

# COMMUNITY WATER FLUORIDATION:

## 70 YEARS OF SUCCESS: MUCH WORK TO DO!

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ORAL HEALTH FLORIDA GENERAL MEMBERSHIP

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# Disclosures

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- Speaking as Co-Chair of Fluoridation Action Team, Oral Health Florida
- Speaking as a private practice pediatric dentist
- Speaking because I fervently want everyone to have healthy teeth and bodies
- I do this for the Adults and children that live in pain and suffer every day of their lives because of preventable, contagious, & communicable dental disease
- I don't get paid jack for doing this

# “Pinellas County Commission votes to Stop Water Fluoridation”

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- Oct. 4, 2011 Pinellas County Commission votes 4-3 to stop CWF
- Launched 6 month effort to re-educate those 4 on credible science overwhelmingly supporting CWF
- All 4 chose political position (brownish hot beverage) over science
- 2 former FL State Legislators threw their hats in the ring; sole platform was to return CWF
- 2 negative voting incumbents ousted in general election
- CWF faucet turned back on 15 months after it was ceased
- 1<sup>st</sup> time political turnover had occurred over CWF in history

# 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)**



## 5

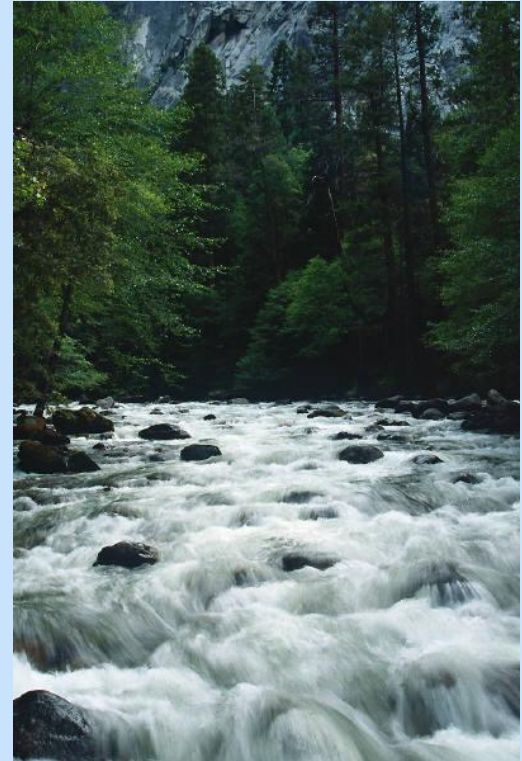


lanthanum 57	cerium 58	praseodymium 59	neodymium 60	promethium 61	samarium 62	europium 63	gadolinium 64	terbium 65	dysprosium 66	holmium 67	erbium 68	thulium 69	ytterbium 70
<b>La</b>	<b>Ce</b>	<b>Pr</b>	<b>Nd</b>	<b>Pm</b>	<b>Sm</b>	<b>Eu</b>	<b>Gd</b>	<b>Tb</b>	<b>Dy</b>	<b>Ho</b>	<b>Er</b>	<b>Tm</b>	<b>Yb</b>
138.91	140.12	140.91	144.24	[145]	150.36	151.96	157.25	158.93	162.50	164.93	167.26	168.93	173.04
actinium 89	thorium 90	protactinium 91	uranium 92	neptunium 93	plutonium 94	americium 95	curium 96	berkelium 97	californium 98	einsteinium 99	fermium 100	mendelevium 101	nobelium 102
<b>Ac</b>	<b>Th</b>	<b>Pa</b>	<b>U</b>	<b>Np</b>	<b>Pu</b>	<b>Am</b>	<b>Cm</b>	<b>Bk</b>	<b>Cf</b>	<b>Es</b>	<b>Fm</b>	<b>Md</b>	<b>No</b>
[227]	232.04	231.04	238.03	[237]	[244]	[243]	[247]	[247]	[251]	[252]	[257]	[258]	[259]

\* \* Actinide series

# Fluoride is Naturally Occurring

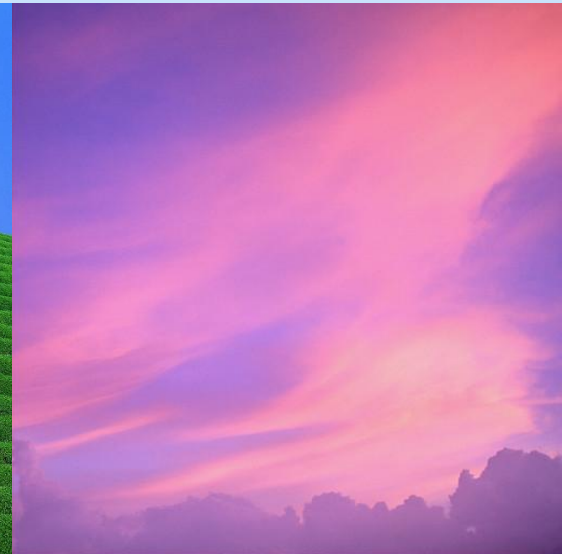
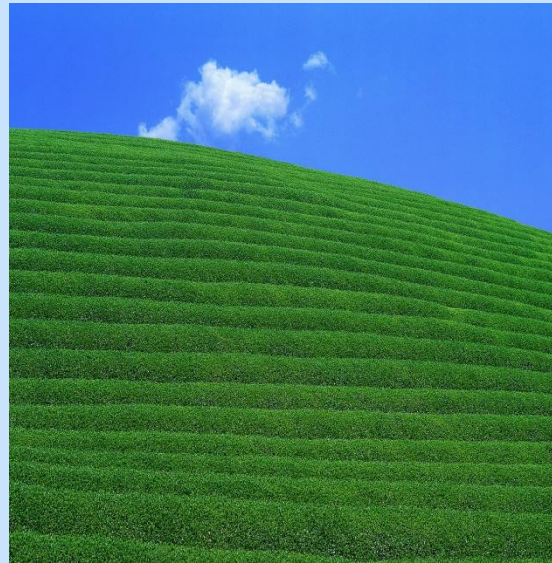
- 13<sup>th</sup> most abundant mineral in the earth's crust
- Surface water (rivers) -- typically low concentrations, 0.2 mg/L (ppm) or less
- Groundwater (wells) --higher concentrations, 0.1 mg/L to over 5.0 mg/L
- Ocean water is typically 0.8 to 1.4 mg/L





# Intake of fluoride from...

- Soil
- Plants
- Water
- Air



# So How Much is 1 ppm?\*

- One part per million (ppm) is equivalent to
  - ▣ 1 inch in 16 miles
  - ▣ 1 minute in two years
  - ▣ 1 cent in \$10,000
  - ▣ length of pickup truck on a road between New York and California

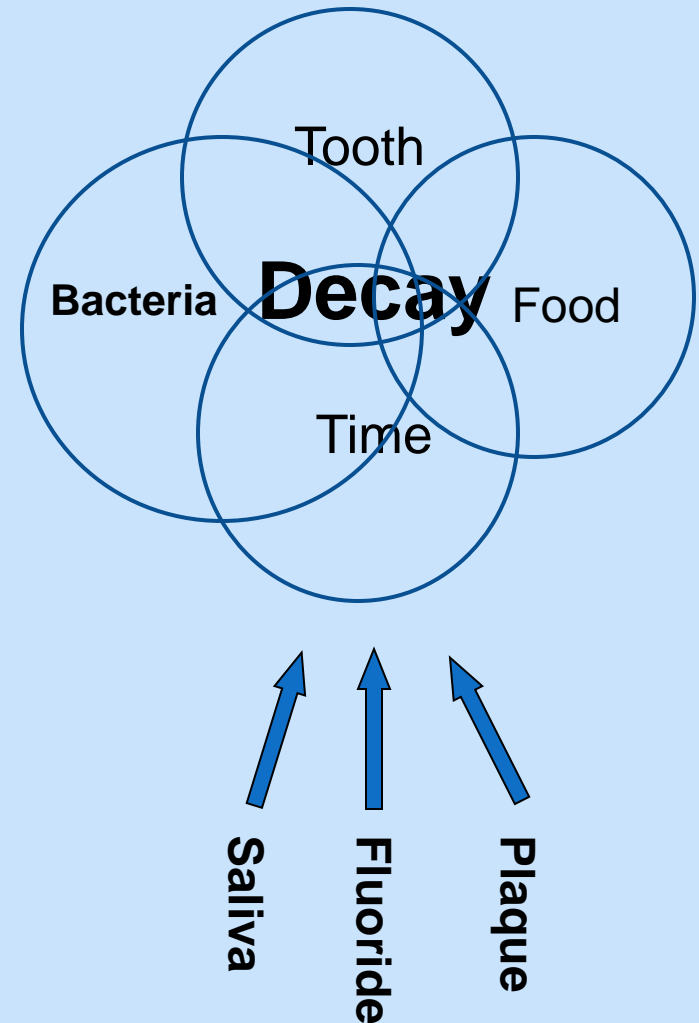


\* 1mg/L = 1ppm



# Required for Decay:

- Diet
  - sugars and carbohydrates
  - Frequency of intake
  - Form of substrate-sticky vs non-sticky
- Oral hygiene
- Xerostomia (Dry Mouth)
  - fluoride
  - salivary flow and composition
- Bacteria Levels
  - — (especially mutans streptococci)
- Tooth Anatomy



# Systemic Benefits – Preeruptive

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- Earliest researchers - hypothesized that fluoride affects enamel and inhibits dental ~~caries~~ CAVITIES **only** when incorporated into developing dental enamel (preeruptively)
- Evidence supports hypothesis of systemic benefit (including research conducted within this decade)

# Topical Benefits - Posteruptive

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- *Predominant* effect is posteruptive and topical
- Effect depends on fluoride being in the right amount in the right place at the right time
- *Best when small amounts maintained constantly in the mouth, specifically in dental plaque and Saliva*
- **Adults** also benefit from fluoride, rather than only children, as was previously assumed

# Basics: How Fluoride Works Topically

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- Fluoride inhibits demineralization
- Fluoride enhances remineralization of surface enamel
- Dental plaque is fluoride reservoir releasing small amounts of fluoride when pH is lowered as we eat
- Fluoride is taken up more readily by demineralized enamel than by sound enamel
- Fluoride in saliva continuously bathes the tooth in fluoride

Koulorides. J Dent Res 1990;69(Spec Issue):558.

# Summary

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For the best prevention of tooth decay:

- ✓ **Topical:** *frequent exposure to low concentrations of fluoride-saliva, release from plaque*
- ✓ **Topical & Systemic:** *water fluoridation and dentifrices, including professionally applied varnishes*
- ✓ **Systemic:** *incorporation into developing permanent teeth prior to eruption (<8 years old)*

# History of Fluoride's Benefits

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## 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*



# Colorado Brown Stain?

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# Other Important Events

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- 1930 - H. V. Churchill used a newly available method of spectrographic analysis that identified high concentrations of fluoride (13.7ppm) in the water of a community in Arkansas with high rates of mottled enamel
- 1931 – McKay contacted Churchill and sent him water samples. Fluoride was discovered in each sample that McKay sent for analysis (2.0ppm to 12.0 ppm)
- It was now known what substance in the water was causing the staining of teeth-Fluoride**

# H. Trendley Dean

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1931 - First dentist appointed to the National Institute of Health

**Primary responsibility** -investigate the association between fluoride and mottled enamel

Mid 1930s – 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”



# Dean's Investigations

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- Developed the Community Fluorosis Index (Dean's Fluorosis Index)
  - Normal
  - Questionable
  - Very Mild
  - Mild
  - Moderate
  - Severe
- ➔ **Led to the landmark study of introduction of fluoridation in 1945**

# Community Water Fluoridation Begins

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- Grand Rapids, Michigan was the first city to adjust fluoride concentration in public drinking water (1945). **Cavity rates dropped dramatically~70%**
- Gainesville 1<sup>st</sup> city in Florida to fluoridate  
-1949
- The rest is History
- 2015 marked the 70<sup>th</sup> anniversary of community water fluoridation (CWF)



# Birth of CWF January 26, 1945

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70<sup>th</sup> Anniversary of  
Community Water Fluoridation  
Sunday January 26, 2015

Toasting with my daughters  
with refreshing and fluoridated  
water in Gainesville, FL



# CWF is:

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- 1. Safe**
- 2. Effective**
- 3. Cost Savings**

# 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**

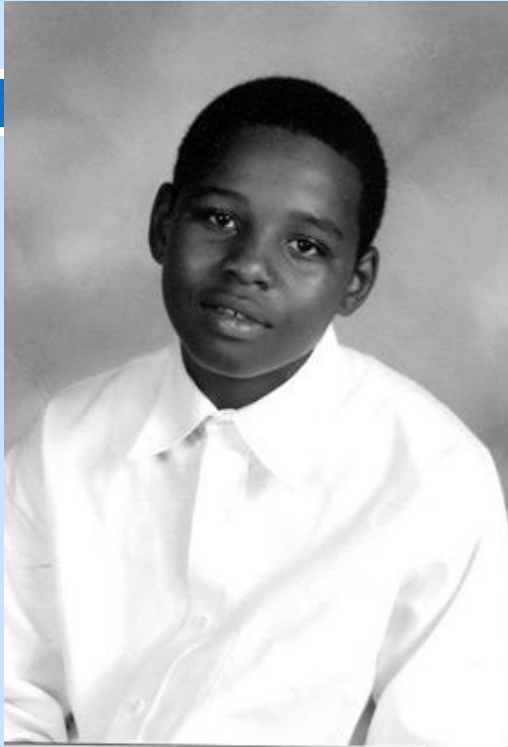


**Severe Dental Infection-Life Threatening**

# CAVITIES: Disproportionately Distributed

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- Nearly 80% of cavities occur in 20% of the population
- **The poor** bear a disproportionate burden of cavities



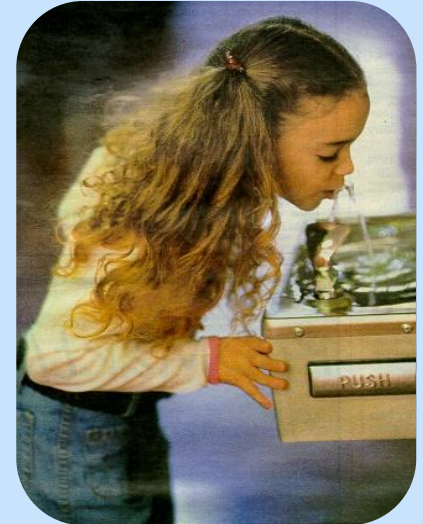
Deamonte Driver, 12, died February 25, 2007, after an infection from a molar spread to his brain

**Severe Dental Infections can and are  
Life Threatening!!**

# An Ounce of Prevention: Community Water Fluoridation

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- ❑ CDC: One of 10 great Public Health Achievements of the 20th century
- ❑ **Reduces cavities** for both children and adults by at least 25% above and beyond those already being prevented by fluoridated toothpaste, rinses, varnish, etc
- ❑ Over **210 million residents (~75%)** in the U.S. are served by community water fluoridation that are on community water systems
- ❑ Over **13 million Floridians (~77%)** are served by community water fluoridation that are on community water systems
- ❑ Helps Americans keep their teeth longer into adulthood more than ever before
- ❑ Saves millions of dollars in treatment costs and eliminates pain and suffering



# FLUORIDATION: “Magic Bullet”

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- ❖ What Does Credible Science Say?
- ❖ Is There Debate About the Safety?
- ❖ Is There Debate About the Effectiveness?
- ❖ Is There Debate About the Savings in Cost and Human Suffering it Provides?



# THE SCIENCE IS CRYSTAL CLEAR

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## No Debate!!

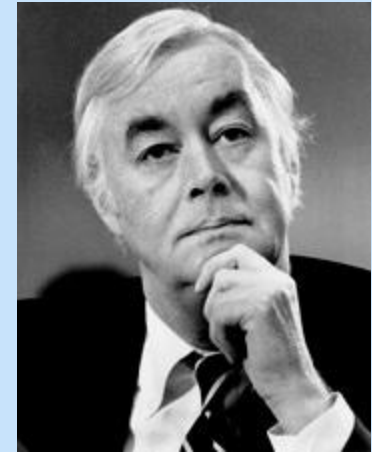
Fluoridation is Safe, Effective, and Provides Huge Cost Savings  
& Reduces Human Pain and Suffering



# Sen. Daniel Patrick Moynihan

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



*.....but not his own facts”*

# The Weight of Science



World Health Organization

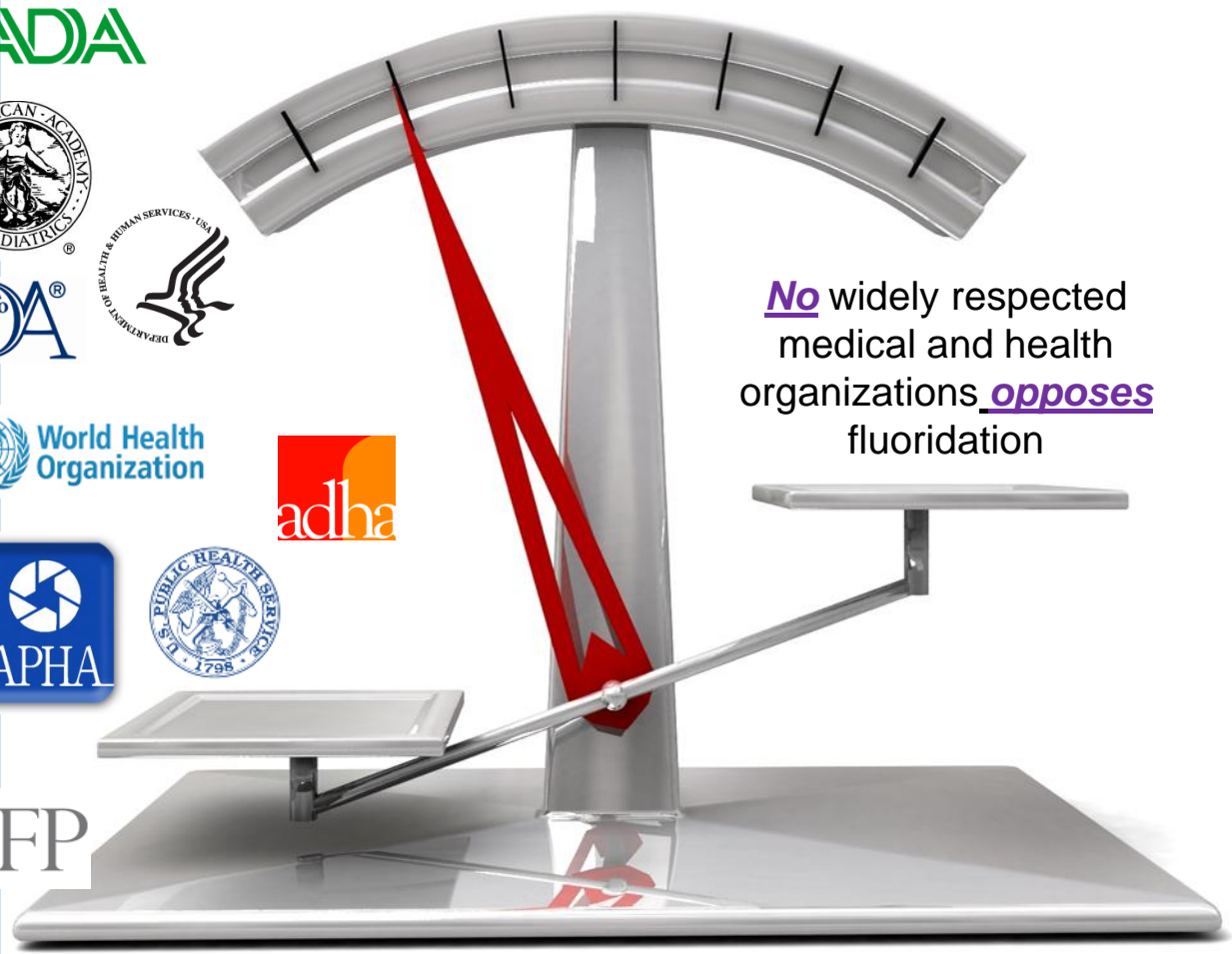
MAYO CLINIC



E.A.P.D.  
EUROPEAN ACADEMY OF PAEDIATRIC DENTISTRY

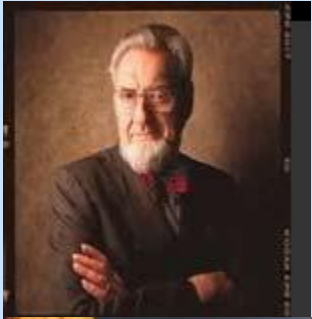


AAFP



No widely respected  
medical and health  
organizations opposes  
fluoridation

# 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)*

# Is Water Fluoridation Still Necessary?

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## YES!

### Systematic Reviews:

- ✓ Effect of Starting Community Water Fluoridation: 29.1% cavity reduction
- ✓ Effect from Stopping CWF: 17.9% increase in cavities



# DEBATES ON SCIENCE

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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***

## 1. Community Preventive Services Taskforce: Systematic Reviews

- ❑ Blue Ribbon Panel Established by Congress
- ❑ Purpose is to scientifically evaluate the literature
- ❑ Provide recommendations to communities

## 2. National Research Council's: Systematic Reviews

*“Scientific Review of EPA Standards on Fluoride in Drinking Water, 2006”*

- ❑ 3 ½ years of **debate**
- ❑ Recommendations and findings



# Community Preventive Services Taskforce

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## 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**.



Department of Health and Human Services  
Centers for Disease Control and Prevention

## Community Water Fluoridation

Normal



Questionable



Very mild



Mild



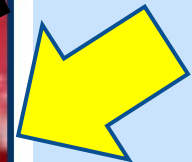
Moderate



Severe



*Community Preventive Services Task Force*  
finds **no evidence** of  
severe fluorosis with  
CWF



## Accurate Photos of Enamel Fluorosis

[http://www.cdc.gov/fluoridation/safety/dental\\_fluorosis.htm](http://www.cdc.gov/fluoridation/safety/dental_fluorosis.htm) January 13, 2013

## National Research Council

### THE NATIONAL ACADEMIES

*Advisers to the Nation on Science, Engineering, and Medicine*

**Report issued in March 2006**

**Focused on naturally occurring high levels of fluoride in drinking water. (~200,000, ~\$4 million dollars spent on study)**

#### Reviewed studies:

- Effects of Fluoride on Teeth
- Musculoskeletal Effects
- Reproductive and Developmental Effects
- Neurotoxicity and Neurobehavioral Effects
- Effects on the Endocrine System
- Effects on the Gastrointestinal, Renal, Hepatic, and Immune Systems
- Genotoxicity and Carcinogenicity



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

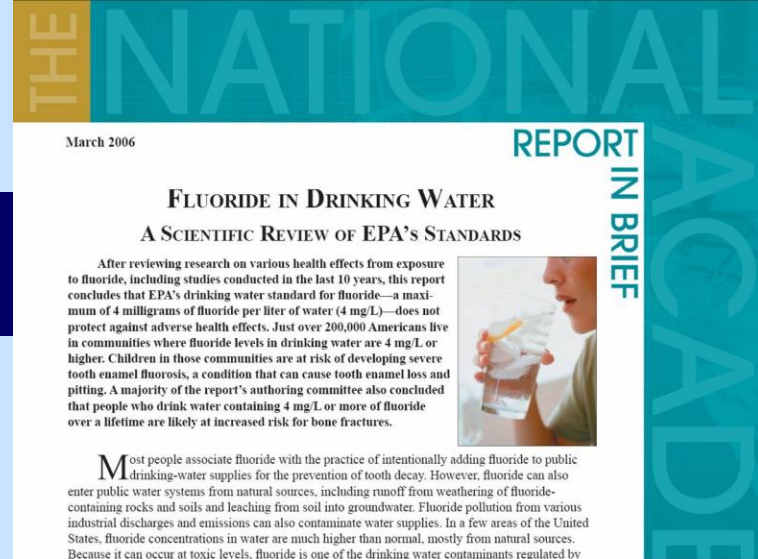
- S. Carolina **5.9 mg/L**
- Virginia **6.3 mg/L**
- Texas **8.8 mg/L**
- Colorado **11.2 mg/L**
- Oklahoma **12.0 mg/L**
- New Mexico **13.0 mg/L**
- Idaho **15.9 mg/L**

## National Research Council

# THE NATIONAL ACADEMIES

*Advisers to the Nation on Science, Engineering, and Medicine*

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Report issued in March 2006:

1. No Health Effects from fluoride in water at 2mg/L (2ppm)
2. Severe fluorosis is virtually zero at 2mg/L fluoride in water

### IMPORTANT NOTE:

Community water fluoridation = 0.7ppm (mg/L)

- 1/3<sup>rd</sup> level at which severe fluorosis is virtually zero (2ppm)



Department of Health and Human Services  
Centers for Disease Control and Prevention

## Community Water Fluoridation

Normal



Questionable



Very mild



Mild



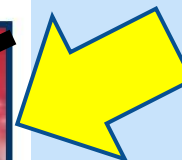
Moderate



Severe



2006 NRC Review  
finds **no evidence**  
of severe fluorosis  
below 2mg/L  
(ppm) fluoride in  
water



## Accurate Photos of Enamel Fluorosis

[http://www.cdc.gov/fluoridation/safety/dental\\_fluorosis.htm](http://www.cdc.gov/fluoridation/safety/dental_fluorosis.htm) January 13, 2013



# WHICH WOULD BE YOUR CHOICE???

Tooth Decay

or Mild Dental Fluorosis



# Summary

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## Water fluoridation:

- ✓ **No adverse health effects from drinking fluoridated water**
- ✓ Is Safe, Effective, and the most Cost Efficient means to reach everyone with the cavity fighting benefits of CWF
- ✓ benefits all members of the community, regardless of age, race, SES, access to dental care
- ✓ offers a great return on its investment: For every \$1 invested in fluoridation, \$38 in dental treatment costs/person/year are avoided
- ✓ is recommended by the Task Force on Community Preventive Services and all major health organizations; WHO, CDC, AAP, ADA, AMA.....

# The Science is Crystal Clear

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1. Since the science is crystal clear, why do a handful of people oppose it?
2. Let's Evaluate Claims made by those opposed to community water fluoridation (CWF), aka:

**“Anti-fluoridationists”**

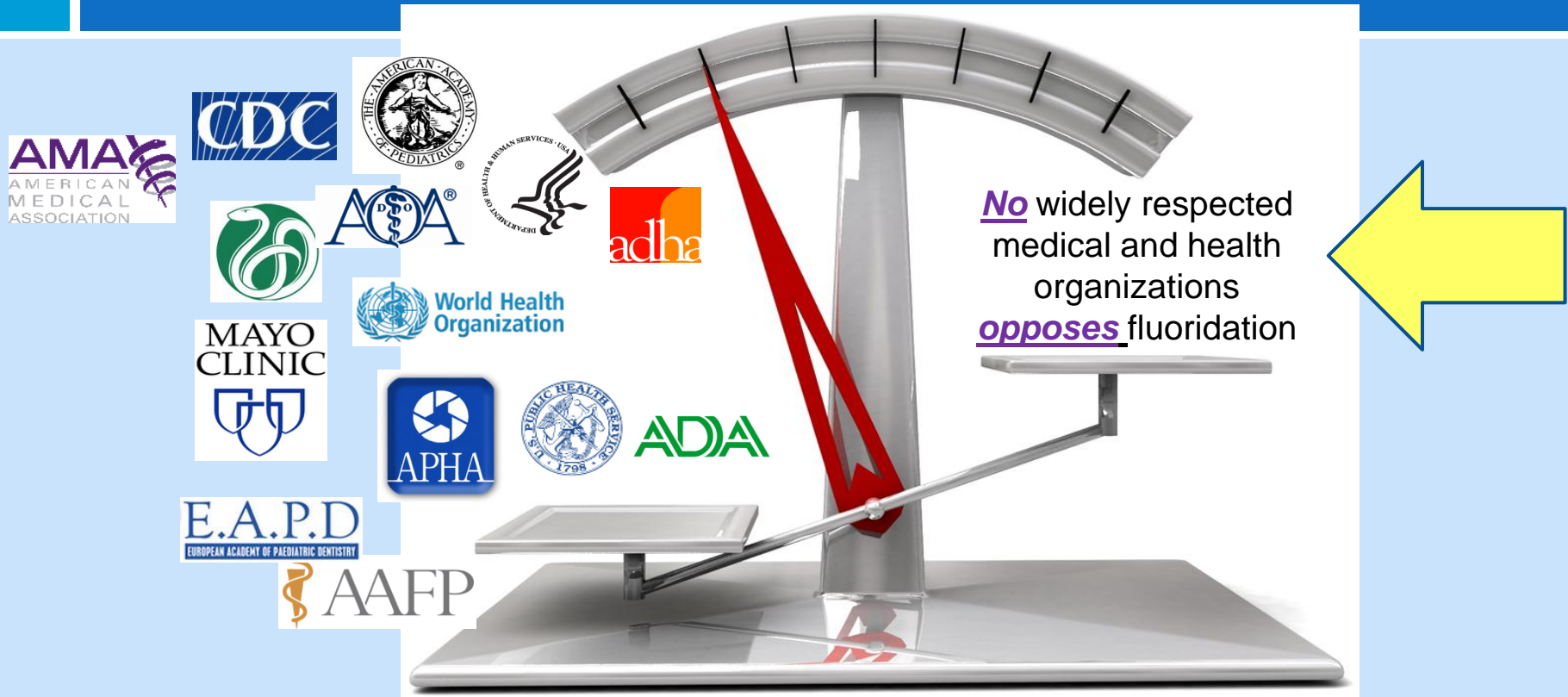


# Claims

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- ▣ Not needed, doesn't work, small effect , there are alternatives
- ▣ Lower IQ in children
- ▣ Increases lead uptake
- ▣ Cancer
- ▣ Down Syndrome
- ▣ Allergies
- ▣ AIDS
- ▣ Alzheimer's disease
- ▣ Reproductive problems
- ▣ Effects on the renal, gastrointestinal, and immune systems

# 1. The Weight of Science



2. No adverse health effects from drinking fluoridated water

# My Top 5 Favorite Deceptions

1. **Osteosarcoma:** “Water fluoridation is killing a few young boys every year” -Paul Connett, Brooksville, FL August, 2013
2. **Infant Formula:** “Even the ADA stated that infant formula shouldn’t be mixed with fluoridated water”
3. **Toothpaste:** “Just look at the back of the tube. This stuff is poison. It says to call poison control if swallowed”
4. **Fluorosis:** “41% of 12 -15 year olds are afflicted with fluoridation overdose resulting in white streaks, dark discolored and stained enamel, and pitting of their teeth”
5. **Water Fluoridation:** “You are mass medicating people without informed consent”

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

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RITA



# WHICH WOULD BE YOUR CHOICE???

Tooth Decay

or

Mild Dental Fluorosis



# Community Water Fluoridation

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# QUESTIONS?

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