COMMUNITY WATER FLUORIDATION:

70 YEARS OF SUCCESS: MUCH WORK TO DO!

MAY 29, 2015
ORAL HEALTH FLORIDA GENERAL MEMBERSHIP
Disclosures

- 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”

- 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
- 1st 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).
Fluoride is the ion of Fluorine
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

- 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**

### Diagram

- Tooth
- Decay
- Bacteria
- Food
- Time
- Saliva
- Fluoride
- Plaque
• Earliest researchers - hypothesized that fluoride affects enamel and inhibits dental caries \textit{CAVITIES only} when incorporated into developing dental enamel (preeruptively)

• Evidence supports hypothesis of systemic benefit (including research conducted within this decade)
Topical Benefits - Posteruptive

• *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

- 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

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)
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?
• 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

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

• 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

• Grand Rapids, Michigan was the first city to adjust fluoride concentration in public drinking water (1945). **Cavity rates dropped dramatically~70%**

• Gainesville 1st city in Florida to fluoridate
  -1949

• The rest is History

• 2015 marked the 70th anniversary of community water fluoridation (CWF)
Birth of CWF January 26, 1945

70th Anniversary of Community Water Fluoridation
Sunday January 26, 2015

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

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

- Nearly 80% of cavities occur in 20% of the population
- The poor bear a disproportionate burden of cavities
Severe Dental Infections can and are
Life Threatening!!

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

- 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”

- 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

No Debate!!
Fluoridation is Safe, Effective, and Provides Huge Cost Savings & Reduces Human Pain and Suffering
“Everyone is entitled to his own opinions . . . .

..........but not his own facts”
The Weight of Science

No widely respected medical and health organizations oppose 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

“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

“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?

YES!

**Systematic Reviews:**

- **Effect of Starting** Community Water Fluoridation: 29.1% cavity reduction

- **Effect from Stopping** CWF: 17.9% increase in cavities
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
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**.
Community Preventive Services Task Force finds no evidence of severe fluorosis with CWF.
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
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)
- 1/3rd level at which severe fluorosis is virtually zero (2ppm)
2006 NRC Review finds **no evidence** of severe fluorosis below 2mg/L (ppm) fluoride in water.

### Community Water Fluoridation

<table>
<thead>
<tr>
<th>Level</th>
<th>Description</th>
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<tbody>
<tr>
<td>Normal</td>
<td></td>
</tr>
<tr>
<td>Questionable</td>
<td></td>
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<tr>
<td>Very mild</td>
<td></td>
</tr>
<tr>
<td>Mild</td>
<td></td>
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<tr>
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</tr>
<tr>
<td>Severe</td>
<td>X</td>
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**Accurate Photos of Enamel Fluorosis**

WHICH WOULD BE YOUR CHOICE???

Tooth Decay or Mild Dental Fluorosis
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

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

- 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

No widely respected medical and health organizations opposes fluoridation.

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.
WHICH WOULD BE YOUR CHOICE???

Tooth Decay or Mild Dental Fluorosis
Community Water Fluoridation

QUESTIONS?

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