DFT) were actually caused by a lack of teeth as opposed to the alleged effects of fluoride on dental caries.

Source: Yiamouyiannis JA. Water fluoridation and tooth decay: Results from the 1986-1987 national survey of U. S. school children. *Fluoride*. 1990 Apr;23(2):55-67.

For more information, see also: Kennedy D, Just A, Kall J, Cole G. International Academy of Oral Medicine and Toxicology (IAOMT) Position Paper against Fluoride Use in Water, Dental Materials, and Other Products for Dental and Medical Practitioners, Dental and Medical Students, Consumers, and Policy Makers. ChampionsGate: FL: IAOMT. 2017. Available from: <https://files.iaomt.org/wp-content/uploads/IAOMT-Fluoride-Position-Paper.pdf>

Other researchers have further questioned fluoride's use in preventing tooth decay. Authors of a 2014 scientific literature review affirmed that fluoride's anti-caries effect is reliant upon calcium and magnesium in the tooth enamel but also noted that the remineralization process in tooth enamel is not dependent on fluoride. In addition, the researchers wrote: "Fluoride exposure has a complex relationship in relation to dental caries and may increase dental caries risk in malnourished children due to calcium depletion and enamel hypoplasia..."

Source: Peckham S, Awofeso N. Water fluoridation: a critical review of the physiological effects of ingested fluoride as a public health intervention. *The Scientific World Journal*. 2014 Feb 26;2014.

Furthermore, authors of research published in 2010 identified that the concept of "fluoride strengthening teeth" could no longer be deemed as clinically significant to any decrease in caries linked to fluoride use.

Source: Tenuta LM, Cury JA. Fluoride: its role in dentistry. *Brazilian Oral Research*. 2010;24:9-17. Available from: https://www.scielo.br/scielo.php?script=sci_arttext&pid=S1806-83242010000500003

Even an article in the Centers for Disease Control and Prevention (CDC)'s weekly report included this statement: "The prevalence of dental caries in a population is not inversely related to the concentration of fluoride in enamel, and a higher concentration of enamel fluoride is not necessarily more efficacious in preventing dental caries."

Source: Centers for Disease Control and Prevention (CDC). Kohn WG, Maas WR, Malvitz DM, Presson SM, Shaddik KK. Recommendations for using fluoride to prevent and control dental caries in the United States. *Morbidity and Mortality Weekly Report: Recommendations and Reports*. 2001 Aug 17:i-42. Available from: https://stacks.cdc.gov/view/cdc/5160/cdc_5160_DS1.pdf

Significantly, in a 2019 publication, Dr. Philippe Grandjean of the Harvard T.H. Chan School of Public Health wrote: “While water fluoridation continues to be recommended, the benefits appear to be minimal in recent studies of caries incidence...Consensus has since then been building on the lack of efficacy of water fluoridation in preventing caries...It therefore appears that population-based increase of systemic fluoride exposure may be unnecessary and, according to the evidence considered in this review, counterproductive.”

Source: Grandjean P. Developmental fluoride neurotoxicity: an updated review. *Environmental Health*. 2019 Dec;18(1):1-7. Available from: <https://ehjournal.biomedcentral.com/articles/10.1186/s12940-019-0551-x?fbclid=IwAR13tndxPuiCFjZ72LXrWZiQL1SMorZfT4ky9KUqlwLt3ZjmplLmvMmIY70>

LEGAL ASPECTS OF LOWERING LEVELS OF FLUORIDE IN WATER

In western Europe, some governments have openly recognized hazards of fluoride, and only 3% of the western European population drinks fluoridated water. According to the most recent statistics, in the United States, over 72% of Americans are drinking fluoridated water.

Source of US Fluoridation Statistics: Centers for Disease Control and Prevention. Water Fluoridation Data & Statistics. Page last reviewed January 13, 2020. Available from: <https://www.cdc.gov/fluoridation/statistics/index.htm>

Neither the Environmental Protection Agency (EPA) nor the federal government mandate water fluoridation in America, and the decision to fluoridate community water is made by the state or local municipality. However, the U.S. Public Health Service (PHS) establishes recommended fluoride concentrations in community drinking water for those who choose to fluoridate, and the Environmental Protection Agency (EPA) sets contaminant levels for public drinking water.



After water fluoridation in Grand Rapids, Michigan, began in 1945, the practice spread to locales across the country in the decades that followed. These efforts were encouraged by the Public Health Service (PHS) in the 1950s, and in 1962, the PHS issued standards for fluoride in drinking water that would stand for 50 years. They stated that fluoride would prevent dental caries and that optimal levels of fluoride added to drinking water should range between 0.7 to 1.2 milligrams per liter.

However, the PHS lowered this recommendation to the single level of 0.7 milligrams per liter in 2015 due to an increase in dental fluorosis and to the increase in sources of fluoride exposure to Americans.

For detailed citations to support this information, see this source: Kennedy D, Just A, Kall J, Cole G. International Academy of Oral Medicine and Toxicology (IAOMT) Position Paper against Fluoride Use in Water, Dental Materials, and Other Products for Dental and Medical Practitioners, Dental and Medical Students, Consumers, and Policy Makers. ChampionsGate: FL: IAOMT. 2017. Available from: <https://files.iaomt.org/wp-content/uploads/IAOMT-Fluoride-Position-Paper.pdf>

Meanwhile, the Safe Drinking Water Act was established in 1974 to protect the quality of American drinking water, and it authorized the EPA to regulate public drinking water. Because of this legislation, the EPA can set enforceable maximum contaminant levels (MCLs) for drinking water, as well as non-enforceable maximum contaminant level goals (MCLGs) and non-enforceable drinking water standards of secondary maximum contaminant levels (SMCLs).

The EPA specifies that the MCLG is “the maximum level of a contaminant in drinking water at which no known or anticipated adverse effect on the health of persons would occur, allowing an adequate margin of safety.” Additionally, the EPA qualifies that community water systems exceeding the MCL for fluoride “must notify persons served by that system as soon as practical, but no later than 30 days after the system learns of the violation.”

The source of this information came from the EPA’s webpages about drinking water contaminants and fluoride.

Sources: United States Environmental Protection Agency. How EPA regulates drinking water contaminants [Internet]. Available from: <https://www.epa.gov/dwregdev/how-epa-regulates-drinking-water-contaminants>. Accessed February 24, 2017.

United States Environmental Protection Agency. Questions and answers on fluoride [Internet]. Available from: https://www.epa.gov/sites/production/files/2015-10/documents/2011_fluoride_questionsanswers.pdf. Accessed November 2, 2016.

For these and additional citations to support this information, see this source: Kennedy D, Just A, Kall J, Cole G. International Academy of Oral Medicine and Toxicology (IAOMT) Position Paper against Fluoride Use in Water, Dental Materials, and Other Products for Dental and Medical Practitioners, Dental and Medical Students, Consumers, and Policy Makers. ChampionsGate: FL: IAOMT. 2017. Available from: <https://files.iaomt.org/wp-content/uploads/IAOMT-Fluoride-Position-Paper.pdf>

Moreover, the Toxic Substances Control Act of 1976 (TSCA [and nicknamed as “ToSCA”]) authorizes the EPA to prohibit the “particular use” of a chemical that presents an unreasonable risk to the general public or susceptible subpopulations.

On Nov. 22, 2016, FAN, along with five other organizations including the IAOMT and five individuals, presented a Citizens' Petition under Section 21 of TSCA to the EPA. The Petition requested the EPA to exercise its authority to prohibit the purposeful addition of fluoridation chemicals to U.S. water supplies on the grounds that a large body of animal, cellular, and human research showed that fluoride was neurotoxic at doses within the range now seen in fluoridated communities.

Source: Fluoride Action Network. TSCA Trial Press Kit. Available from:
<http://fluoridealert.org/issues/tsca-fluoride-trial/>

To access the Citizens' Petition: Connett M. Citizen petition under Toxic Substances Control Act regarding the neurotoxic risks posed by fluoride compounds in drinking water. November 22, 2016. To the United States Department of Environmental Protection (EPA) by the Fluoride Action Network (FAN), the International Academy of Oral Medicine and Toxicology (IAOMT), the American Academy of Environmental Medicine (AAEM), Food & Water Watch (FWW), Moms Against Fluoridation, the Organic Consumers Association, Audrey Adams, Jacqueline Denton, Valerie Green, Kristin Lavelle, and Brenda Staudenmaier. Online at <http://fluoridealert.org/wp-content/uploads/epa-petition.pdf>.

INSERT CITIZEN PETITION URGES EPA TO END WATER FLUORIDATION FROM FAN:

<https://www.youtube.com/watch?v=dI-1GxTfs9U>

The case eventually landed in Federal Court when the EPA denied the petition. The denial allowed the Plaintiffs to file suit through TSCA. The Court denied EPA's Motion to dismiss the case on December 21, 2017. Meanwhile, due to standing issues, the IAOMT was dropped from the suit, as years went by.

Finally, the case went to trial in June 2020 in the U.S. District Court for the Northern District of California in San Francisco with Judge Edward M. Chen. It was the first time in history that citizens reached the trial stage of a lawsuit under TSCA. History was also made because the trial was held via live video stream due to concerns over COVID-19.

Source: Fluoride Action Network. TSCA Trial Press Kit. Available from:
<http://fluoridealert.org/issues/tsca-fluoride-trial/>

Carol Goodwin Blick of Clean Water Sonoma-Marin (CWSM) aptly summarized the status of the case after the closing arguments in the summer of 2020: "After final arguments concluded on Thursday, June 18th, Judge Edward M. Chen (the Court) made a surprise proposal that he defer judgment, while EPA and the plaintiffs discuss a solution that will satisfy both. The Court appeared convinced by the science indicating that fluoride poses an unacceptable neurotoxic risk to the 200 million in the U.S. (about 2/3s of the total population) who currently receive artificially fluoridated tap water, with the greatest risk to perinatal infants and children."

Source: Carol Goodwin Blick, Clean Water Sonoma-Marin (CWSM). Judgement on Hold In TSCA EPA Water Fluoridation Case. Sonoma County Gazette. Jun 24, 2020. Available from: <https://www.sonomacountygazette.com/sonoma-county-news/judgement-on-hold-in-tsca-epa-water-fluoridation-case>

After statements were made by both sides in July 2020, a status conference was held on August 6, 2020. Judge Chen suggested that the plaintiffs file a new petition. The case is being held open, and the next status hearing will be held November 5, 2020.

Source: Bergeson LL, Hutton CN. Judge Suggests New TSCA Section 21 Petition Be Filed Regarding Fluoride in Drinking Water. *The National Law Review*. 2020 Aug;X(226). Available from: <https://www.natlawreview.com/article/judge-suggests-new-tsca-section-21-petition-be-filed-regarding-fluoride-drinking>.

CONCLUSION

Fluoride is not a nutrient. Its absence creates no observable deficiency state. There is no biological process that requires it as a cofactor, and there are a great many that are known to be poisoned by it. Toxicology specifically recognizes it as toxic to bone, kidney, liver, thyroid and brain, and an endless list of specific biochemical processes.

Not only that, but data from the U.S. Public Health Service going back decades acknowledges that there are subsets of the population who are unusually susceptible to the toxic effects of fluoride, including the elderly, people with less than adequate nutrition, and those with cardiovascular and kidney conditions.

The need to update previously established fluoride guidelines is even more urgent now: fluoride exposures have dramatically increased for all Americans since the 1940's, when community water fluoridation was first introduced. In subsequent decades, fluoride was also introduced for use in dental products applied in the office and at home, such as toothpaste and mouth rinse, and during this time frame, it was also added to other consumer products. Understanding fluoride exposure levels from all sources is crucial because risk assessment for fluoride in water and food should now be inclusive of these common multiple exposures.

Risk assessment is a set of standardized procedures for determining a level of exposure at which there is an expectation of no negative health outcomes for the entire population.

So, when we have a large group of verified findings showing how fluoride has a deleterious effect on children's IQ, or the data on development of dental fluorosis, like we discussed earlier, we can start to apply standard risk assessment methods to determining safe limits for fluoride exposure.



Thus, risk assessments must consider the total fluoride exposure from all sources. Educating medical and dental practitioners, students, consumers, and policy makers about sources of fluoride exposure and the associated potential health risks is essential to improving the dental and overall health of the public.

In summary, given the elevated number of fluoride sources and the increased rates of fluoride intake in the American population, which have risen substantially since water fluoridation began in the 1940's, it has become a necessity to reduce and work toward eliminating avoidable sources of fluoride exposure, including water fluoridation, fluoride-containing dental materials, and other fluoridated products.

POSTFACE TO IAOMT'S FLUORIDE VIDEO ACTIVITY

Text on screen:

You have finished viewing the video component of this activity. If you are participating in this activity as part of an IAOMT course, you must successfully complete a quiz to obtain credit. Access to the quiz is provided in the "Activity Content" below this video, as well as on the menu to the left. Additionally, the "Materials" tab above this video contains links to references and resources cited in this activity, scientific literature related to the topics presented, and a script for this entire video. Thank you for learning with the IAOMT, as we work together to achieve safer dentistry and a healthier world.