Fluoride Ingestion:
Connecting the Dots for Health

Action

Discontinue water fluoridation, which will greatly reduce fluoride ingestion.

Science & Facts

- Neurotoxic – can decrease IQ and increase ADHD in children
- May increase hypothyroidism
- Causes dental fluorosis
- Dental benefits from contact with teeth, not ingestion

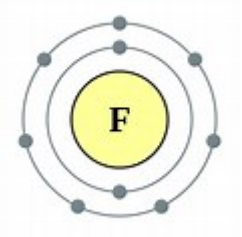
Ethics

- Fluoride in water is used as a drug
- No informed consent for ingestion
- Low-income families can't avoid it
- Kids should be able to reach and maintain their full potential

History

- 1950 – U.S. Public Health Service endorses fluoridation, few safety studies
- 2006 - NAS *Fluoride in Drinking Water* identifies fluoride as endocrine disruptor and causing multiple health risks
- 2012 –Meta-analysis shows higher fluoride levels lower IQ's in 26 out of 27 studies
- 2017–2019 High quality studies confirm lowering IQ at common exposure levels

Introduction

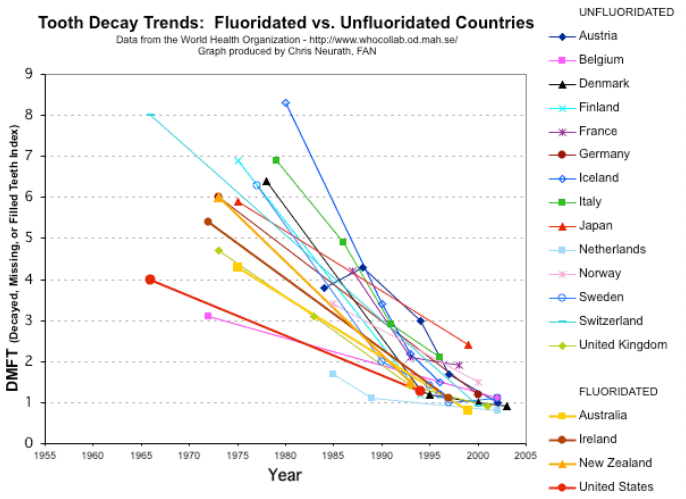


To add or not to add fluoride to community drinking water – that is the question. Currently, about 74% of the U.S. population, often without their knowledge or consent, drinks fluoridated water. There has been a 70-year controversy over the efficacy, safety and ethics of the consumption of fluoridated water. The American Dental Association(ADA, 2019) (ADA) and the Center for Disease Control and Prevention(CDC, 2019) (CDC) as well as others maintain that consumption of fluoridated water is safe, reduces dental caries in children and adults, and therefore has significant public health benefits. Others claim that adding fluoride to drinking water causes significant harm with benefits that are greatly overstated, and is, moreover, unethical. Risks of ingesting fluoride include lowered IQs and increased ADHD and hypothyroidism rates. Since the 1960s, fluoride toothpaste became widespread, a topical use generally acknowledged to be more effective in preventing cavities than ingestion. This is thought to be a major reason why tooth decay trends have decreased so much, regardless of whether the water was fluoridated (see graph – Tooth Decay Trends: Fluoridated vs. Unfluoridated Countries). For these and other reasons, a growing number of public health professionals are recommending that fluoridation of drinking water be discontinued.

Action

Discontinue water fluoridation so that ingestion of fluoride is greatly reduced.

Science & Facts



There are two important aspects to the science surrounding fluoridation: 1) is there significant benefit to outweigh any hazard; and 2) from a toxicological perspective, are there significant hazards at expected exposure levels (dose/response) and are some people more vulnerable than others?

There is no question that ingested fluoride can be detrimental to human health. The challenge is determining if there is a level of exposure to fluoride that is safe and improves dental health.

Dental fluorosis, which damages tooth enamel, is caused by an excess of ingested fluoride by young children. At a very mild or mild level, it causes white splotches or stripes on teeth. At moderate or severe levels, the mottling is more pronounced and can cause yellow or brown stains and pitting of the enamel, which can increase cavities. A 2019 study(Neurath et al., 2019) found that both prevalence and severity of fluorosis have jumped. Nearly 65% of 12-15 year-olds in the U.S. are afflicted, with 27.9% moderate and 2.6% severe levels, reinforcing a 2018 study that found similar increases in 16-17 year-olds. Fluoridated water is a major contributor to all levels.

Fluoride(Neurath et al., 2019) has been identified as an endocrine disruptor. Fluoride is known to have lowered thyroid functions since the 1950's, when it was used to treat hyperthyroid patients. The 2006 NAS review stated unequivocally that it **"decreased thyroid function"**(Wiener, Shen, Findley, Tan, & Sambamoorthi, 2018). Studies in Canada(Malin, Riddell, McCague, & Till, 2018) and England(Peckham, Lowery, & Spencer, 2015) added further evidence that increases in fluoride exposure contributed to hypothyroidism.

The 2006 NAS review also determined **"fluorides have the ability to interfere with the functions of the brain."** Since then, hundreds of studies in animals and humans have further validated that conclusion. The 2012 Harvard meta-analysis found children ingesting higher levels of fluoride tested an average 7 IQ points lower in 26 of 27 studies(Choi, Sun, Zhang, & Grandjean, 2012). Most had higher fluoride concentrations than in U.S. water, but in many the total exposures to fluoride was no more than what millions of Americans receive.

In 2017, an NIH-funded prospective study found that every one part per million increase in fluoride in pregnant women's urine was associated with a reduction of their children's IQ by 5-6 points(Bashash et al., 2017). By 2018, out of 60 studies, 53 had linked higher fluoride levels with lower IQ's in children(Till et al., 2018), see also meta-analysis by Choi et al (Choi et al., 2012).

Finally, the chemical typically used to fluoridate water, fluorosilicic acid, can be contaminated with lead and/or arsenic(Choi et al., 2012). Both are known to be neurotoxic and there are no safe levels for either.

From the 1950s the PHS recommendation for the concentration of fluoridated water has been 1.0 mg/L (milligrams per liter or ppm) for most of the USA, with a range of 0.7 to 1.2 mg/L. In 2015 this recommendation was lowered to 0.7 mg/L to reduce the toxic side effects of fluoride ingestion while attempting to maintain its beneficial effects. For toxicological assessment, ingested doses are typically adjusted by body weight. Kids eat more, breathe more, and drink more than adults on a body weight basis so they will have higher fluoride doses than adults. Moreover, child organ systems such as the brain and bones are still developing, making them more vulnerable to the toxic effects of fluoride. Typically, when managing risk and benefits of a compound, standard toxicological protocols are applied, including safety factors, to insure safety for the most vulnerable individuals.

History

The history of community water fluoridation is a reflection of the post WWII era of the 1950's when many thought chemicals in one form or another could solve almost any problem. Our gaze was focused on the beneficial properties of the chemicals, not on the potential hazards. A classic example is DDT, that in addition to being a potent pesticide, almost killed off predatory birds and more recently was found to be harmful to humans.

Since the 1930's, fluoride was known to have two qualities – decreasing cavities but increasing dental fluorosis. There was also early evidence it could weaken bones and lower thyroid function.

In the 1940's, discussions began on fluoridating water at levels that would maximize the benefit but minimize the harm. In 1945, two studies began, comparing one fluoridated city (at 1 ppm) with a similar unfluoridated one - Grand Rapids/Muskegon, MI and Newburgh/Kingston, NY. They were designed to run for at least ten years, but early promising reports from Grand Rapids on cavity reduction and pressure from Wisconsin dentists, who had already persuaded at least 50 cities in that state to start fluoridating, led the U.S. Public Health Service to approve fluoridation in 1950, after only five years. This endorsement was quickly followed by the American Dental Association, American Public Health Association and American Medical Association.

All asserted fluoridation was safe, even though no long-term safety studies had ever been done on any diseases and no studies at all on endocrine disruption, neurotoxicity, cancer, diabetes or chemical sensitivities. Their statements on the certainty of no health risks have continued to the present day, even after the 2006 NAS review cited numerous health risks and the need for more research on several harmful medical conditions, including cancer, diabetes, kidney disease, neurotoxicity and others.

Today, fluoridation's endorsement by the U.S. government and much of the medical establishment is in stark contrast to most of the rest of the world. Approximately 95% of the world's population drinks unfluoridated water(International, 2019). Out of 196 nations, only 24 have any artificial fluoridation and of those, only 10 for more than half their population. Over 98% of Europe's population drinks unfluoridated water, where only five out of 48 nations have any at all. Some nations have fluoridated salt, but it's always sold as a consumer choice.

In 1999, the CDC included fluoridation as one of its top ten public health achievements of the 20th century. It's revealing that of all ten, it is the only one that has been rejected or not even considered by most nations, cities and health organizations in the world. It's also important that much of the most authoritative scientific evidence against fluoridation has come out since 1999 and the CDC has not changed its position.

Ethics

A drug is defined by the FDA as any substance used in the diagnosis, treatment or prevention of disease. For example, the FDA requires a label on fluoridated toothpaste that says, for children under 6, **"If more than used for brushing is accidentally swallowed, get medical help or contact a Poison Control Center right away."** But when fluoride is added to drinking water, the FDA has looked the other way and refuses to regulate it.

Unlike other drugs, fluoridated water has never undergone clinical trials to establish its safety and effectiveness. Fluoridated water is in a "black hole" without any regulation. The EPA regulates it as a contaminant when it occurs naturally, but has stated they will not even consider health risks when fluoride is intentionally added to drinking water(Society, 2019).

Physicians prescribe drugs on an individual's needs, ensuring that it's pharmaceutical grade (not contaminated) and requiring a specific dose for a specific length of time. They also must inform their patients of potential harmful side effects. However, the final decision on whether to take the drugs rests with the patient. With fluoridation, all these safety protocols are violated, taking away the individual's right of informed consent.

Many European nations, including France, Germany, Belgium, the Netherlands and Czech Republic, cite the ethical problem of putting a drug in drinking water as a reason they disallow fluoridation(Cross & Carton, 2003).

Fluoridation is also an environmental and social justice issue. Health conditions that render people more vulnerable to fluoride exposure, such as kidney disease and diabetes, are more prevalent among low-income populations, as are nutrient deficiencies. Moreover, low-income families cannot afford expensive filters or bottled water to avoid fluoridated water. They have no choice.

Finally, the Precautionary Principle says that whenever there is evidence that a substance is causing health or environmental harm, preventive measures should be taken, even if the evidence isn't 100% conclusive. The burden of proof should be to show beyond a reasonable doubt that the substance is safe, not absolute proof that it is harmful. Numerous scientific studies finding harm from fluoridation started in the 1950's and have continued to accumulate to the present day. Discontinuing the practice is the prudent preventive measure to take.

Current Regulations (USA)

EPA – The maximum contaminant level (MCL) for fluoride in drinking water is 4.0 ppm (4 mg/L)
CDC – The recommended level for fluoridating drinking water is 0.7 ppm (0.7 mg/L)
NSF – Maximum concentration allowed for fluoride is 1.2 ppm; maximum allowable concentration of arsenic is 1.0 ppb; maximum allowable concentration of lead is 1.5 ppb

References

ADA. (2019). American Dental Association. Retrieved from www.ada.org

Bashash, M., Thomas, D., Hu, H., Martinez-Mier, E. A., Sanchez, B. N., Basu, N., . . . Hernandez-Avila, M. (2017). Prenatal Fluoride Exposure and Cognitive Outcomes in Children at 4 and 6-12 Years of Age in Mexico. *Environ Health Perspect, 125*(9), 097017. doi:10.1289/EHP655

CDC. (2019). Center for Disease Control and Prevention: Community Water Fluoridation. Retrieved from https://www.cdc.gov/fluoridation/index.html

Choi, A. L., Sun, G., Zhang, Y., & Grandjean, P. (2012). Developmental fluoride neurotoxicity: a systematic review and meta-analysis. *Environ Health Perspect, 120*(10), 1362-1368. doi:10.1289/ehp.1104912

Cross, D. W., & Carton, R. J. (2003). Fluoridation: a violation of medical ethics and human rights. *Int J Occup Environ Health, 9*(1), 24-29. doi:10.1179/107735203800328830

International, N. (2019). *Fact Sheet on Fluoridation Products and Fluoride*. Retrieved from http://www.nsf.org/newsroom_pdf/Fluoride_Fact_Sheet_2019.pdf

Malin, A. J., Riddell, J., McCague, H., & Till, C. (2018). Fluoride exposure and thyroid function among adults living in Canada: Effect modification by iodine status. *Environ Int, 121*(Pt 1), 667-674. doi:10.1016/j.envint.2018.09.026

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 Clin Trans Res*, 2380084419830957. doi:10.1177/2380084419830957

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. *J Epidemiol Community Health, 69*(7), 619-624. doi:10.1136/jech-2014-204971

Society, B. F. (2019). Retrieved from https://www.bfsweb.org/extent-of-water-fluoridation

Till, C., Green, R., Grundy, J. G., Hornung, R., Neufeld, R., Martinez-Mier, E. A., . . . Lanphear, B. (2018). Community Water Fluoridation and Urinary Fluoride Concentrations in a National Sample of Pregnant Women in Canada. *Environ Health Perspect, 126*(10), 107001. doi:10.1289/EHP3546

Wiener, R. C., Shen, C., Findley, P., Tan, X., & Sambamoorthi, U. (2018). Dental Fluorosis over Time: A comparison of National Health and Nutrition Examination Survey data from 2001-2002 and 2011-2012. *J Dent Hyg, 92*(1), 23-29. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/29500282