

March 20, 2026

# Water fluoridation: The evidence-based science

**Johnny Johnson, Jr., DMD, MS**





# Overview of community water fluoridation

# Fluoride: A naturally occurring mineral



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

*(Sources: Centers for Disease Control and Prevention, "[Fluoridation Basics](#)," ; Kanduti D, Sterbenk P, Artnik B. Fluoride: A Review of Use and Effects on Health, *MateriaSocioMedica*, 2016, 28:2.)*

# 1901: A defining moment for dental disease

[Timeline](#) for community water fluoridation:



1901

Dentists in the United States and Italy separately observe lower rates of dental decay in populations with distinctively stained teeth. Dr. Frederick S. McKay of Colorado Springs, Colorado, notes that many residents have what locals call “Colorado brown stain”.



**Colorado Brown Stain**

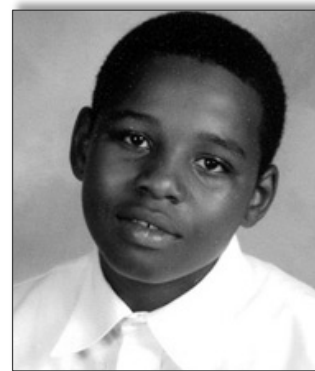


# **Benefits and risks of fluoridation and fluorides**

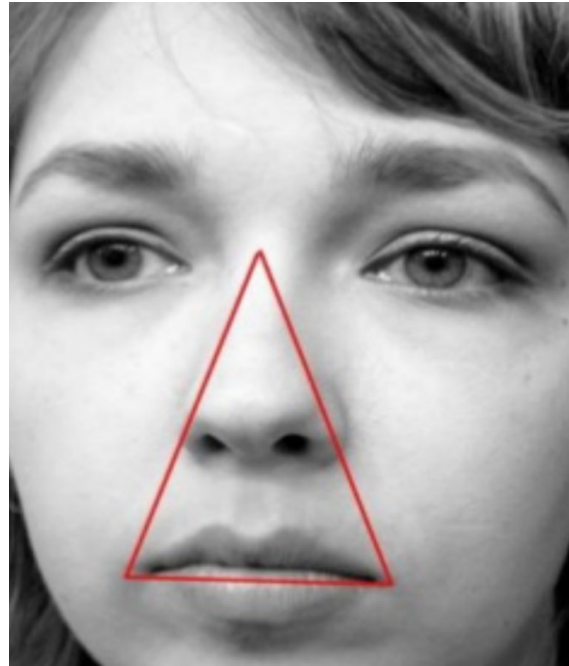
# Why Oral Health Matters

Dental cavities are the **most common chronic disease** of adults and children. It's significantly more common than *asthma, obesity, and diabetes*. **Infectious and transmissible**

- Severe pain (toothaches)
- Difficulty in chewing
- Poor weight gain
- Difficulty concentrating
- Predictor of cavities later in life
- Costly to treat
- Deaths

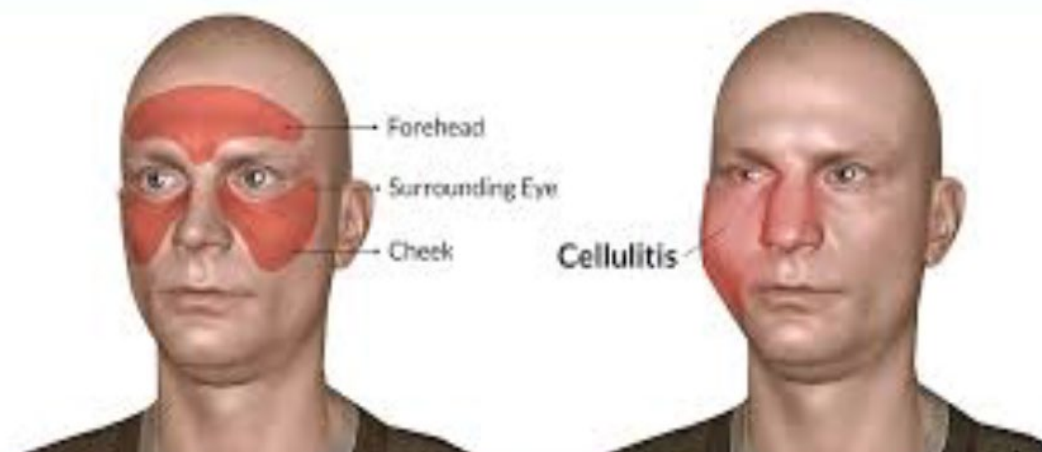


# Triangle of death



- Infections in this area of the face are extremely dangerous.
- They can lead to the spread of infection into surrounding tissues rapidly.

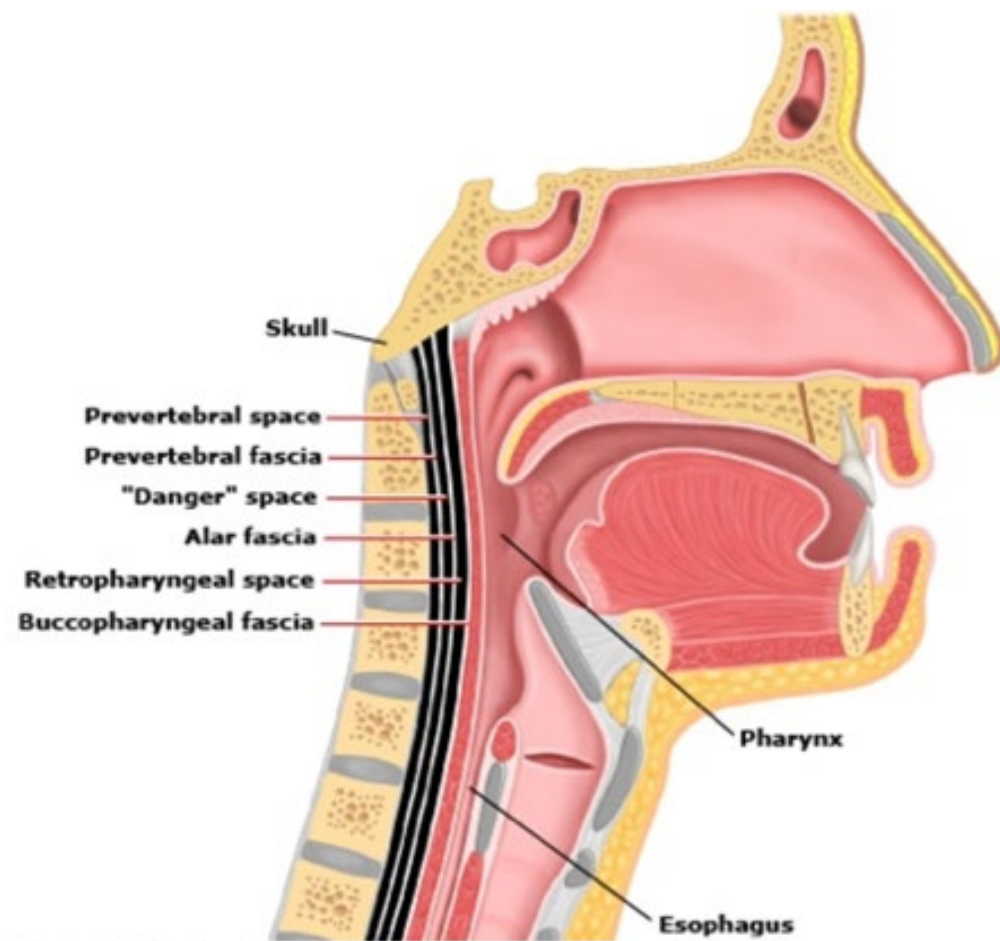
Facial Cellulitis



# Complications from dental abscess

Pus is going to spread somewhere:

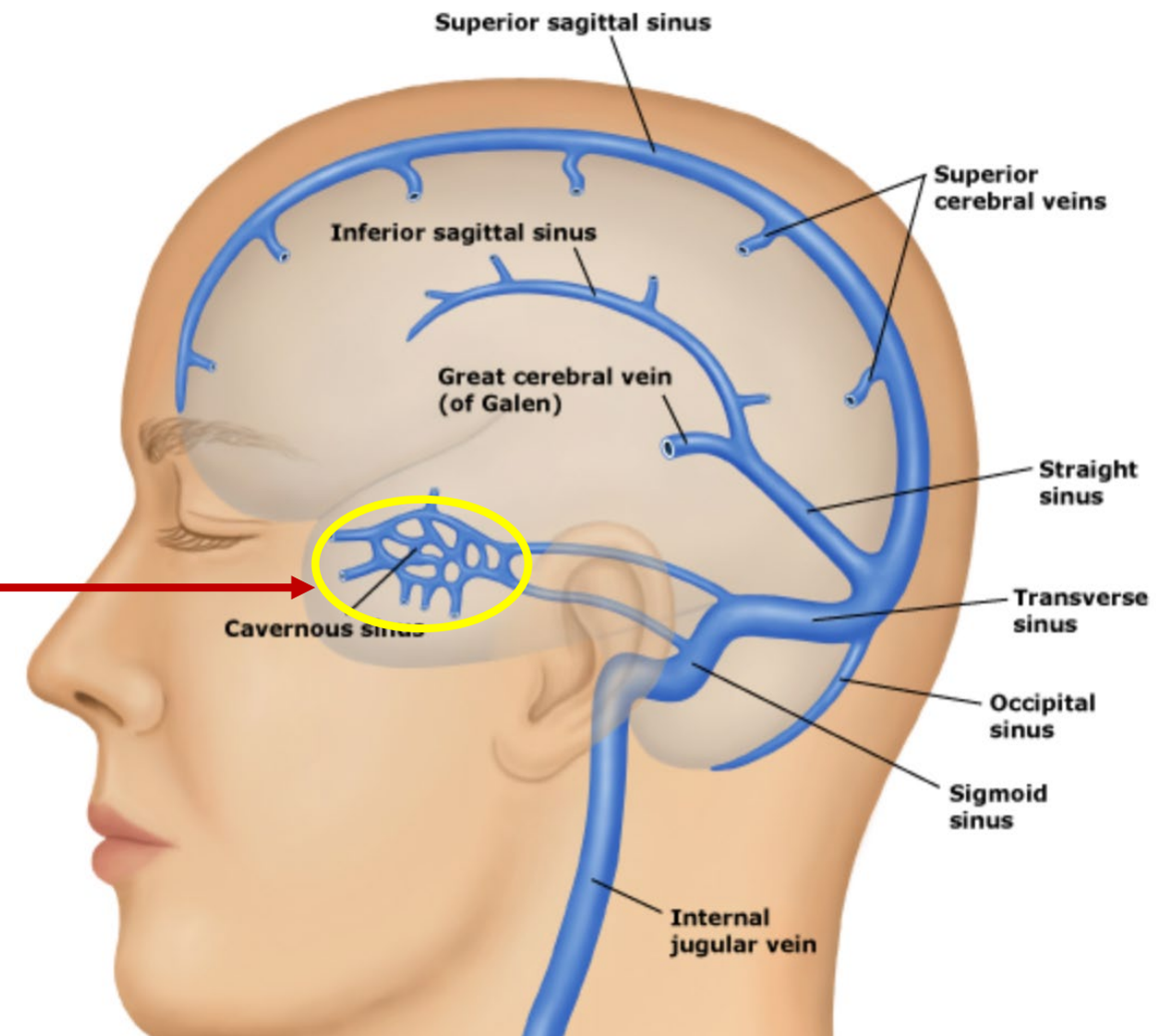
1. Sepsis
2. Brain abscess
3. Cardiac damage/heart attack
4. Stroke
5. Lung infection/collapse
6. Head and neck space infections
  - Airway obstruction
  - Orbital infection
7. Death



<https://www.emboardbombs.com/study-guide/retropharyngeal-abscess/>

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# Cavernous sinus thrombosis – Brain abscess



# How fluoride works



## Systemically – Fluoridated water

- Fluoride helps strengthen the developing permanent teeth *before* they come through the gums.



## Topically – Fluoridated water, toothpaste, mouth rinse, and varnish

- Continuous exposure to small amounts of fluoride helps *both* adults and children by remineralizing the tooth enamel.

(Source: Achievements in Public Health, 1900-1999: Fluoridation of Drinking Water to Prevent Dental Caries, MMWR, October 22, 1999, 48:41; as this scientific article notes, "Fluoride from topical sources such as fluoridated drinking water is taken up by cariogenic bacteria when they produce acid.")

# Both forms of fluoride are needed

**“If I’m using fluoride toothpaste, do I still need to drink fluoridated water?”**



Both drinking water and toothpaste with fluoride provide important and complementary benefits. Fluoridated water keeps a low level of fluoride in saliva and dental plaque all day. The much higher concentration of fluoride in toothpaste offers additional benefit. Fluoride slows the activity of bacteria that cause decay and combines with enamel on the tooth surface to make it stronger and better able to resist decay. Together, the two sources offer more protection than using either one alone.

# A study demonstrates fluoridation's impact

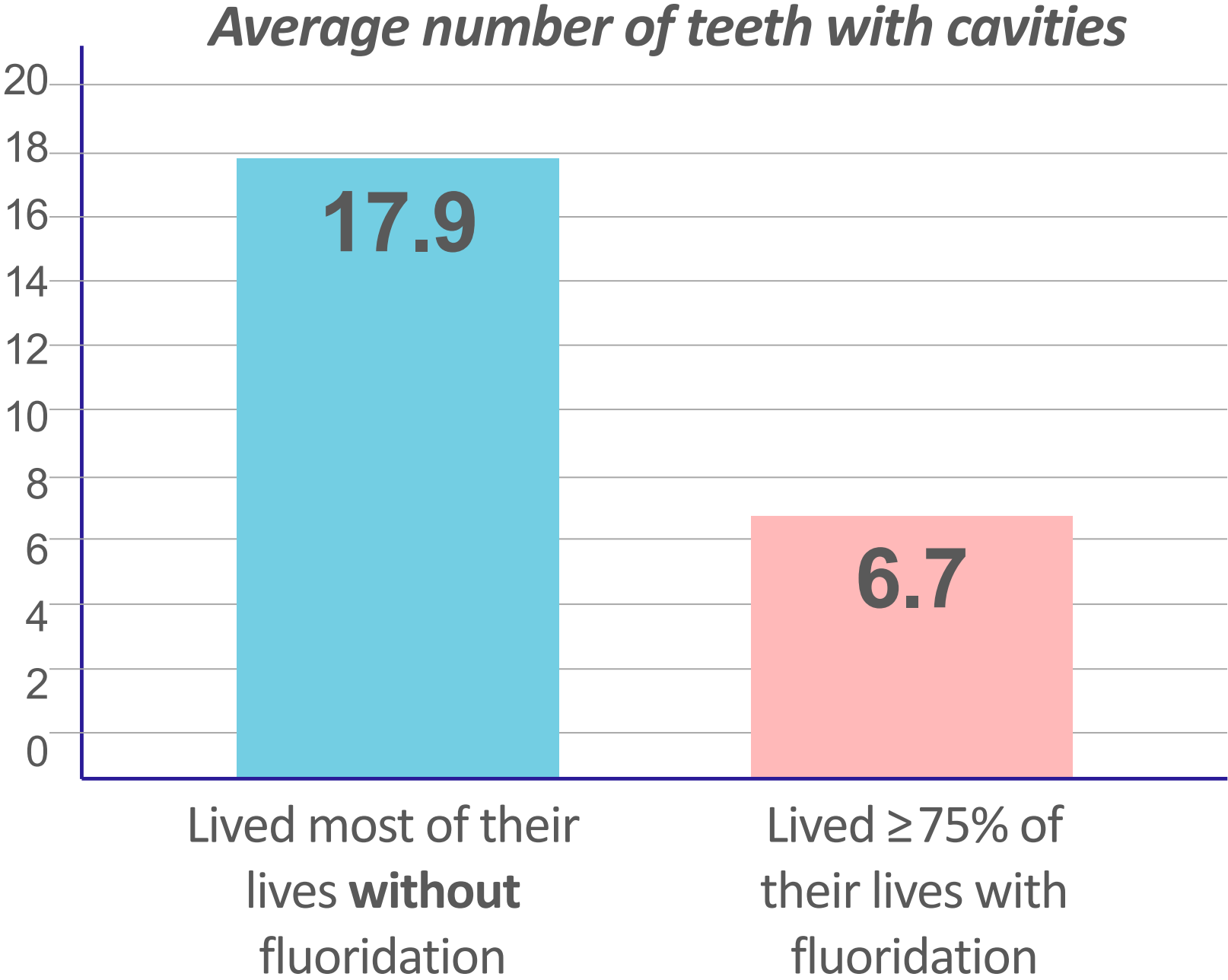


- **Study of U.S. children** (2018)
- Consider a classroom of 30 children in a fluoridated city.
- On average, these children would have **39 fewer tooth surfaces with cavities** in their primary teeth than the same number of students in a non-fluoridated city.

*(Source: G.D. Slade et al., "Water Fluoridation and Dental Caries in U.S. Children and Adolescents." Journal of Dental Research, 2018.)*

# Adults also benefit from fluoridation

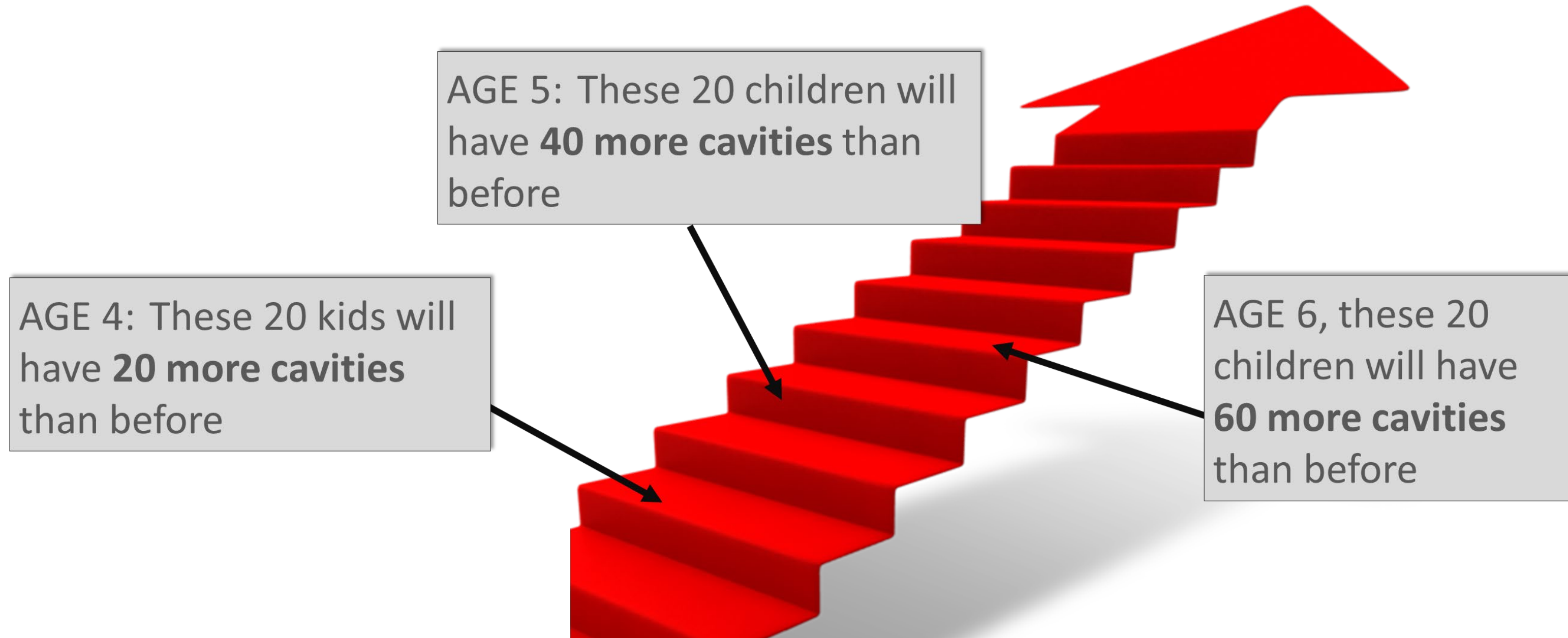
**A study of adults in Brazil (2016)**



(Source: M.A. Peres, P.R. Barbato, et al. "Access to fluoridated water and adult dental caries: A natural experiment. Journal of Dental Research, July 2016, 95:8, pp. 868-874.)

# The Alaska fluoridation cessation study

Imagine **20 children** who are in the same Head Start classroom when water fluoridation stops:



*(Source: J. Meyer et al., "Consequences of community water fluoridation cessation for Medicaid-eligible children and adolescents in Juneau, Alaska," BMC Oral Health, 2018, 18:215.)*

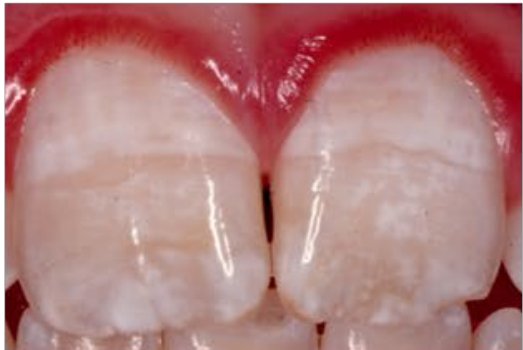
# The **ONLY** risk of water fluoridation



Normal



Very Mild



Moderate

Improper use of fluoride products



Questionable



Mild





Severe

Not caused by fluoridation



(Source: Information from the Centers for Disease Control and Prevention's [website](#), accessed Dec 2023)



# How do we know that fluoridated water is safe?

# Scientific panels have confirmed fluoride's safety

Intensive reviews have concluded that the levels of fluoride commonly found in Western countries are safe:




- ✓ Health Research Board (Ireland, [2022](#))
- ✓ Public Health England ([2018](#) / [2022](#))
- ✓ Food Safety Authority of Ireland ([2018](#))
- ✓ National Health & Medical Research Council of Australia ([2017](#))
- ✓ U.S. Public Health Service ([2015](#))
- ✓ Royal Society of New Zealand ([2014](#), [2021](#), [2024](#))
- ✓ CADTH (Canadian Agency for Drugs, Technology, and Health), ([2019](#), [2020](#))
- ✓ **European Food Safety Authority ([2025](#))**



Public Health  
England



(Sources: Public Health England produced fluoridation monitoring reports in both of the years indicated; Food Safety Authority of Ireland, report issued 2018; National Health and Medical Research Council of Australia, policy statement issued 2017; U.S. Public Health Service report was published by Public Health Reports in 2015; Royal Society of New Zealand, conclusions released 2014, 2021, 2024; Health Research Board. Impact of community water fluoridation on systemic health excluding oral health: An evidence review, November 2022; Canadian Agency for Drugs, Technology and Health, 2019, 2020); Fluoride safety: updated intake levels for all ages, EFSA, [2025](#))



# **What about claims that fluoride lowers IQ?**

# Dr. Scott Tomar – ADA Fluoridation Spokesperson



**My View: We should continue to support community water fluoridation**

Scott L. Tomar, D.M.D., Dr.P.H.

*“The quality and validity of a systematic review and meta-analysis can be no better than the quality of the studies they include.”*

*“the NTP monograph and separately published meta-analysis found no significant association between exposure to fluoride at the levels used in community water fluoridation and children’s IQ.”*

(Source: [ADA News](#), January 29, 2025)

# 70% of the NTP studies had serious flaws

January 6, 2025

## Fluoride Exposure and Children's IQ Scores

### A Systematic Review and Meta-Analysis

Kyla W. Taylor, PhD<sup>1</sup>; Sorina E. Eftim, PhD<sup>2</sup>; Christopher A. Sibrizzi, MPH<sup>2</sup>; [et al](#)

[» Author Affiliations](#) | [Article Information](#)

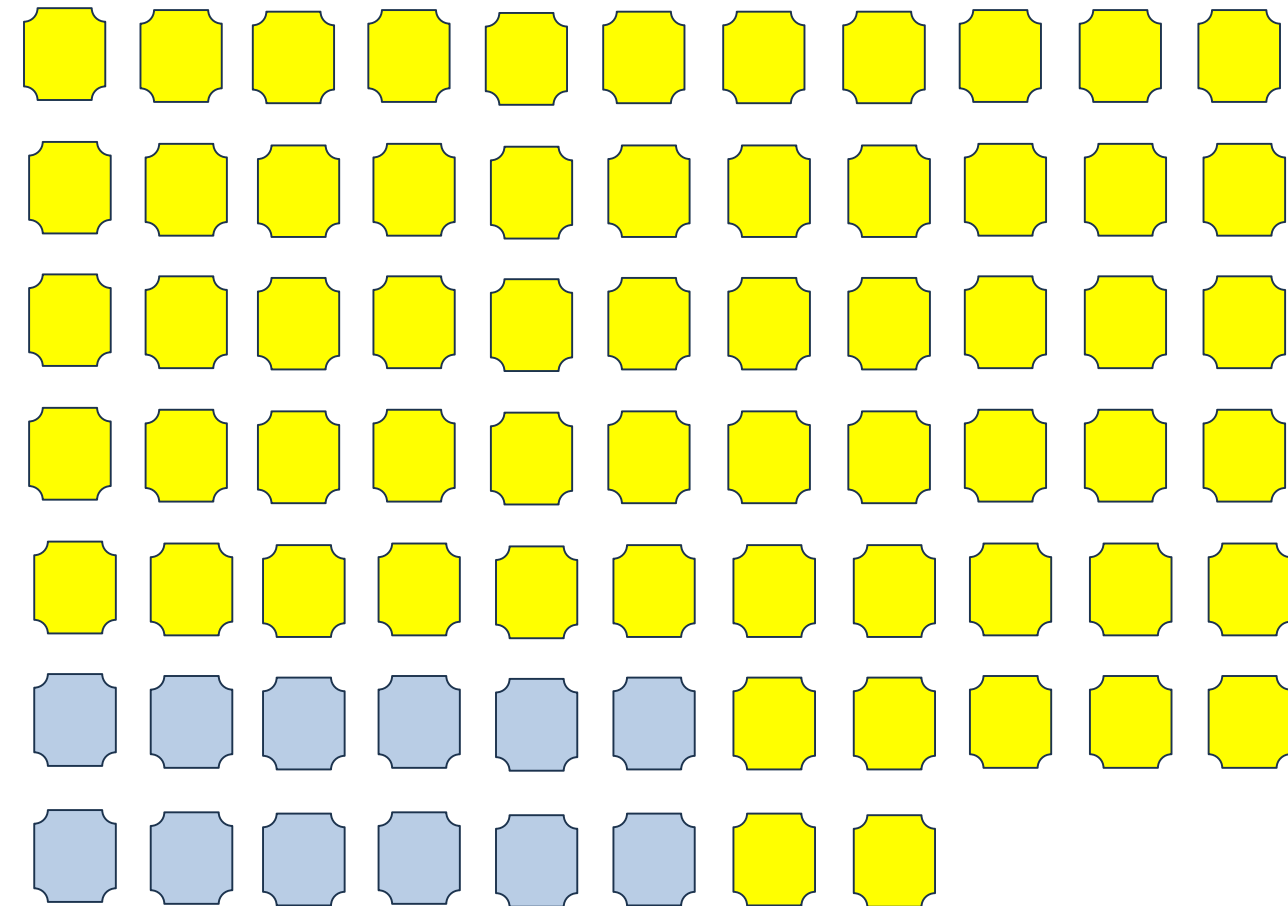
*JAMA Pediatr.* Published online January 6, 2025. doi:10.1001/jamapediatrics.2024.5542

#### Key Points

**Question** Is fluoride exposure associated with children's IQ scores?

**Findings** Despite differences in exposure and outcome measures and risk of bias across studies, and when using group-level and individual-level exposure estimates, this systematic review and meta-analysis of 74 cross-sectional and prospective cohort studies found significant inverse associations between fluoride exposure and children's IQ scores. For fluoride measured in water, associations remained inverse when exposed groups were restricted to less than 4 mg/L or less than 2 mg/L but not when restricted to less than 1.5 mg/L; for fluoride measured in urine, associations remained inverse at less than 4 mg/L, less than 2 mg/L, and less than 1.5 mg/L; and among the subset of low risk-of-bias studies, there were inverse associations when exposed groups were restricted to less than 4 mg/L, less than 2 mg/L, and less than 1.5 mg/L for analyses of fluoride measured both in water and in urine.

**PROBLEM:** 52 of the 74 studies (70%) were judged by the report authors to have a “high risk of bias.”



(Source: *Fluoride Exposure and Children's IQ Scores, A Systematic Review and Meta-Analysis*, *JAMA Pediatr*, Published [Online](#): January 6, 2025, 179;(3):282-292)

# New, *only* large U.S. Study on fluoridation and IQ

SCIENCE ADVANCES | RESEARCH ARTICLE

## PUBLIC HEALTH

### Childhood fluoride exposure and cognition across the life course

John Robert Warren<sup>1\*</sup>, Gina Rumore<sup>1</sup>, Soobin Kim<sup>2</sup>, Eric Grodsky<sup>3</sup>, Chandra Muller<sup>4</sup>, Jennifer J. Manly<sup>5</sup>, Adam M. Brickman<sup>5</sup>

“We find that children exposed to recommended levels of fluoride in drinking water exhibit modestly better cognition in secondary school, an advantage that is smaller and no longer statistically significant at age ~60.”

(Source: “Childhood fluoride exposure and cognition across the life course”, [Science Advances](#), Warren, J.R. et al., Sci. Adv., 19 Nov 2025 )

- Followed >27,000 subjects from high school to about 60 years old
- Evaluated cognitive test performance in high school and again at about age 60
- Researchers found that those who had water fluoridation from birth or during part of their childhood *performed better* on cognitive tests than those who were not exposed
- Researchers also discussed the contentious studies and the NTP review/meta-analysis about fluoride and IQ deficits. Those studies did not address the fluoride levels that people in the U.S. are exposed to in water fluoridation



# **Can water fluoridation be replaced by other modalities?**

# Are there good alternatives to fluoridation?

**NO**

- *Fluoridation* is the single **most cost-effective way** to prevent cavities for adults and children.
- *Fluoride toothpaste* is **not** a replacement for fluoridation. Both are needed.
- *Fluoride supplements*: Compliance is a problem.
- Supplements and school-based dental programs **do not serve adults**, whose oral health needs continue as they age.

# Considerations to take into account *before* Rx

- Fluoride content of your community water system.
- If on a private well, get it tested for fluoride content.
- Check if the patient is on any prescribed vitamins or fluoride supplements – prescribed vitamins may contain fluoride.
- Follow the chart below. Prescriptions begin at 6 months to 16 years.

Age	Fluoride ion level in drinking water (ppm)*		
	<0.3 ppm	0.3-0.6 ppm	>0.6 ppm
<b>Birth–6 months</b>	None	None	None
<b>6 months–3 years</b>	0.25 mg/day**	None	None
<b>3–6 years</b>	0.50 mg/day	0.25 mg/day	None
<b>6–16 years</b>	1.0 mg/day	0.50 mg/day	None

\*1.0 part per million (ppm) = 1 milligram/liter (mg/L) | \*\*2.2 mg sodium fluoride contains 1 mg fluoride ion.

(Source: 2025 ADA Fluoridation Facts, p 27“)

# Fluoridation – Cost savings

Fluoridation saves families from the pain and suffering of cavities, lost time from school and work, difficulty with focusing on school and work, and extensive expenses on dental care.

## Return on Investment (ROI)

- Water fluoridation saves \$45 in avoided dental treatment costs/person/year
- For every \$1 invested in fluoridation, \$28 in avoided dental treatment costs is saved per person, per year.
- >15 million people in FL lost fluoridated water last year. \$45 x 15 million people = **\$675 million** in increased expenditures on dental care

(Source: "Costs And Savings Associated With Community Water Fluoridation In The United States", O'Connell et al., Health Affairs, Vol. 35, No. 12: Oral Health & More, [Dec 2016](#))

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# THANK YOU

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