

THE BENEFITS OF WATER FLUORIDATION

***“Is it still Safe, Effective, and
Necessary?”***

Clearwater City Council
September 1, 2016

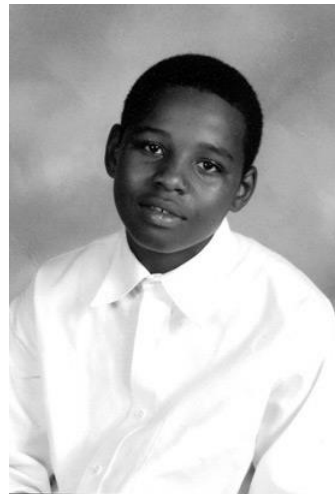
Johnny Johnson, Jr., DMD, MS
President, American Fluoridation Society

Disclosures

- Financial: None
- President of the American Fluoridation Society
- Florida Dental Association Water Fluoridation spokesperson-
Clearwater, FL
- Private practice pediatric dentist and CWF advocate-Palm
Harbor

Why Do Cavities Matter?

- Infection
- Extreme pain
- Difficulty in chewing
- Poor weight gain
- *Difficulty concentrating*
- *Missed school hours*
- Predictor of cavities in later life
- Costly treatment
- **LIFE THREATENING**
- **DEATH**



Deamonte Driver, 12, died February 25, 2007, after an infection from a molar spread to his brain

CAVITIES: Disproportionately Distributed



- Nearly 80% of cavities occur in 20% of the population



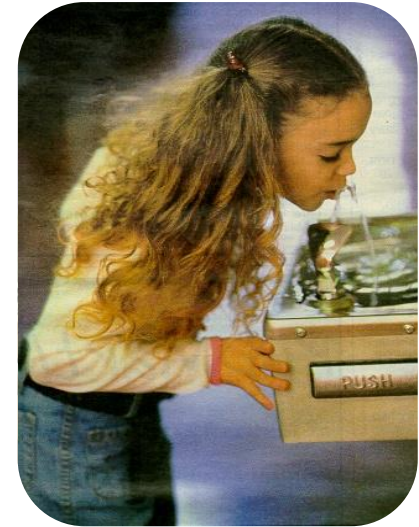
- **The poor** bear a disproportionate burden of cavities

Community Water Fluoridation

An Ounce of Prevention:

After 71 years of CWF in the United States, the FACTS:

1. **Safe**-NO adverse health effects in anyone
2. **Effective-Adults** & Children benefit: 25% reductions in cavities
3. **Cost Savings**-Saves millions of dollars in treatment costs and eliminates preventable pain and suffering. Huge Return on Investment: \$1:\$43
4. **CDC**: One of 10 great Public Health Achievements of the 20th century
5. **Americans** keep their **teeth longer into adulthood** more than ever before
6. **>214 million** U.S. residents served by it daily (2014), **~75%** of Community Water Systems
7. **Community Water Fluoridation** is closest thing we have to a **Magic Bullet**



How did we discover Fluoride's Benefits?

History of Fluoride's Benefits

Frederick S. McKay

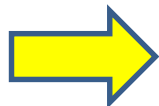
➡ **1901** – established practice in Colorado Springs, CO

- Curious mind and good observational skills
- “Colorado Brown Stain”



- Stain was difficult to polish off – must be caused during the period of enamel formation – environmental agent
- Only life-long residents (or those who had moved there as infants) had stain

- **1908** – began to investigate extent of condition in surrounding area



Key Observation: *very few cavities in this population*

H. Trendley Dean

- **1931** - First dentist appointed to the National Institute of Health
- Primary responsibility -investigate the association between fluoride and mottled enamel
- **Mid 1930's** – Dean began to use the term **fluorosis** in place of mottled enamel
- *Determined that fluorosis caused by water with 1.0 ppm or less was of “no public health significance”*



Community Water Fluoridation Begins



- **Grand Rapids, Michigan** was the first city to adjust fluoride concentration in public drinking water (1945)
- **Cavity rates dropped dramatically**
- **Gainesville 1st city in Florida to fluoridate -1949**
- The rest is History
- 2016 marked the 71st anniversary of community water fluoridation

Dental Fluorosis: What is it?

- Dental fluorosis is *a change in the appearance* of the tooth's enamel.
- Very mild** and **mild forms** of dental fluorosis (*the most common forms*)—teeth have scattered white flecks, occasional white spots, frosty edges, or fine, lacy chalk-like lines. These changes are **barely noticeable** and difficult to see except by a dental health care professional.
- Moderate form**—teeth have larger white spots
- The **rare, severe** form—rough, pitted surfaces.
- Dental fluorosis **only occurs** when younger children (<8y.o.) consume too much fluoride while teeth are developing under the gums

Dental Fluorosis



Normal



Questionable



Very Mild



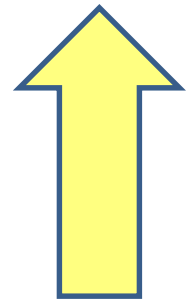
Mild



Moderate



Severe



Does **NOT**
occur from CWF

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Questionable



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Moderate



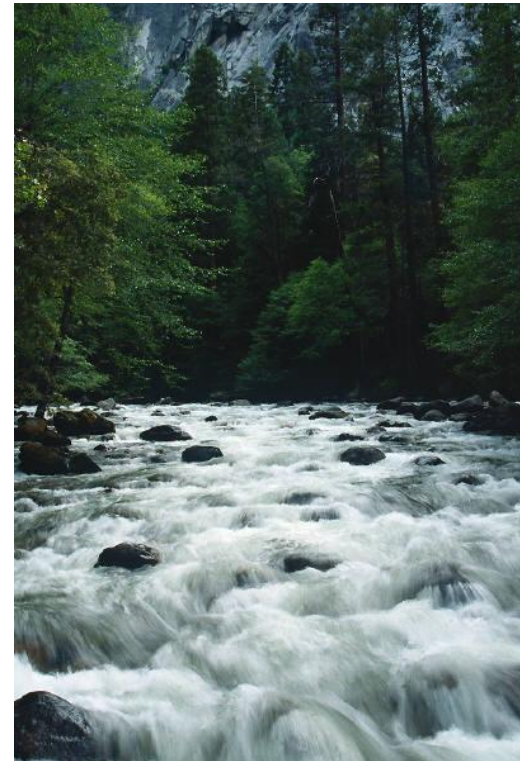
Severe

**Does Not Occur
with CWF**

What is Fluoridation? Is it Still Necessary?

Fluoride is Naturally Occurring

- **13th most abundant mineral in the earth's crust**
- Surface water (rivers) -- typically low concentrations, 0.2 mg/L (ppm) or less
- **Clearwater has 0.2 mg/L naturally**
- Groundwater (wells) --higher concentrations, 0.1 mg/L to over 5.0 mg/L
- **Ocean water is typically 0.8 to 1.4 mg/L**



Fluoridation Definition

- Fluoridation is the precise adjustment of the fluoride in drinking water to a level that is recommended for optimal reduction of tooth decay
- This adjustment includes adjustment upwards or downwards, depending on the natural level of fluoride in the water.
- Updated optimal level for community water fluoridation is a uniform 0.7mg/L (ppm)



Required for Cavities:

•Diet

- sugars and carbohydrates
- frequency of intake
- form of substrate-sticky vs non-sticky

•Oral hygiene

- Toothbrushing, flossing, fluoride toothpaste & mouthrinses

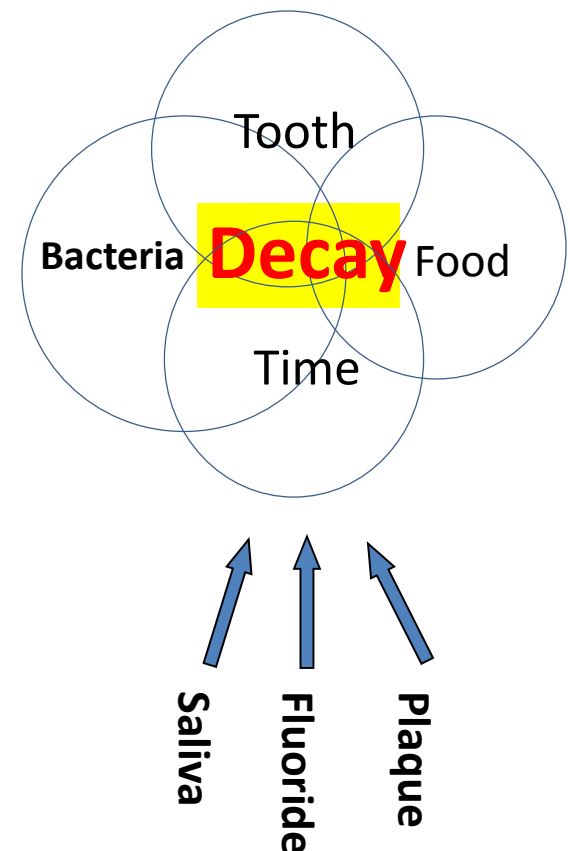
•Xerostomia (Dry Mouth)

- drug induced
- radiation therapy
- salivary flow and composition

•Bacteria Levels

— (especially mutans streptococci)

•Tooth Anatomy



Is Water Fluoridation Still Necessary?

YES!



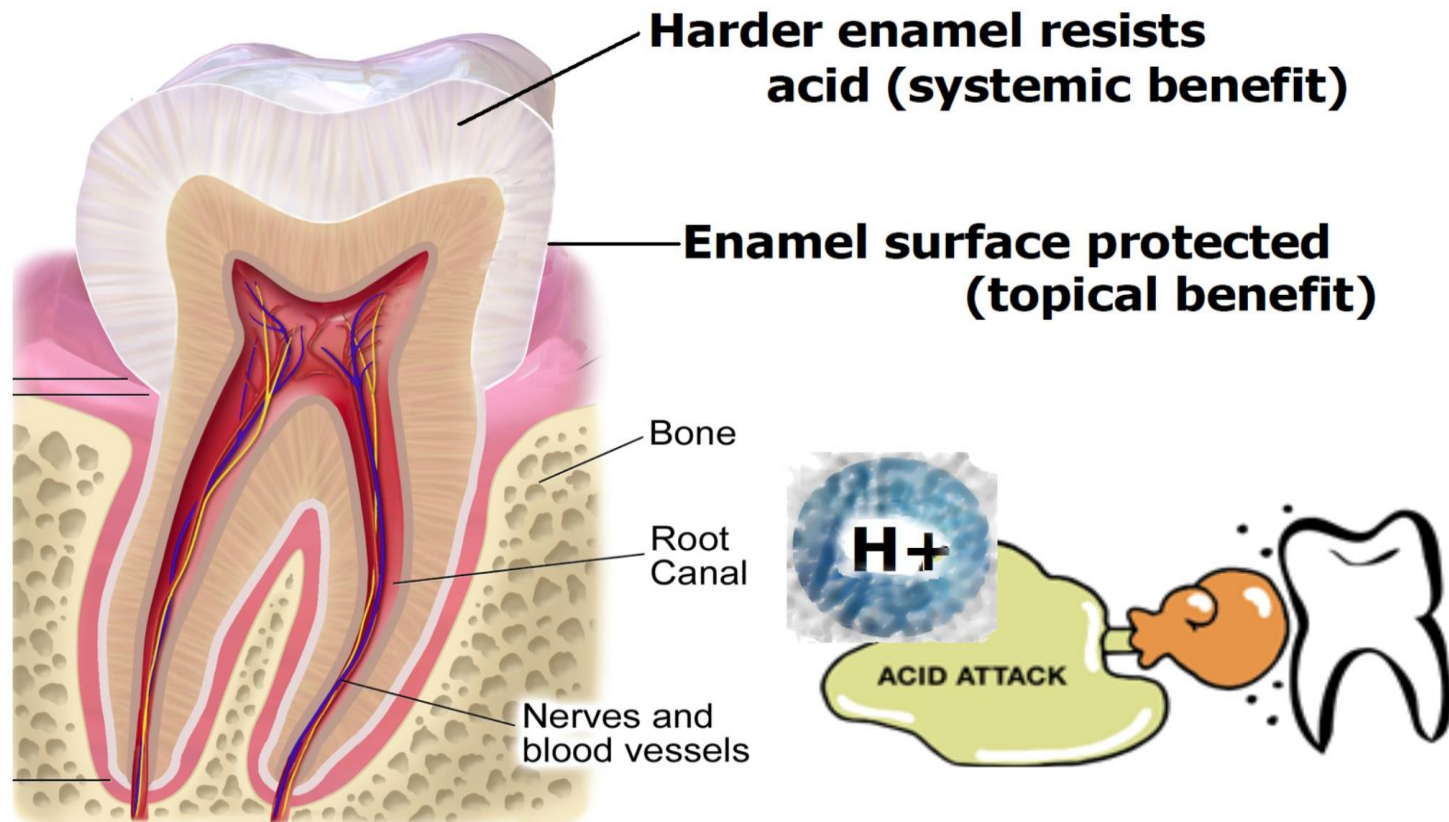
Systematic Reviews: Evidence-Based

- ✓ Effect of Starting Community Water Fluoridation:
29.1% cavity reduction
 - ✓ New South Wales, Australia
- ✓ Effect from Stopping CWF: **17.9%** increase in cavities
 - ✓ Calgary, Ontario Canada-stopped 2011

How Does Fluoride Work?

Summary of Mechanisms of Action of Fluoride Ion

- **Predominant Effect** is *post-eruptive* and *topical*:
 - ✓ Fluoride coming in contact with the teeth after eruption
 - ✓ Toothpaste, rinses, varnish, saliva
- **SYSTEMIC EFFECT:**
 - ✓ Best when small amounts maintained constantly in the mouth, specifically in dental plaque and saliva
 - ✓ Fluoride becomes incorporated into developing permanent teeth of children while still under gums-more resistant to cavities
- **Adults** also benefit from fluoride, rather than only children, as was previously assumed



The Science

Is there a Debate?

Debates on the science of any topic takes place in *expert panels* that have been set up to critically evaluate the literature, *never in public forums*

CWF--THERE IS NO DEBATE!!

Safe: ***No adverse health effects from drinking fluoridated water***

Effective:

- ✓ Reduces cavities by at least 25% over a person's lifetime by simply drinking the water. Does not require a cognizant change in behavior
- ✓ Benefits all members of the community, regardless of age, race, ethnicity, SES, or access to dental care

Cost Savings:

- ✓ The most Cost Efficient & Cost Effective means to reach everyone in the community with the cavity fighting benefits of fluoride.
- ✓ Offers a great ROI: For every \$1 invested in fluoridation, \$43 in dental treatment costs/person/year are avoided

Pain/Tooth loss: Reduces needless pain & suffering from preventable cavities, and tooth loss from extensive destruction of the tooth



Expert committees and systematic reviews

- All are in agreement
- Evidence does not support an association between (adjusted) community water fluoridation and any adverse health effect or systemic disorder



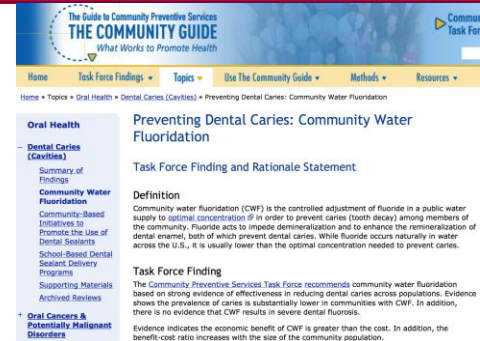


Scientific Reviews

- Health Effects of Water Fluoridation, Royal Society of New Zealand and Prime Minister's Chief Science Advisor (2014)
- **The Guide to Community Preventive Services, (2013)**
- Fluoride in Drinking Water - Guidelines for Canadian Drinking Water Quality for Public Consultation, Canada (2009)
- National Health & Med Research Council, Australia (2007)
- Findings and Recommendations of the Fluoride Expert Panel (January 2007)
- **National Research Council, U.S.A. (2006)**
- ATSDR Toxicological Profile for Fluorides, Hydrogen Fluoride, and Fluorine (2003)
- U. S. Guide to Community Preventive Services (2002)
- Forum on Fluoridation, Ireland (2002)
- Medical Research Council, U.K. (2002)
- CDC Fluoride Recommendations (2001)
- University of York, UK (2000)
- U.S. Surgeon General's Report (2000)
- Institute of Medicine, U.S.A. (1999)
- World Health Organization (1994)
- National Research Council U.S.A. (1993)
- PHS Report, U.S.A. (1991)



Community Preventive Services Taskforce



(Note: studies used were evaluated by the Cochrane Oral Health Group)

Recommendations Reaffirmed 2013:

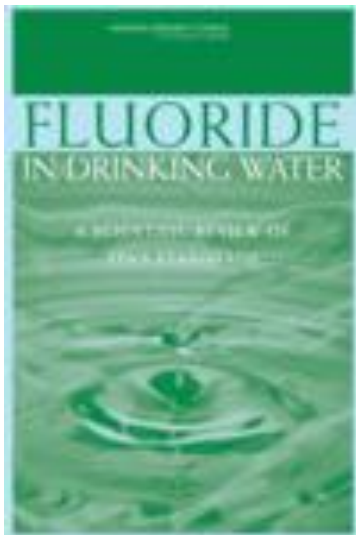
1. Community Water Fluoridation is **RECOMMENDED** based on **STRONG EVIDENCE** of effectiveness in **reducing cavities across populations**
2. Evidence shows the **prevalence of cavities is substantially lower** in communities with community water fluoridation (CWF)
3. There is **NO EVIDENCE** that CWF results in **severe fluorosis**



THE NATIONAL ACADEMIES*Advisers to the Nation on Science, Engineering, and Medicine***FLUORIDE IN DRINKING WATER
A SCIENTIFIC REVIEW OF EPA'S STANDARDS**

Report issued in March 2006:

MCLG: Maximum Contaminant Level Goal: *is a health goal set at a concentration at which NO ADVERSE HEALTH EFFECTS are expected to occur and the margins of safety are judged "adequate."*

**MCLG for Fluoride is 4mg/L**

~200,000 people

**States with high levels of
fluoride naturally occurring:**

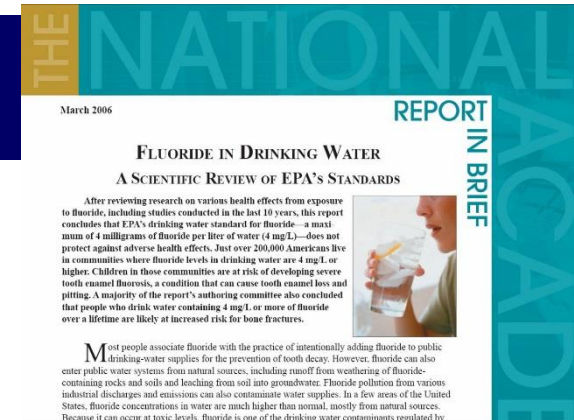
- S. Carolina **5.9 mg/L**
- Virginia 6.3 mg/L
- Texas **8.8 mg/L**
- Colorado 11.2 mg/L
- Oklahoma **12.0 mg/L**
- New Mexico 13.0 mg/L
- Idaho **15.9 mg/L**

THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

Reviewed studies:

- Effects of Fluoride on Teeth-**Yes**
- ~~Musculoskeletal Effects-**NO!**~~
- ~~Reproductive and Developmental Effects-**NO!**~~
- ~~Neurotoxicity and Neurobehavioral Effects-**NO!**~~
- ~~Effects on the Endocrine System-**NO!**~~
- ~~Effects on the Gastrointestinal, Renal, Hepatic, and Immune Systems-**NO!**~~
- ~~Genotoxicity and Carcinogenicity-**NO!**~~



THE NATIONAL ACADEMIES

Advisers to the Nation on Science, Engineering, and Medicine

Summary of Findings:

MCLG for Fluoride at 4mg/L: **ONLY** health effect is **severe fluorosis**



Severe fluorosis is **virtually zero** at 2mg/L (ppm) fluoride in water



NOTE:

- Community water fluoridation = 0.7ppm (mg/L)
- 1/3rd level at which severe fluorosis is virtually zero

Dental Fluorosis



Normal



Questionable



Very Mild



Mild



Moderate



Severe

**Does Not Occur
with CWF**

WHICH WOULD BE YOUR CHOICE???

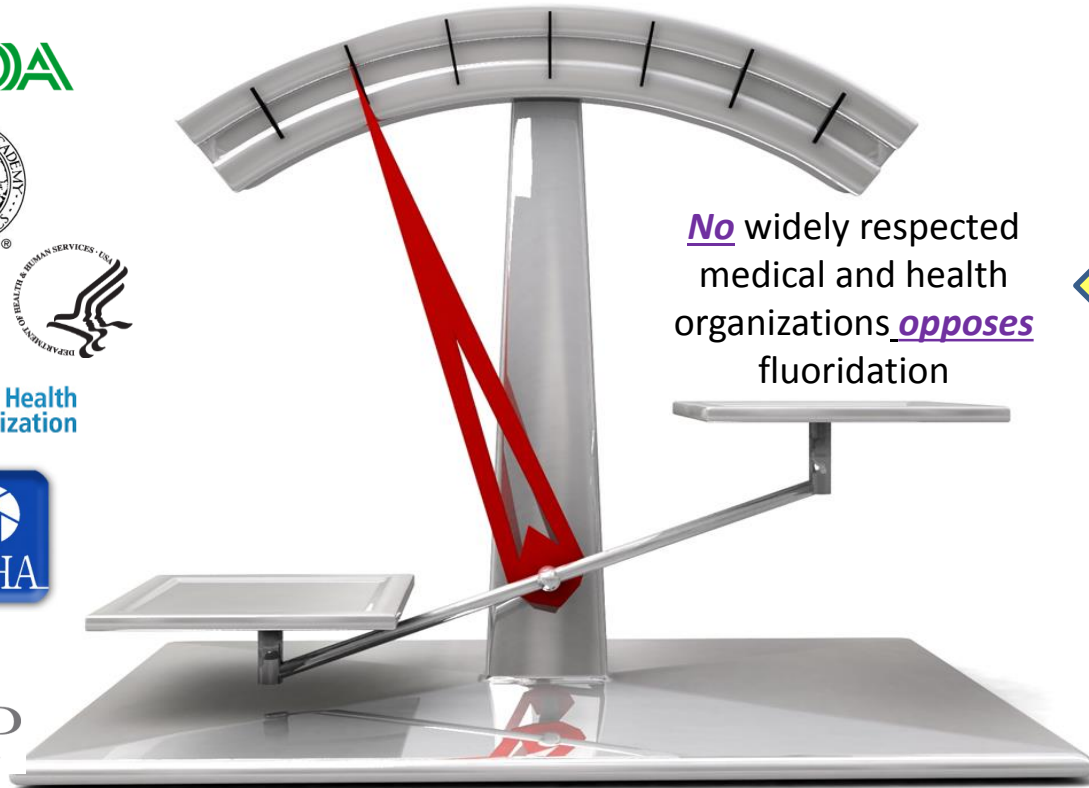
Tooth Decay

or

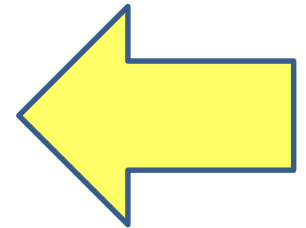
Mild Dental Fluorosis



The Weight of Science



No widely respected
medical and health
organizations opposes
fluoridation



No adverse health effects from drinking fluoridated
water

CWF: A strong consensus of support

- American Academy of Family Physicians
- American Academy of Pediatrics
- American Academy of Pediatric Dentistry
- American Academy of Physician's Assistants
- American Association for the Advancement of Science
- American Dental Association
- American Dental Hygienists' Association
- American Fluoridation Society
- American Medical Association
- American Osteopathic Association
- American Public Health Association
- Association of Maternal & Child Health Programs
- Centers for Disease Control and Prevention
- Florida Dental Association



INSTITUTE OF MEDICINE

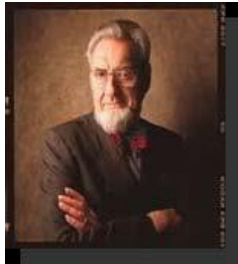


- Florida Dental Hygiene Association
- Institute of Medicine
- Mayo Clinic
- Society for Science-Based Medicine
- U.S. Office on Women's Health
- U.S. Surgeon General
- World Health Organization



(Source: Many of these organizations' statements are included in "In Their Own Words," Campaign for Dental Health, 2014.)

A Public Health Achievement



“Fluoridation is the single most important commitment a community can make to the oral health of its children and to future generations.” **Dr. C. Everett Koop**
Surgeon General (1982-1989)



“Fluoridation is the single most effective public health measure to prevent tooth decay and improve oral health over a lifetime, for both children and adults.” **David Satcher, MD, PhD**
Surgeon General (1998-2002)



“Community water fluoridation is one of the most practical, cost-effective, equitable, and safe measures communities can take to prevent tooth decay and improve oral health. [E]ach generation born since the implementation of water fluoridation has enjoyed better dental health than the preceding generation.”
Dr. Vivek H. Murthy, MD, MPH
Surgeon General (2014-current)

Since Science is Crystal Clear:

Who opposes it?

Folks with illnesses that
truly believe CWF causes it

Folks being misled by those who
have a personal bone to pick

FLUORIDE ACTION NETWORK
Paul & Michael Connett



Sen. Daniel Patrick Moynihan

*“Everyone is entitled to his own
opinions.....*

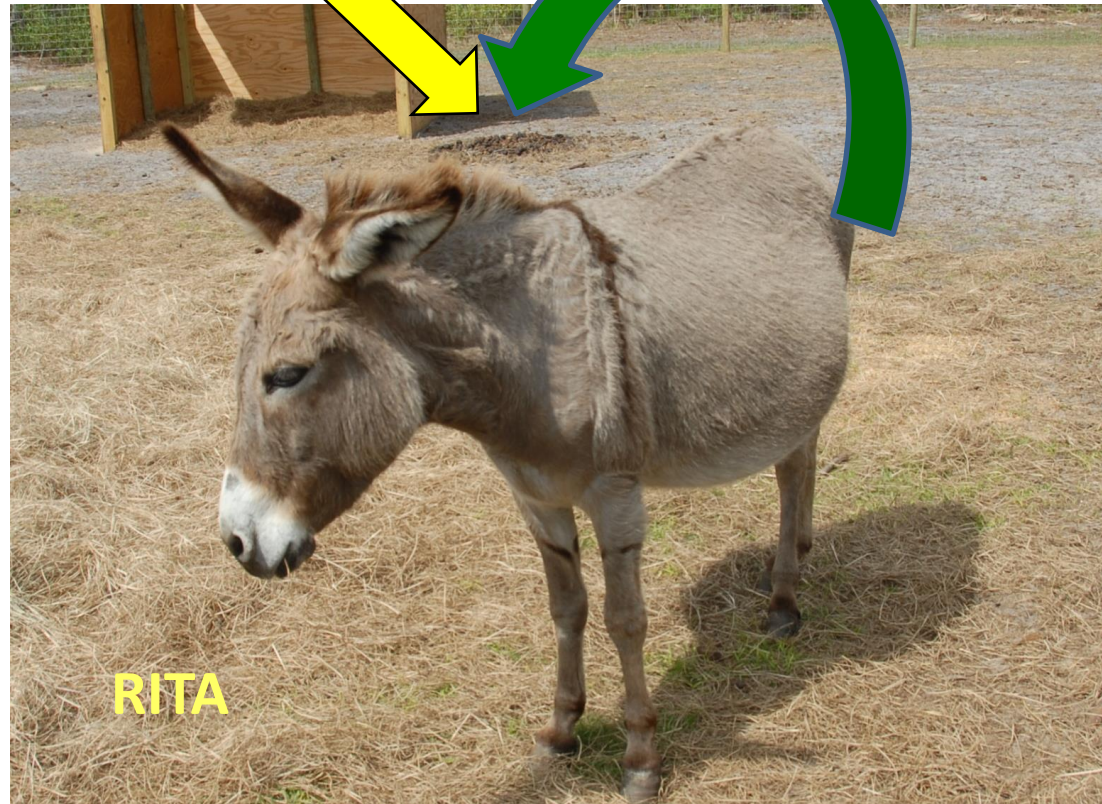


.....but not his own facts”

Claims by Opponents: **ALL FALSE**

WHO data shows cavities coming down all countries the same regardless of CWF	ADA states don't use in infant formula
Allergies to fluoridation	Cancer-No Toxicological Testing has been done!
THYROID PROBLEMS	Down Syndrome
"Harvard Study" Lowers IQ in children:	Causes ADHD, AIDS, Alzheimer's disease
Cochrane Oral Health Group says it isn't effective	Breast milk fluoride level-"Mother Nature knows best"
"ChildSmile"	Effects on the renal, gastrointestinal, and immune systems, reproductive problems
PHARMACEUTICAL GRADE FLUORIDE	Fluorosis is sign of toxic effects on body
Forced Medication	Government Conspiracy-dentists taught to believe it works b/c industry needed to dispose of it

If you throw it at a wall often enough,
some of it's going to stick



Claim: *"Fluoridated water contains 250 x more fluoride than mother's milk."*

FACTS:



Mild

- *There are no known adverse health effects for infants*
- **Milder form** of dental fluorosis *is the only risk*
- **Vitamin D** is added to milk because mother's milk **lacks** sufficient amounts. The National Academy of Sciences and the American Academy of Pediatrics recommends vitamin D per day beginning during the first 2 months of life
- **Vitamin K**-injection given to infants-deficient
- **Iron** supplementation given to infants to prevent anemia-deficient

In Response to Paul Connett's Claims of THYROID PROBLEMS in Brooksville, FL

August 27, 2013



To Whom It May Concern:

As a practicing endocrinologist, I was appalled at the claims that fluoridated drinking water causes clinically significant harm to the endocrine system.

Clinically, in more than 30 years of seeing patients, I have never seen any fractures or thyroid problems associated with fluoridated water. Early puberty is more associated with obesity than anything else, though there are many endocrine disruptors that have estrogenic effect. Fluoride has not been implicated, though lavender, tea tree oil and HCG, substances found commonly in hair products, have been.

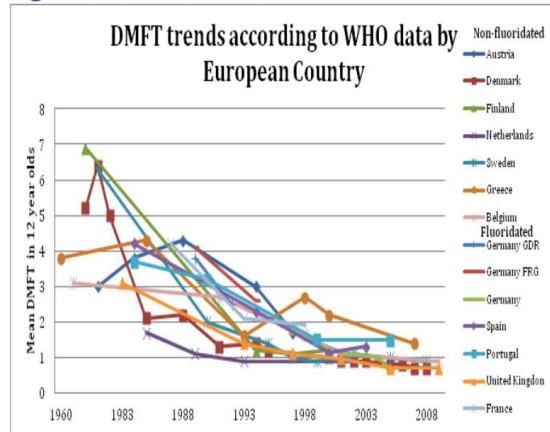


Janet Silverstein, MD

Dr. Janet Silverstein currently serves as Program Director for the Pediatric Endocrine Fellowship at Shands at UF and Division Chief of Pediatric Endocrinology at UF. In her

Manipulated World Health Organization Data claiming cavities falling worldwide regardless of water fluoridation by Opponents

Figure 1: Data from WHO Database



Graphs created to depict declining trends in tooth decay

Figure 1. Source: Data from the World Health Organization database. Available at <http://www.mah.se/CAPP/Country-Oral-Health-Profiles/> ;

Figure 2: Source: Cheng, KK, Chalmers, I, Sheldon, TA. Adding Fluoride to water supplies. *BMJ*; 2007;335(7622):699-702.

Figure 2: Data manipulated to show linear trend

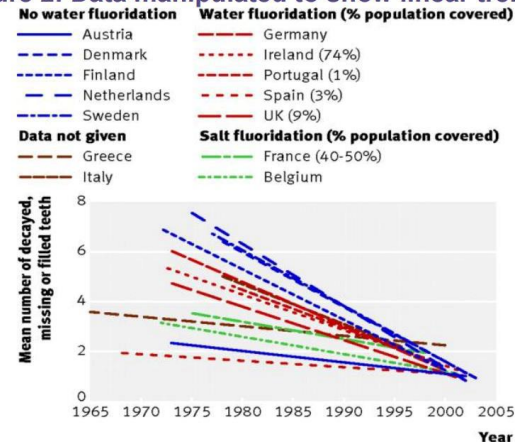


Figure 3: Mean DMFT 12 Year olds in Ireland by Water Fluoridation Status

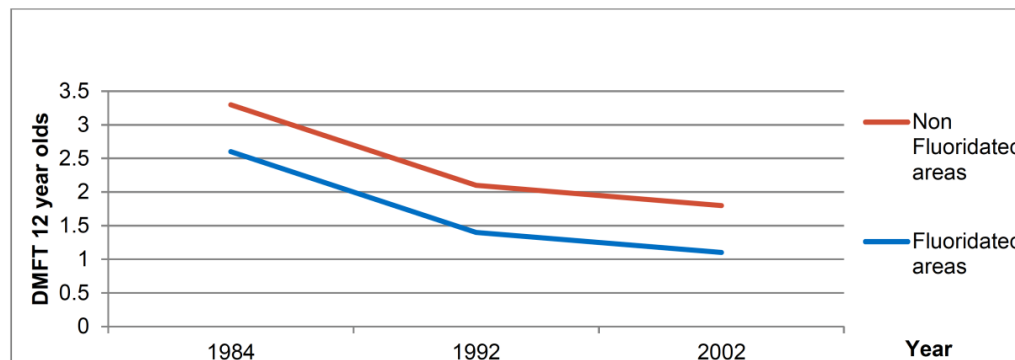


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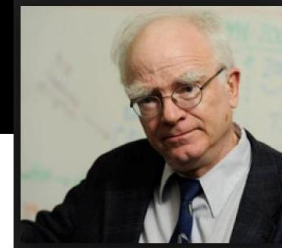
Cavities further reduced by 25% on top of those prevented by toothpaste

IQ Deficits:

Even the authors of the Harvard Meta-analysis distanced themselves away from the opponents:



From: Grandjean, Philippe [<mailto:pgrand@hsph.harvard.edu>]
Sent: Tuesday, July 29, 2014 10:54 AM
To: Walther, Charles J
Cc: Herz, Katherine
Subject: RE: Work With Fluoride



Hello - thank you for asking. We have received many questions about fluoridation, and we do not wish to take any sides. Here is a summary that we generated to summarize the background. I hope this is helpful to you. Best - PG

we do not wish to take any sides

Claim: Fluoride causes Osteosarcoma

FACTS: There has been ***no causal relationship*** of fluoride, ***at any level***, demonstrated to be associated with cancers:

- *“Is fluoride a risk factor for bone cancer? Small area analysis of osteosarcoma and Ewing sarcoma diagnosed among 0–49-year-olds in Great Britain, 1980–2005”*, Blakely, Karen et al, Int. J. Epidemiol. Advance Access published January 14, 2014
- *“An Assessment of Bone Fluoride and Osteosarcoma”*, Kim, F.M. et al, J Dent Res, 07/28/2011 published online
- *“EVIDENCE ON THE CARCINOGENICITY OF Fluoride and Its Salts”*, Reproductive and Cancer Hazard Assessment Branch Office of Environmental Health Hazard Assessment California Environmental Protection Agency, July 2011
- *“Drinking water fluoridation and osteosarcoma incidence on the island of Ireland”*, Comber, Harry et al, Cancer Causes Control (2011) 22:919–924

Claim: Don't use CWF with Infant Formula

FACTS:

This has NEVER been accurate!!!

ADA recommendations:

- **Continued use** of liquid or powdered concentrate infant formulas reconstituted with optimally fluoridated drinking water while being cognizant of the potential risk for *mild* enamel fluorosis
- Use ready-to-feed formula or liquid or powdered concentrate formula reconstituted with water that is either fluoride-free or has low concentrations of fluoride when the potential risk for *mild* enamel fluorosis **may be a concern for parents**



Mild

Claim: Toothpaste contains fluoride poison

FACTS:

Warnings Keep out of the 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. **Ask a dentist before use if you have** • bleeding or redness lasting more than 2 weeks • pain, swelling, pus, loose teeth, or more spacing between teeth. These may be signs of periodontitis, a serious form of gum disease.

Directions • Supervise children as necessary until capable of using without supervision. • Adults and children 6 years of age and older: Brush teeth thoroughly, preferably after each meal or at least twice a day, or as directed by a dentist or a physician. • Children under 12 years: Instruct in good brushing and rinsing habits (to minimize swallowing). • Children under 6 years: Do not use unless directed by a dentist or a physician.

*“To this day, according to the American Association of Poison Control Centers, there have not been **any** deaths or serious adverse reactions from ingestion of fluoride toothpastes”*

-Clifford W. Whall, Jr., PhD
Director of Acceptance Program
ADA Council on Scientific Affairs
April 2, 2012, email to Dr. Johnny Johnson

- **Responsible Parenting**
- **Same labeling on vitamins, Tylenol-required: by FDA**

FACTS: No one has ever died from toothpaste ingestion



**Responsible
Parenting!!**

- ❑ It would take a 20kg child (~4 year old) ingesting 2 full tubes of Adult sized toothpaste at one setting to reach a lethal dose of fluoride
- ❑ The sudsing agent and abrasive components of toothpaste would cause anyone ingesting excess toothpaste to throw up.

Claim: Mass Medication

FACTS:

- U.S. courts have rejected the idea that fluoride is a medication and should not be allowed in water supply
- **Fluoridation:** the adjustment of *natural* (background) water fluoride levels to bring to optimum.
- **Fortification** is a common practice - Folic acid, Vitamin D, Iodine etc.

Summary

Community Water Fluoridation

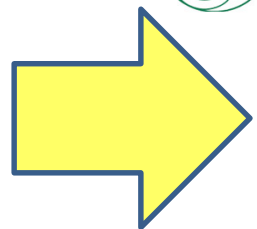
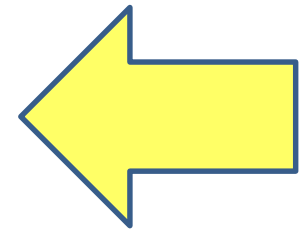
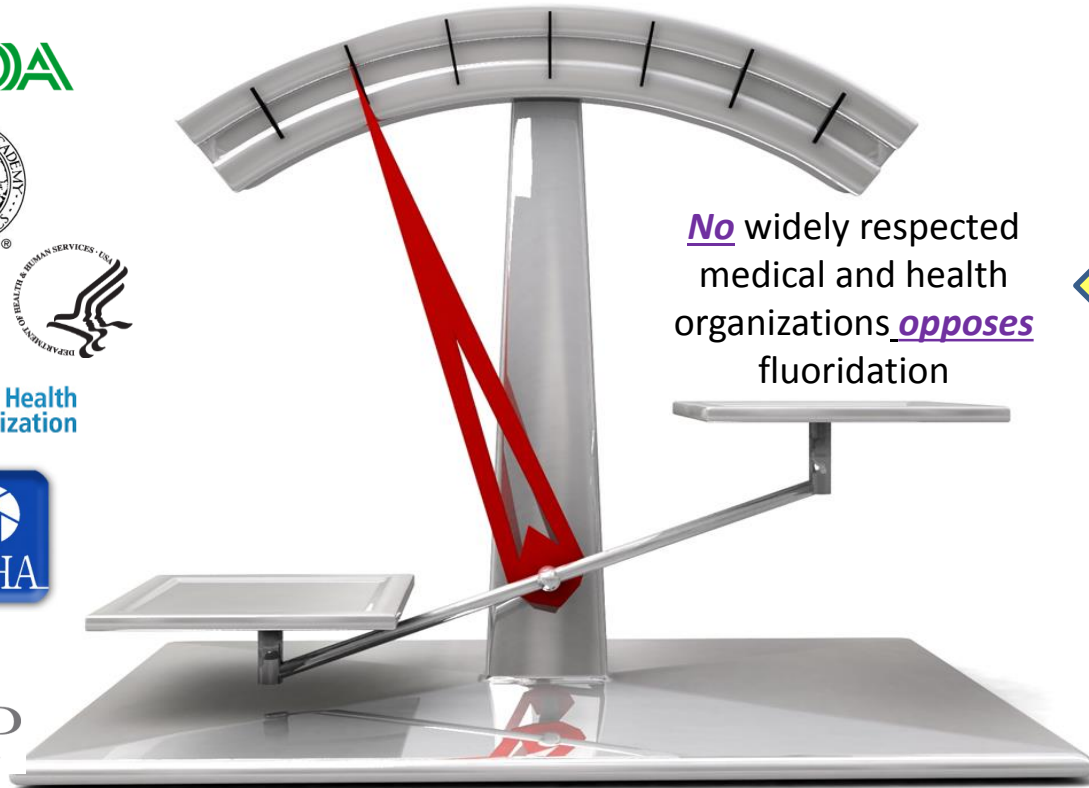
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The Weight of Science



No adverse health effects from drinking fluoridated water



THANK YOU



References:

[American Academy of Pediatrics](#)
[Centers for Disease Control and Prevention](#)

[American Dental Association](#)

[American Fluoridation Society](#)