



Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride in the Pediatric Population

Hybrid Public Meeting
July 23, 2025
9:30am-4pm (eastern)

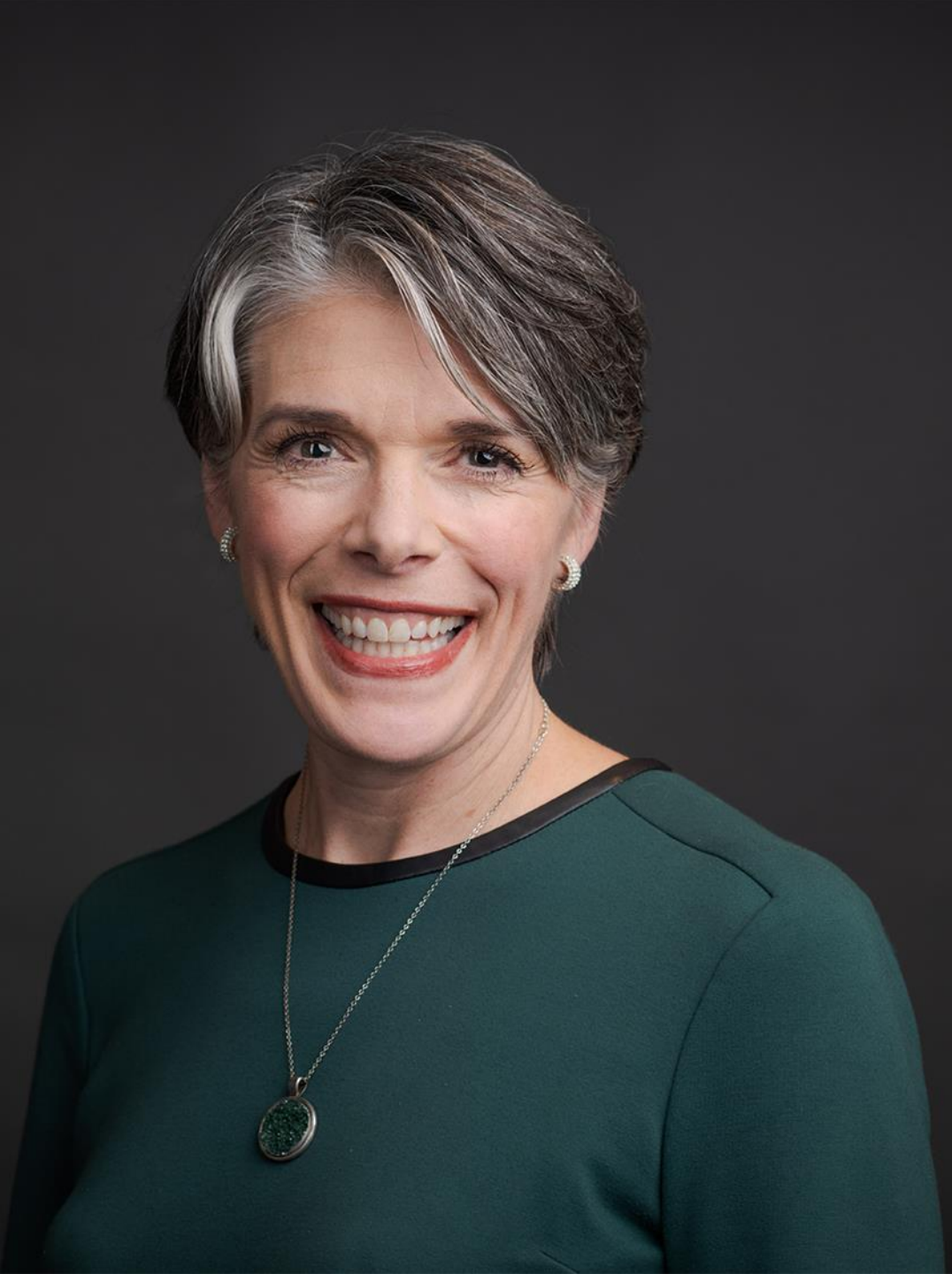


Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride in the Pediatric Population

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July 23, 2025
9:30am-4pm (eastern)

The public meeting will begin shortly

This project is supported by the Food and Drug Administration (FDA) of the U.S. Department of Health and Human Services (HHS) as part of an award of \$125,000 in federal funds (100% of the project). The contents are those of the author(s) and do not necessarily represent the official views of, nor an endorsement, by FDA, HHS, or the U.S. Government. For more information, please visit [FDA.gov](https://www.fda.gov)



Welcome

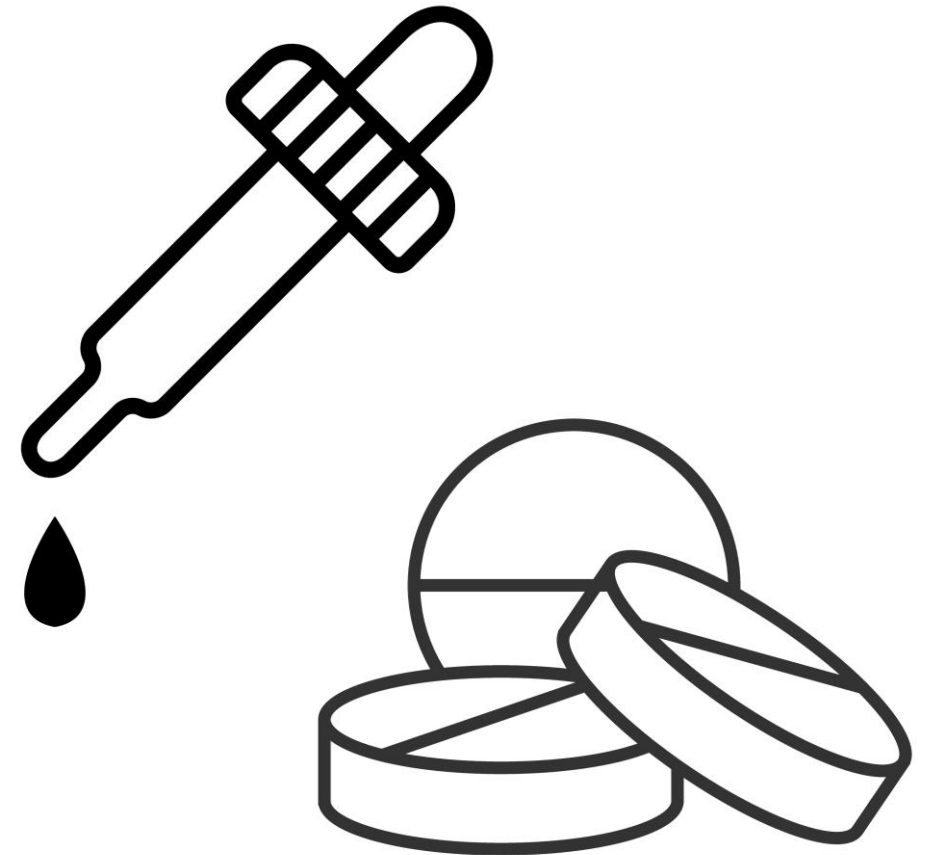
Susan C. Winckler, RPh, Esq.

CEO, Reagan-Udall Foundation for the FDA

Meeting Focus

This hybrid public meeting aims to gather information about the clinical use and safety of ***orally ingestible unapproved prescription fluoride drug products*** in children, such as drops and tablets. Some of these products have been used since the 1940s to prevent tooth decay in areas with low or no water fluoridation.

This meeting is ***not*** about adding fluoride to drinking water and is ***not*** a decision-making forum.



Housekeeping



Due to the meeting size, your microphone and video will remain off during the meeting



Please share your questions using the Zoom Q&A function



This public meeting is being recorded.

The slides, transcript, and video will be available at
www.ReaganUdall.org

Today's Agenda (Session 1)



9:30 am

Welcome

Susan C. Winckler, RPh, Esq., Reagan-Udall Foundation for the FDA

9:35 am

Opening Remarks

Jacqueline Corrigan-Curay, JD, MD, Center for Drug Evaluation and Research, FDA

9:45 am

Scope of Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride in Clinical Practice

Sally Greenberg, JD, Lived Parent Experience

James H. Bekker, DMD, University of Utah School of Dentistry

Bill Osmunson, DDS, MPH, Fluoride Action Network

Reactor Panel (30 mins)

Linda Birnbaum, PhD, DABT, ATS, University of North Carolina at Chapel Hill

David Krol, MD, MPH, FAAP, American Academy of Pediatrics representative

Scott Tomar, DMD, DrPH, University of Illinois Chicago College of Dentistry

10:45 am

Break

Today's Agenda (Session 2)



11am **Identifying Safety Concerns and Potential Risks Associated with the Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride**

Valerie Heaton, Lived Parent Experience

Jennifer Webster-Cyriaque, DDS, PhD, National Institutes of Health

Oral and Gut Microbiome

Gary Moran, BA (mod.), PhD, FTCD, Trinity College Dublin

Purnima Kumar, DDS, MDS, PhD, University of Michigan School of Dentistry

Neurocognitive

Griffin Cole, DDS, NMD, MIAOMT, International Academy of Oral Medicine and Toxicology

Jayanth Kumar, DDS, MPH, formerly at California Department of Public Health

Susan Fisher-Owens, MD, MPH, University of California San Francisco

Kyla Taylor, PhD, National Institutes of Health

Thyroid

Christine Till, PhD, C.Psych, York University

Kathleen Thiessen, PhD, Oak Ridge Center for Risk Analysis

Reactor Panel (30 min)

Bruce Lanphear, MD, MPH, Simon Fraser University

Charlotte W. Lewis, MD, MPH, University of Washington School of Medicine

1pm **LUNCH**

Today's Agenda (Session 3)



2pm

Public Comment on 4 Topics

- Clinical Use and Prescribing Considerations for Pediatric Tooth Decay Prevention
- Safety Concerns
- Appropriateness of Pediatric Use Considering Additional Sources of Exposure
- Impact of Removal of Orally Ingestible Unapproved Prescription Drug Products /Potential Alternatives

3:55 pm

Adjourn



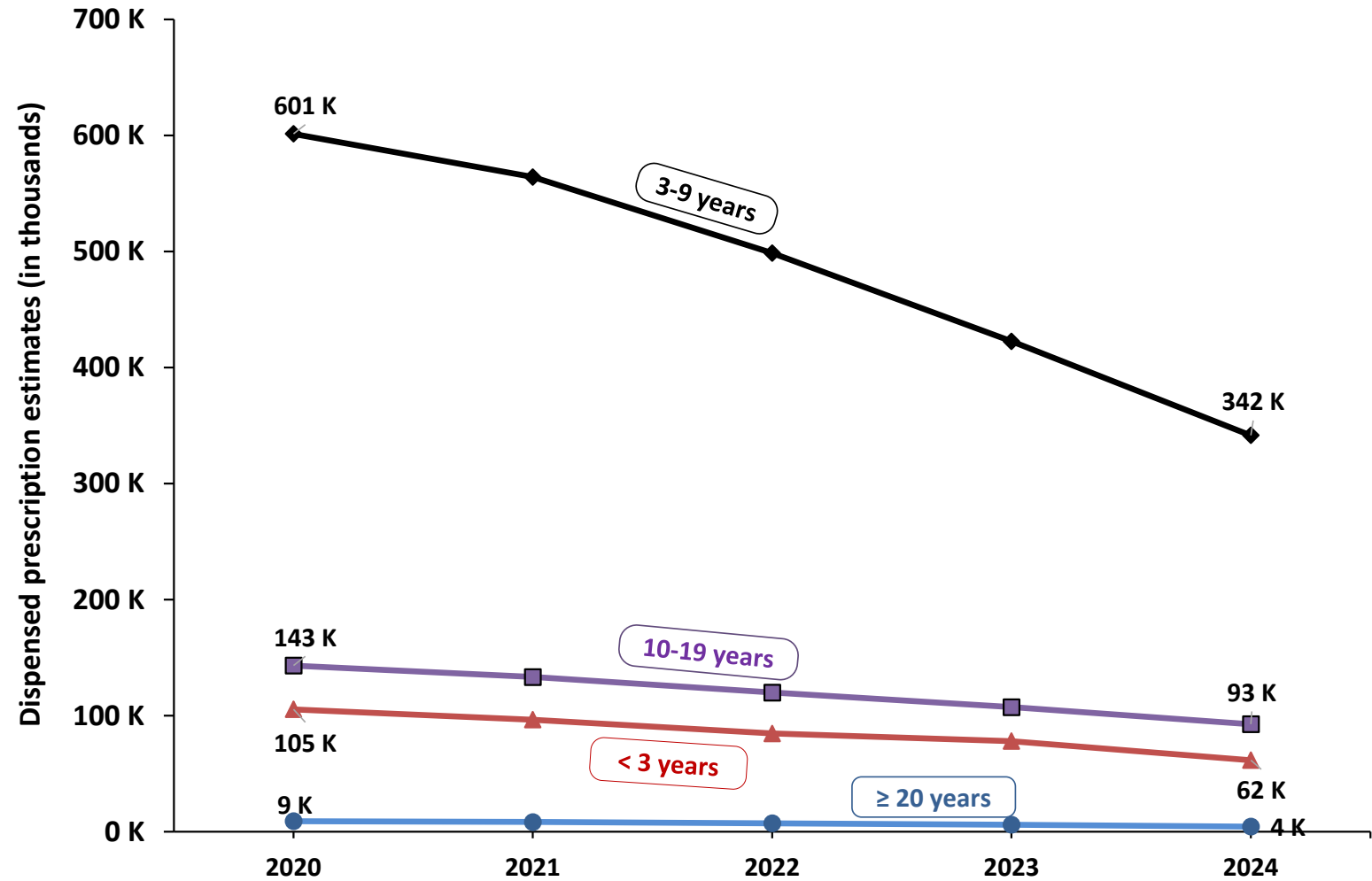
Opening Remarks

Jacqueline Corrigan-Curay, JD, MD

Principal Deputy Center Director,
Center for Drug Evaluation and
Research, FDA



Ingestible prescription sodium fluoride products have been largely dispensed to children



Nationally estimated number of prescriptions dispensed for ingestible prescription sodium fluoride products, by patient age, from U.S. outpatient pharmacies, 2020 – 2024. K represents thousands.

Data do not include products administered or provided in other settings of care (dental offices, clinics, hospitals), multi-ingredient dietary supplements, topical or dental sodium fluoride products (e.g., mouthwash, rinses, toothpaste).

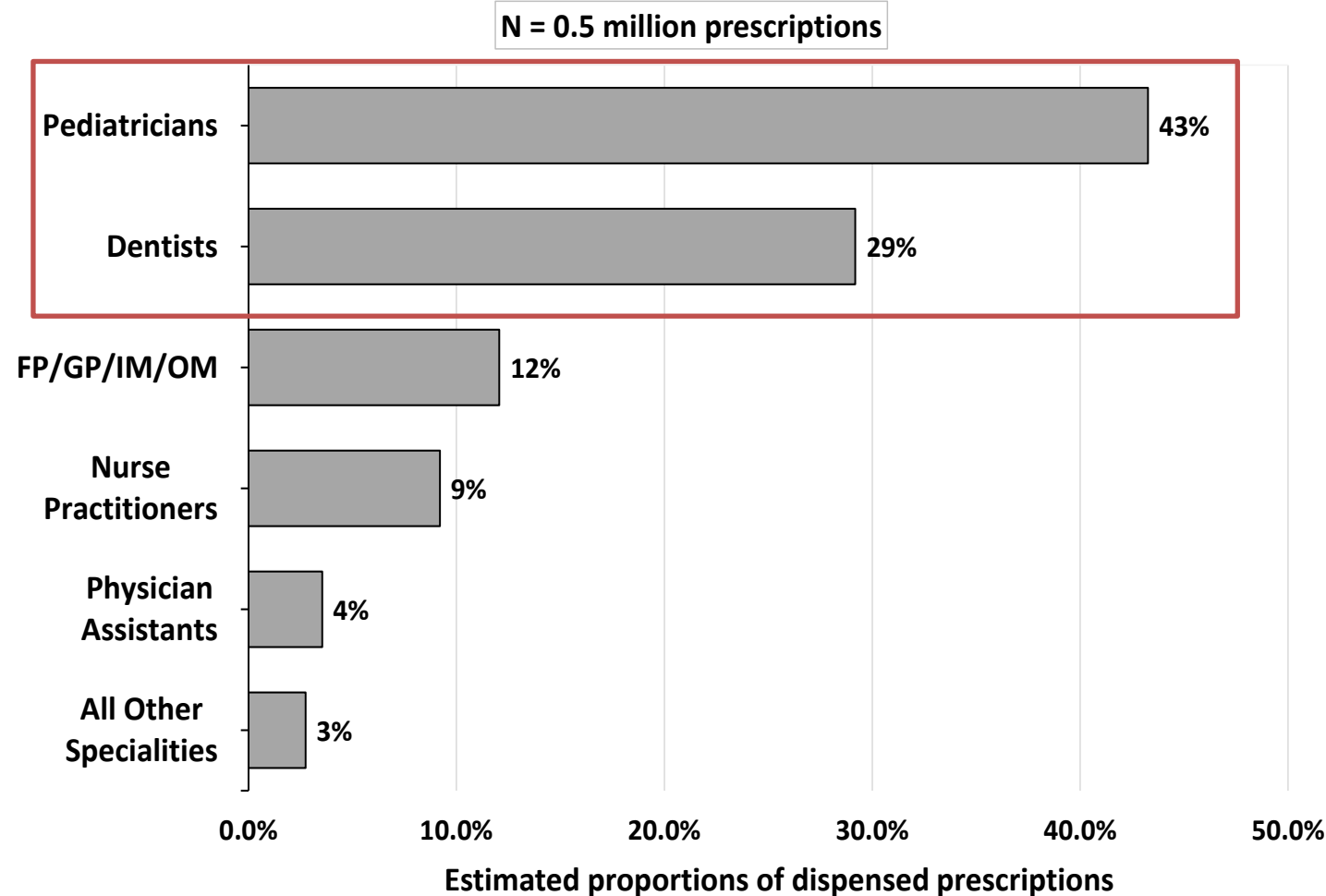
Data have not been age-adjusted for population estimates.

Source: IQVIA National Prescription Audit New to Brand™, time period 2020-2024, data extracted May 2025.

Preliminary Data Not for Distribution



Ingestible prescription sodium fluoride products were most frequently written by pediatricians and dentists in 2024



Nationally estimated proportions of prescriptions dispensed for ingestible sodium fluoride products, by prescriber specialties, from U.S. outpatient pharmacies, 2024

FP/GP/IM/OM represents family practice, general practice, internal medicine, osteopathic medicine.

Data do not include products administered or provided in other settings of care (dental offices, clinics, hospitals), multi-ingredient dietary supplements, topical or dental products (e.g., mouthwash, rinses, toothpaste).

Source: IQVIA National Prescription Audit New to Brand™, time period 2020-2024, data extracted May 2025.



U.S. FOOD & DRUG
ADMINISTRATION



Session 1: Scope of Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride in Clinical Practice

Sally Greenberg, JD

Lived Parent Experience

A Consumer/Mom Perspective on Fluoride Supplements

Sally Greenberg

Water Fluoridation is a Major Public Health Achievement

- Moms rely on the experts.
- When it comes to a kids' teeth, I look to groups like the American Dental Association, the American Academy of Pediatric Dentistry, the U.S. Preventive Services Task Force and professional medical associations which all support continued access to fluoride supplements where needed
- They agree that fluoridation is one of the most effective ways to prevent cavities for children, reducing tooth decay by 25%
- As a Mom, I worry that when community water fluoridation programs are threatened, for example, Florida and Utah, which have banned fluoride in drinking water, parents will need options like fluoride supplements
- In fact, my son was prescribed fluoride supplements when as a child because we lived for a time in a community without fluoridated water; there were no discernable negative effects on his gut or his brain, other than that he often doesn't call me back when I leave messages.
- So, as with my experience, communities that rely on bottled water or well water, fluoride supplements are a needed option.

My Family's Dental Health Story

- My Grandma Annie was born in Romania and raised in the Twin Cities before water fluoridation – she lost all of her teeth and wore dentures as far back as I can remember
- Both my parents, without early fluoridation, also despite brushing and flossing, lost most of their teeth by the time they reached 65 years old
- My dental health – with fluoridated water, is better than my parents but dental care wasn't as advanced as it is today. I confess to having a weakness for candy of all sorts, and that hasn't helped, but the good news is that I have all my teeth, albeit many crowns, root canals, and several implants
- My son - at 29 years old had the benefit of fluoridated water and advanced dental care; he has had two cavities total; I credit his dental health to fluoridated water and better dental care

Conclusion

Moms rely on professional medical associations and other experts, who agree that FDA should NOT withdraw fluoride supplements – the proposal is not backed by sufficient science, removes parental choice, and puts children who don't have access to water fluoridation at risk.

A Cautionary Tale





Session 1: Scope of Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride in Clinical Practice

James H. Bekker, DMD

University of Utah School of Dentistry

Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride in the Pediatric Population



James H. Bekker, DMD

Associate Dean of Professional, Community and Strategic Relations, University of Utah School of Dentistry (UUSOD)

Associate Professor, UUSOD

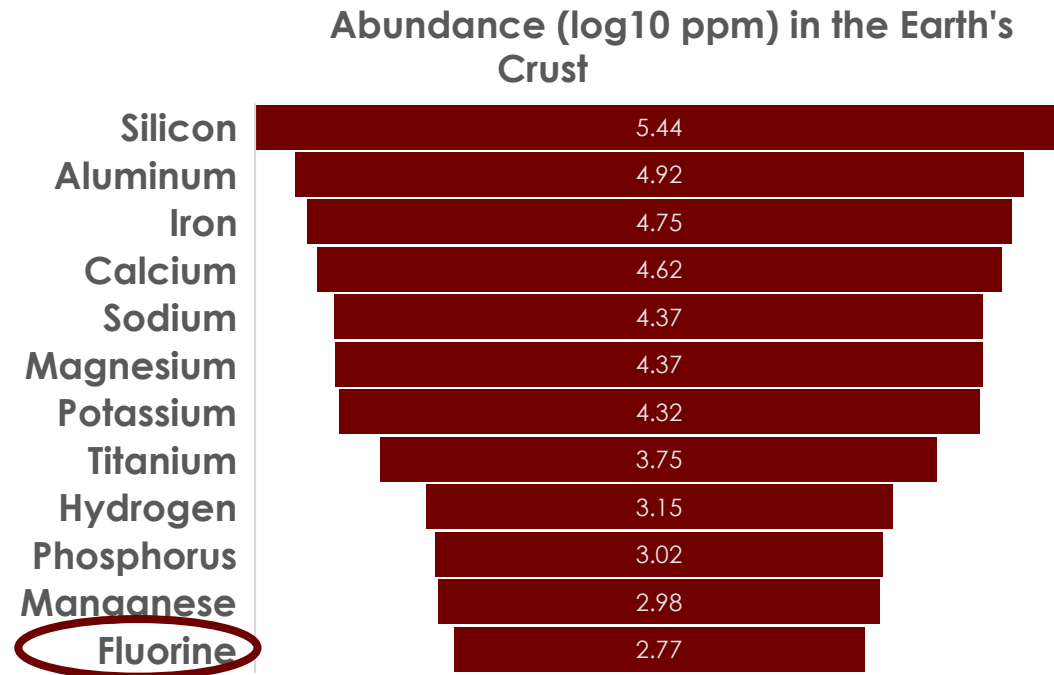
American Dental Association Delegate

Executive Board of Utah Dental Association, past President

Steering Committee for the Utah Oral Health Coalition, past Chairman

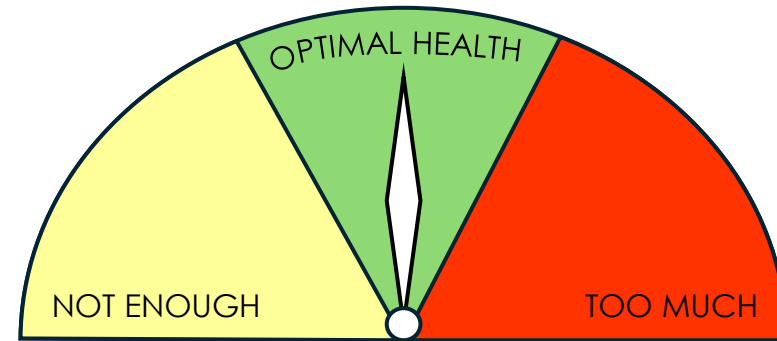
WHAT IS FLUORIDE?

- Fluoride is a naturally occurring nutrient that humans interact with every day



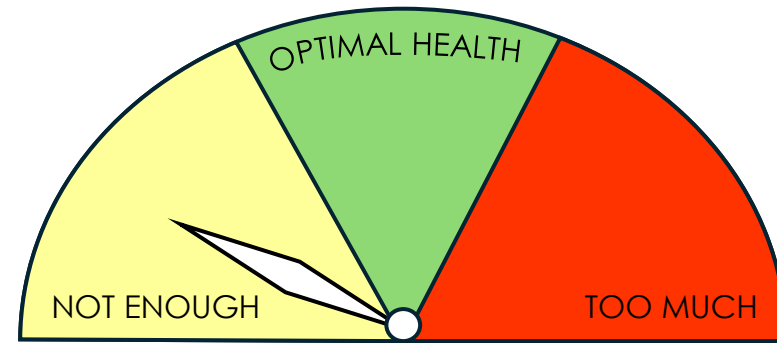
OPTIMAL FLUORIDE FOR HEALTH

- Like other nutrients, fluoride at optimal levels supports health



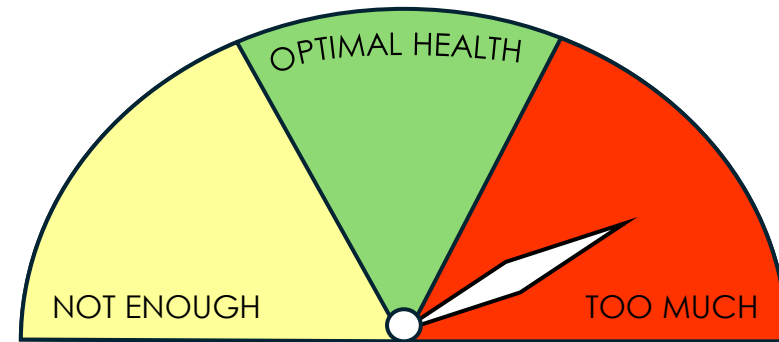
OPTIMAL FLUORIDE FOR HEALTH

- When fluoride is not present during development, it results in reduced tooth enamel strength and weaker bones



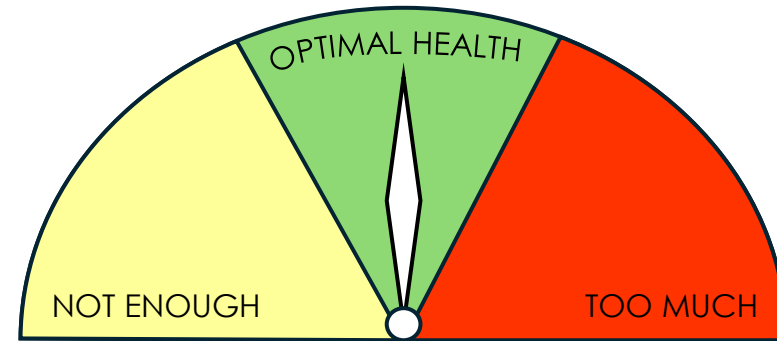
OPTIMAL FLUORIDE FOR HEALTH

- When exposure to fluoride exceeds optimal levels, it may have negative effects



INGESTIBLE FLUORIDE SUPPLEMENTS

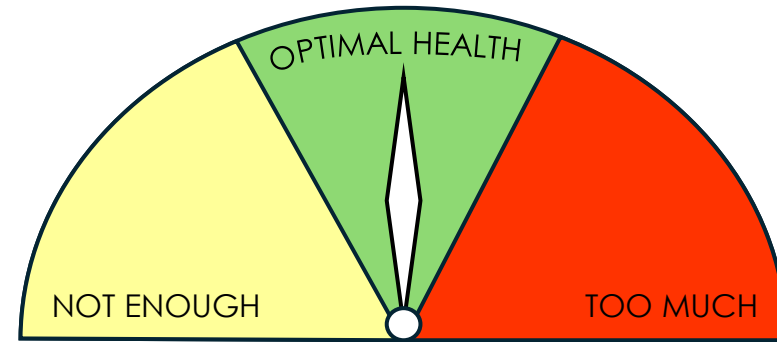
- Fluoride tablets or drops help us to achieve an optimal level of fluoride nutrition



- Optimal fluoride nutrition leads to stronger teeth and results in better oral health

PATIENT-PROVIDER CHOICE

- Providers work with patients to consider the need for supplementation
- Particularly important when community water fluoridation or naturally occurring fluoride is not present

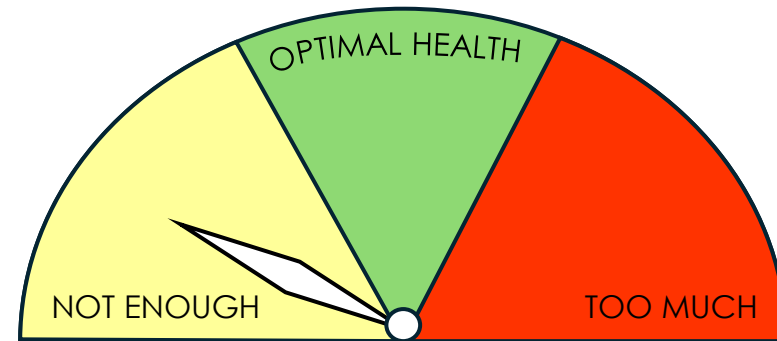


UTAH EXPERIENCE

- Recent legislation removed fluoride from all water systems
- Supplementation with ingestible fluoride was given as the alternative

SOCIETAL IMPACT OF REMOVING SUPPLEMENTAL FLUORIDE OPTIONS

- Increases in:
 - Tooth decay
 - Use of emergency services
 - Cost of care via more invasive dental procedures



ALTERNATIVES?

There are none.



Session 1: Scope of Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride in Clinical Practice

Bill Osmunson, DDS, MPH

Fluoride Action Network



“Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride in the Pediatric Population” 7/23/2025

Bill Osmunson DDS, MPH
Aesthetic, Comprehensive and
Neuromuscular Dentist, Retired,
Educator, Author, and Nutritionist
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A healthy person has
a thousand dreams

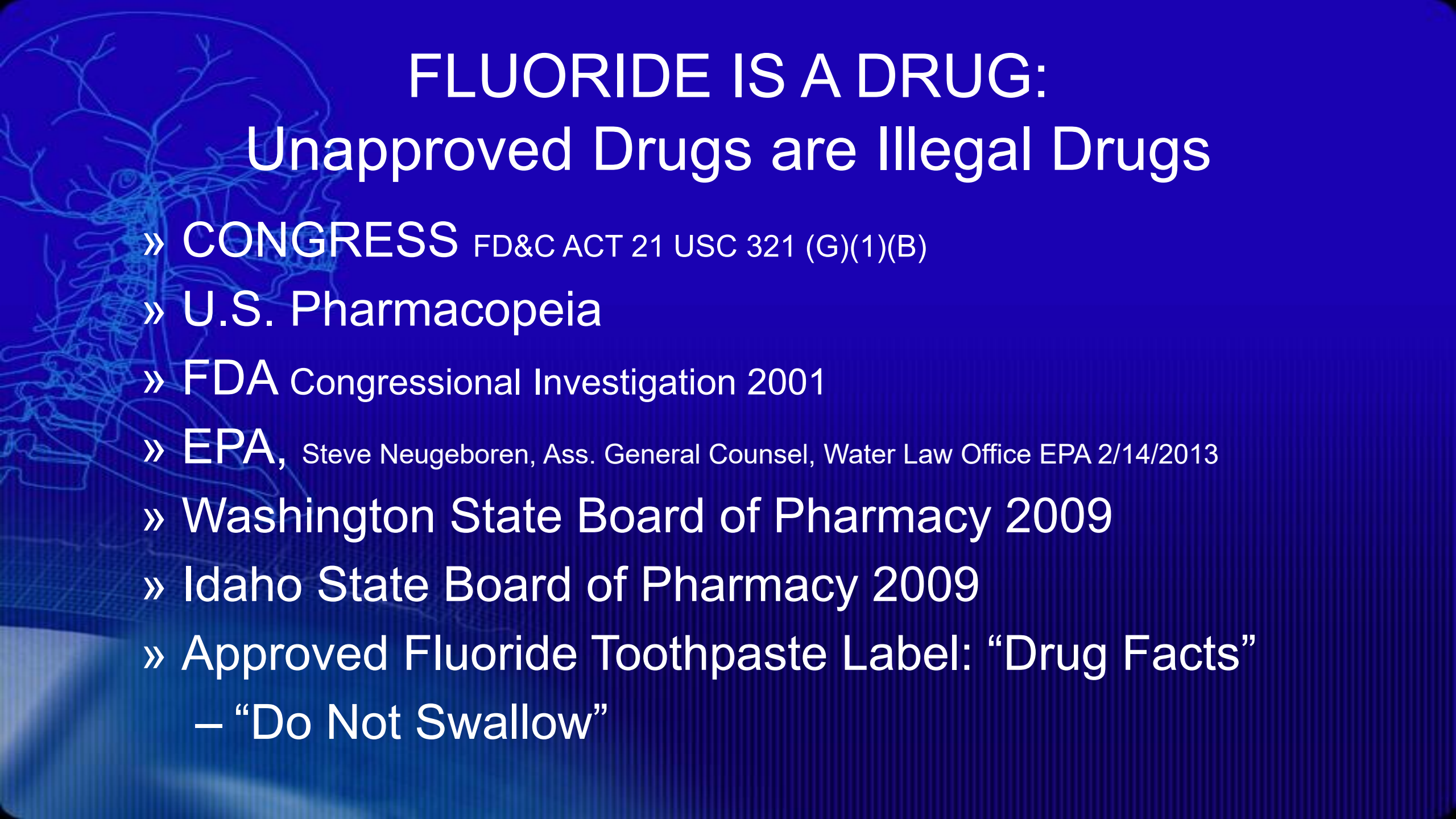
A sick person has one.



» <https://fluoridealert.org/content/u-s-regulatory-agencies-dont-know-safe-vs-toxic-level-of-fluoride-2/>

Sworn Depositions for TSCA Trial





FLUORIDE IS A DRUG:

Unapproved Drugs are Illegal Drugs

- » CONGRESS FD&C ACT 21 USC 321 (G)(1)(B)
- » U.S. Pharmacopeia
- » FDA Congressional Investigation 2001
- » EPA, Steve Neugeboren, Ass. General Counsel, Water Law Office EPA 2/14/2013
- » Washington State Board of Pharmacy 2009
- » Idaho State Board of Pharmacy 2009
- » Approved Fluoride Toothpaste Label: “Drug Facts”
 - “Do Not Swallow”

Warning Letters did Not Work

FDA Letter to 35 Companies DRUG THERAPY 1975

“...there is no substantial evidence of drug effectiveness as prescribed, recommended or suggested in its labeling. . . marketing is in violation of the new drug provisions of the Federal Food, Drug, and Cosmetic Act; they have, therefore, requested that marketing of these products be discontinued.”

FDA Warning letter to Kirkman Labs of 1/13/2016

“... FDA has determined that these products (fluoride drops, pills) are misbranded drugs in violation of section 502 and 503 of the Act [21 U.S.C. §§ 352 and 353], . . .”

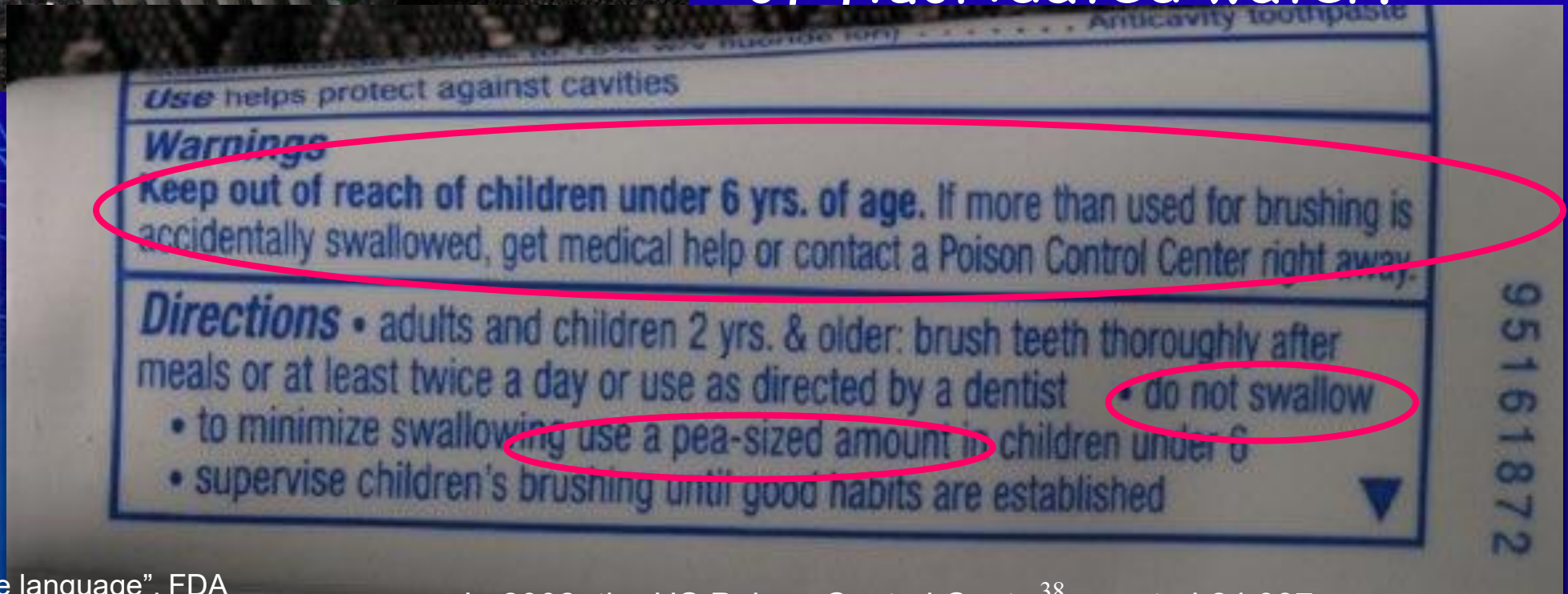
Ban Orally Ingestible Fluoride Drugs intended to prevent caries



FDA responded to the Washington State Board of Health if you apply for approval, fluoridation would be
“BANNED”.



A pea size of toothpaste has 0.25 mg of fluoride, the same as a fluoride pill Or on 11-oz glass of fluoridated water.

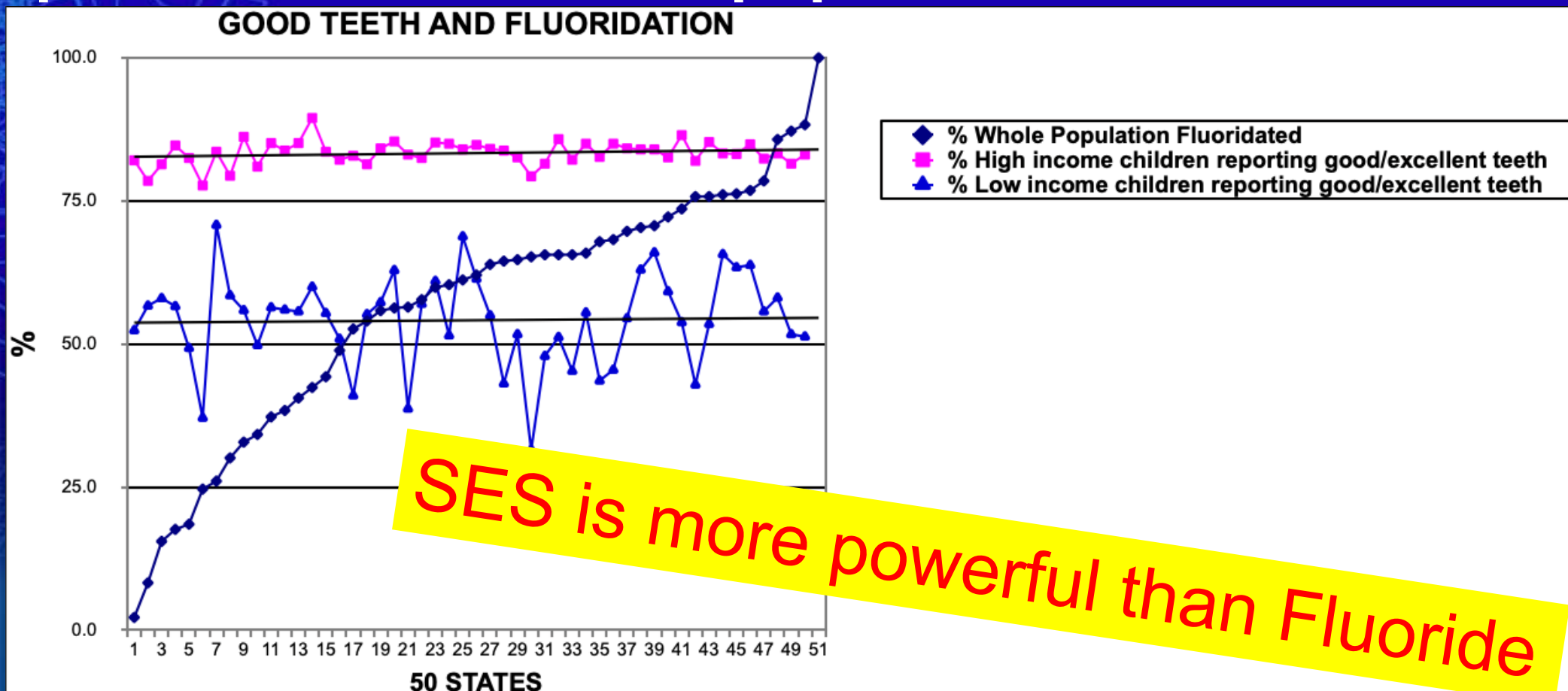


“Flexible language”, FDA

In 2002, the US Poison Control Centers³⁸ reported 24,087 exposures involving toothpaste with fluoride. emedicine

Low-income children experience higher rates of dental decay regardless of fluoridation. Vargas et al. (1998) & CDC NHANES 2011-2016

I plotted 50 states on % population on CWF (2008)



<http://mchb.hrsa.gov/oralhealth/portrait1.ccf.htm> National Survey of Children's Health.

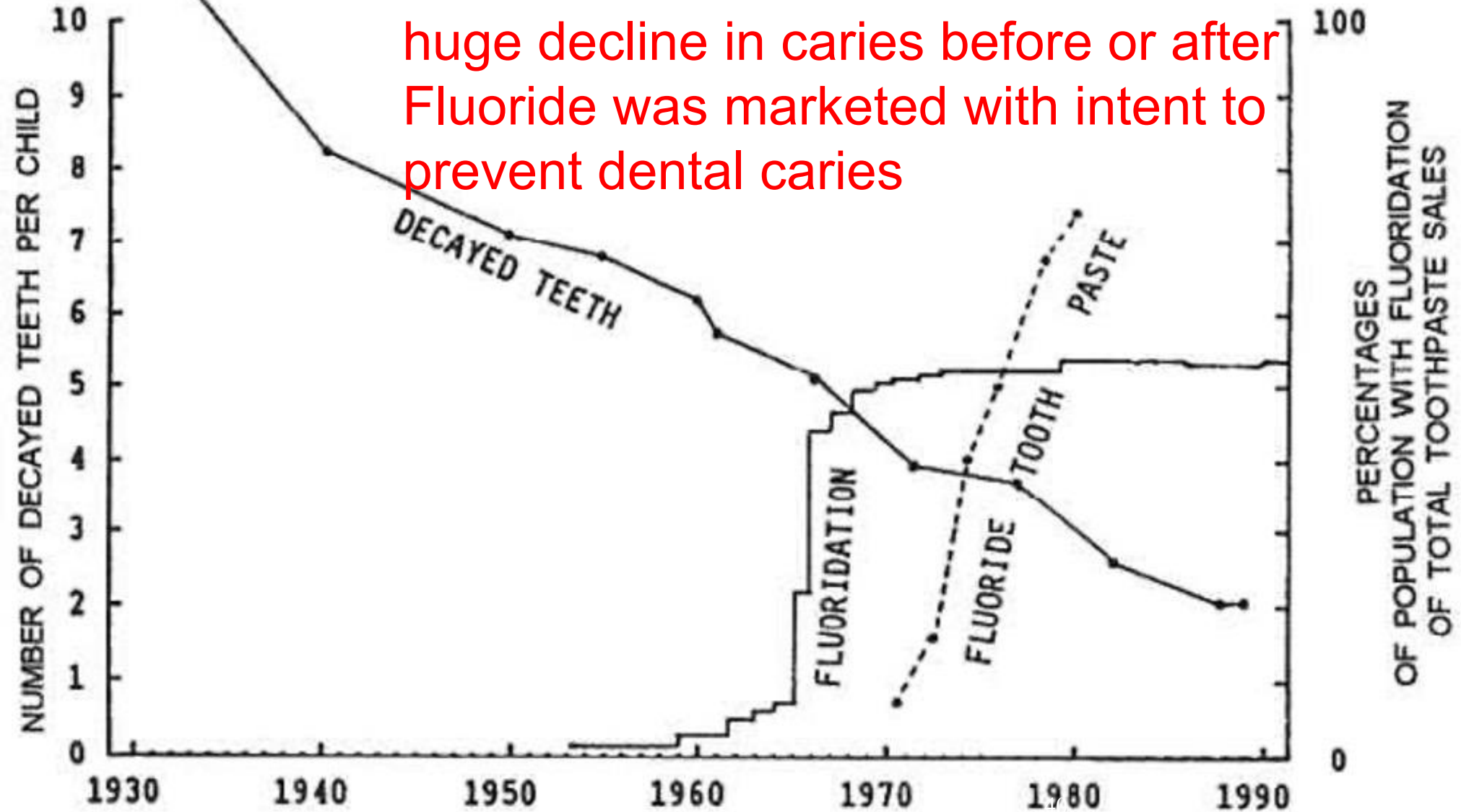
U.S. Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau.

The National Survey of Children's Health 2003. Rockville, Maryland: U.S. Department of Health and Human Services, 2005

http://www.cdc.gov/oralhealth/waterfluoridation/fact_sheets/states_stats2002.htm <http://pubs.usgs.gov/circ/2004/circ1268/htdocs/table05.html>

very little common cause variation

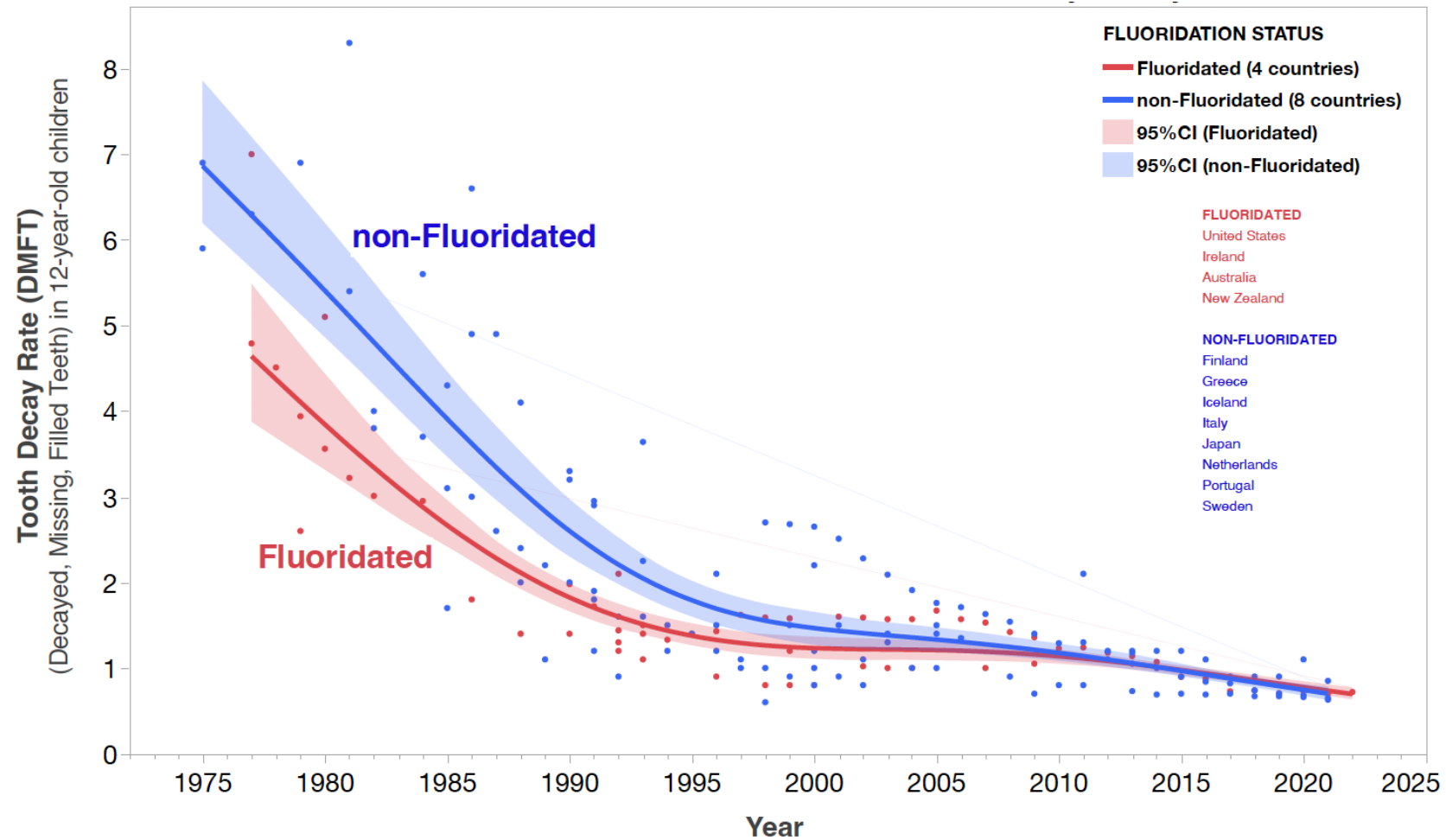
No one knows what caused the huge decline in caries before or after Fluoride was marketed with intent to prevent dental caries



World Health Organization (WHO) Data

Comparing Fluoridated and Non-Fluoridated Developed Nations

Average cavity rates in both declined dramatically and are now indistinguishable



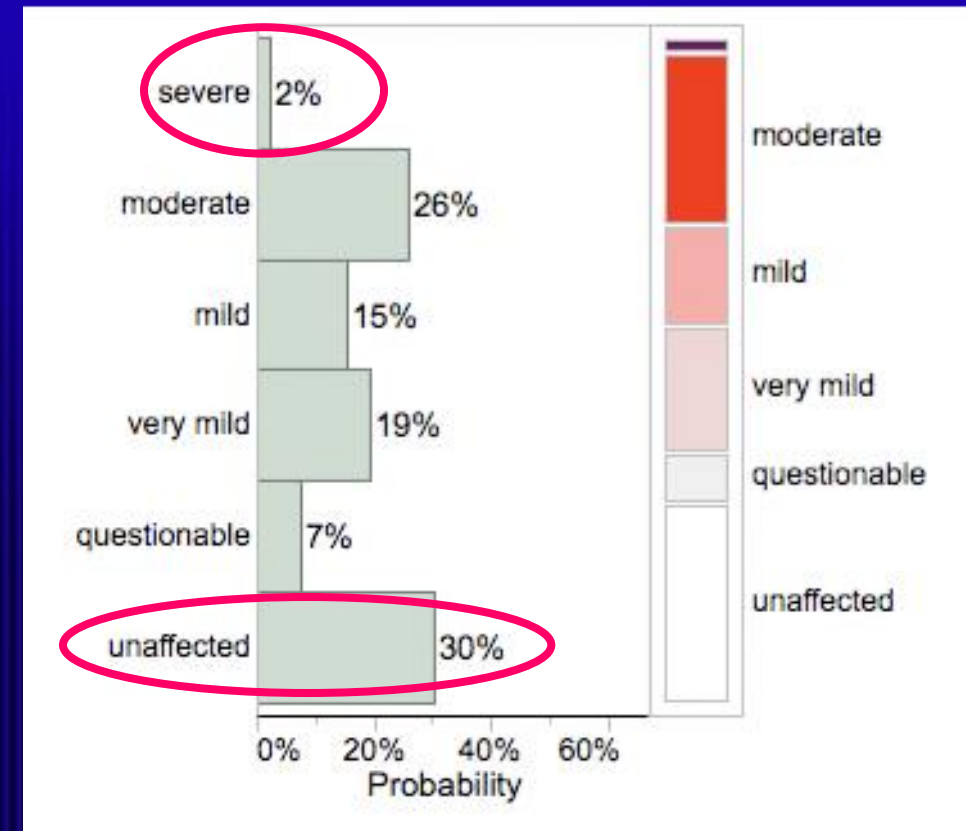
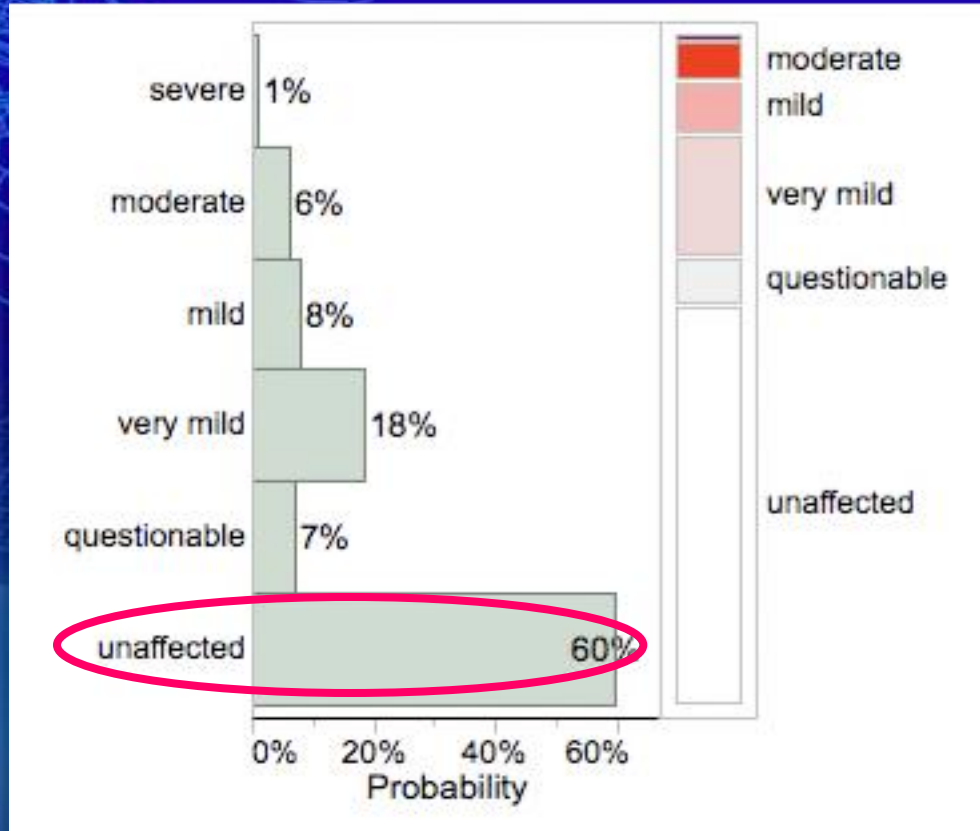
- WHO data available from: <https://capp.mau.se>
- The fluoridated nations have at least 60% of their populations with artificially fluoridated water while non-fluoridated nations have 0%.
- Non-fluoridated nations do not have significant sales of fluoridated salt.
- The large majority of countries in the world have no artificial fluoridation. Only 2% of the population of Europe has fluoridated water.

HUGE INCREASES IN DENTAL FLUOROSIS

If 1% have Severe DF \approx 2,200,000 in USA

40% of children , NHANES 2000

70% NHANES 2012



Most European dental associations no longer recommend fluoride supplements, along with IAOMT, AAEM, AAIM, and regulatory agencies and authorities in:

Austria REJECTED: "toxic fluorides" NOT added

Belgium REJECTED: encourages self-determination — those who want fluoride should get it themselves.

Finland STOPPED: "...do not favor or recommend fluoridation of drinking water. There are better ways of providing the fluoride." A recent study found ...["no indication of an increasing trend of caries...."](#)

Germany STOPPED: A recent study found [no evidence of an increasing trend of caries](#)

Denmark REJECTED: "...toxic fluorides have never been added to the public water supplies in Denmark."

Norway REJECTED: "...drinking water should not be fluoridated"

Sweden BANNED: "not allowed". No safety data available!

Netherlands REJECTED: Inevitably, whenever there is a court decision against fluoridation, the dental lobby pushes to have the judgment overturned on a technicality or they try to get the laws changed to legalize it. Their tactics didn't work in the vast majority of Europe.

Hungary STOPPED: for technical reasons in the '60s. However, despite technological advances, Hungary remains unfluoridated.

Japan REJECTED: "...may cause health problems...." The 0.8 -1.5 mg regulated level is for calcium-fluoride, not the hazardous waste by-product which is added with artificial fluoridation.

Israel SUSPENDED mandatory fluoridation until the issue is reexamined from all aspects.: June 21, 2006
"The labor, welfare and health Knesset committee" Maybe increase in costs?

China BANNED: "not allowed"

[British Columbia, Most of Canada--stopped](#)

[Over 150 cities in the USA—stopped or after review, rejected.](#)

[Growing number in Washington State have rejected or stopped fluoridation, 56% do not add fluoride, some natural CaF.](#)

JUDGMENT


» Certainty of Harm vs Certainty of Safety





Fluoride Ingestion Is Linked to Neurodevelopmental Harm

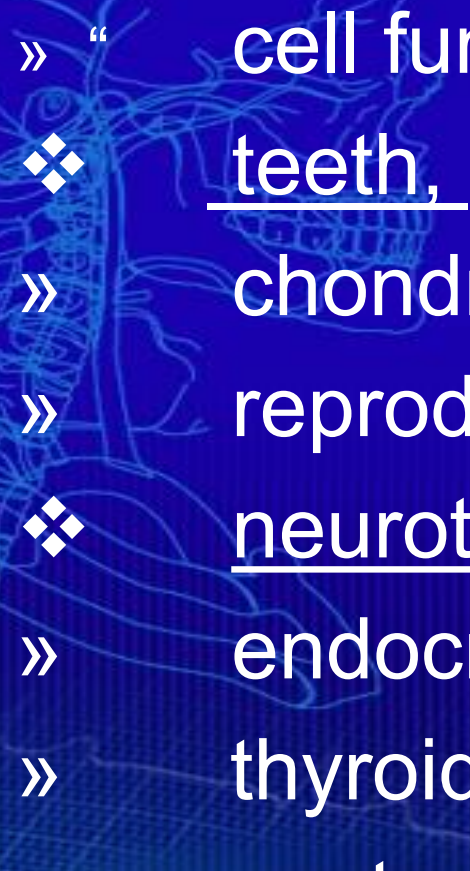
- **Green et al. (2019, JAMA Ped):** Maternal urinary fluoride levels correlated with lower IQ in male children with water fluoridation.
- **Till et al. (2020, Envi Int):** 3.7-point IQ decline per 0.5 mg/L increase in water fluoride.
- **Bashash et al. (2017, EHP):** 5–6 point drop in child IQ with higher maternal urinary fluoride in Mexico.
- **National Toxicology Program Monograph (2020), affirmed by NASEM (2023):** Concluded fluoride is “presumed to be a cognitive neurodevelopmental hazard to humans.”
- **Federal Court: (2024) CWF** is an unreasonable risk.



Lowering IQ lowers SES, fluoride ingestion may inadvertently **increase dental caries risk**, especially among the poor.

This creates a **self-reinforcing loop** in which the "solution" worsens the problem:

The NRC (2006) RISKS

- 
- » “ cell function (mitochondria),
 - ❖ teeth, skeleton, arthritis,
 - » chondrocyte metabolism,
 - » reproductive and developmental effects,
 - ❖ neurotoxicity, neurobehavioral effects,
 - » endocrine system,
 - » thyroid,
 - » gastrointestinal,
 - » renal, hepatic, and immune systems,
 - » genotoxicity, and carcinogenicity.

Molecular Mechanism of Fluoride-Induced Toxicity and Associated Health Hazards. Chauhan (2025)

https://link.springer.com/chapter/10.1007/978-3-031-77247-4_5

- » *“Fluoride toxicity: oxidative stress, upregulates hormonal mechanisms, causing hormonal disruption. . . bone deformity . . . dental fluorosis, Skeletal fluorosis . . . bone and joint abnormalities. . . hampers ATP formation . . . alters metabolic and reproductive hormones, . . . impaired spermatogenesis, . . . reduced sperm quality, and infertility. . . liver damage. . . genetic damage to DNA, IQ deficits, and increased risk of developmental abnormalities. Neurological impacts involve structural changes in the brain, memory issues, and neuronal loss. . . affects cellular organelles, inducing oxidative stress, apoptosis, and disrupting hormonal balance . . . transcription factors, and protein synthesis. It alters different genes implicated in bone metabolism, hormone signaling, and immune function, which leads to harmful impacts of fluoride on human health.”*

Session 1 Reactor Panel



**Linda Birnbaum,
PhD, DABT, ATS**

*University of North Carolina
at Chapel Hill*



**David Krol,
MD, MPH, FAAP**

*American Academy of Pediatrics
representative*



**Scott Tomar,
DMD, DrPH**

*University of Illinois Chicago
College of Dentistry*

BREAK

A medical professional in a white coat with a stethoscope is shown from the chest up. Overlaid on the image is a network diagram with a central hub and several peripheral nodes, each containing a medical icon: a heart with an ECG line, a syringe, a clipboard, a shield with a cross, a person, a flask, a microscope, and an ambulance.

The meeting will resume at 11am ET





Session 2: Identifying Safety Concerns and Potential Risks Associated with the Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride

Valerie Heaton

Lived Parent Experience



Session 2: Identifying Safety Concerns and Potential Risks Associated with the Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride

Jennifer Webster-Cyriaque, DDS, PhD

National Institutes of Health

PENDING WEBSTER-CYRIAQUE SLIDES

Session 2: Oral and Gut Microbiome

Identifying Safety Concerns and Potential Risks Associated with the Use of
Orally Ingestible Unapproved Prescription Drug Products Containing
Fluoride

Purnima Kumar, BDS, MDS, PhD

University of Michigan School of Dentistry



Identifying Safety Concerns and Potential Risks Associated with the Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride

Fluoride and the gut microbiome

Purnima Kumar BDS, MDS, PhD

William and Mary K. Najjar Endowed Professor

Chair, Department of Periodontics, Oral Medicine and Dental Hygiene

University of Michigan

kpurnima@umich.edu

None pertinent to this presentation or
panel discussion



The microbiome: What is it?

The collective community of microorganisms that reside in a specific environment, their genes, interactions, and the products they produce.

Soil

microbiome

Water

microbiome

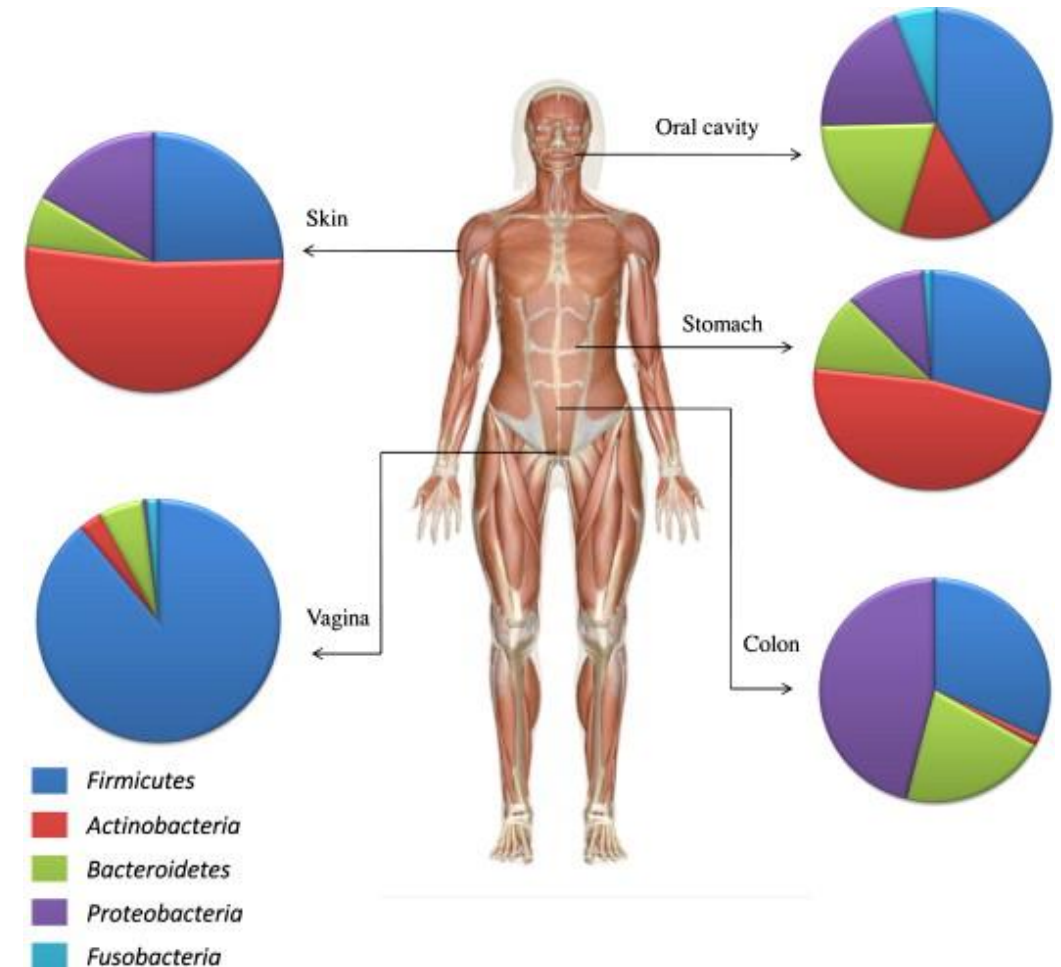
Termite

microbiome

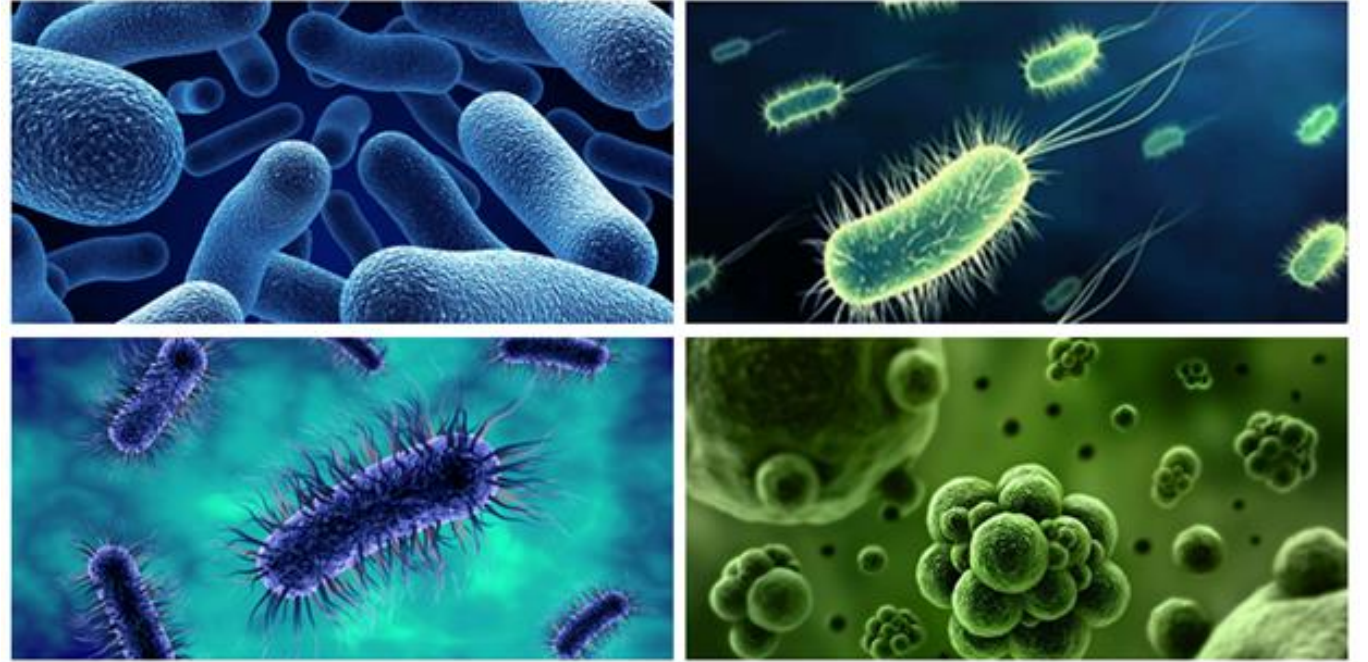
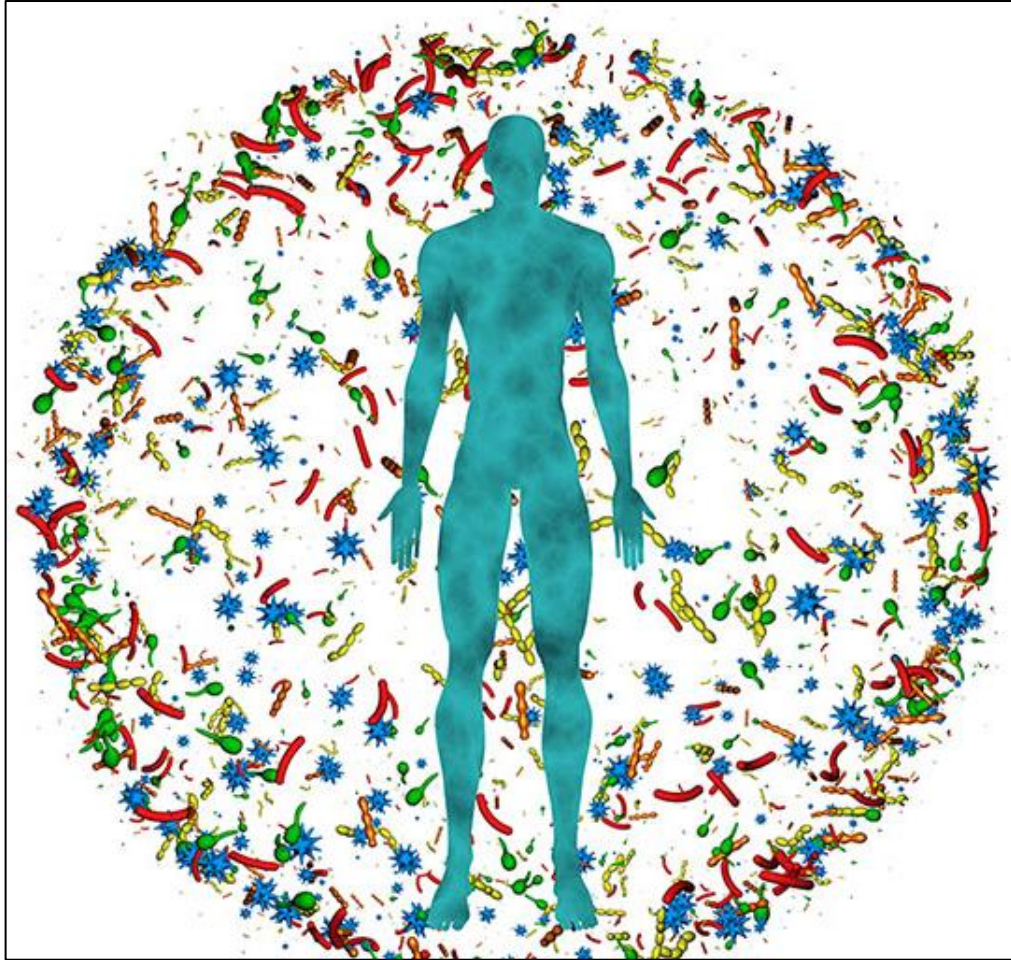
Human



microbiome



Micro-organisms

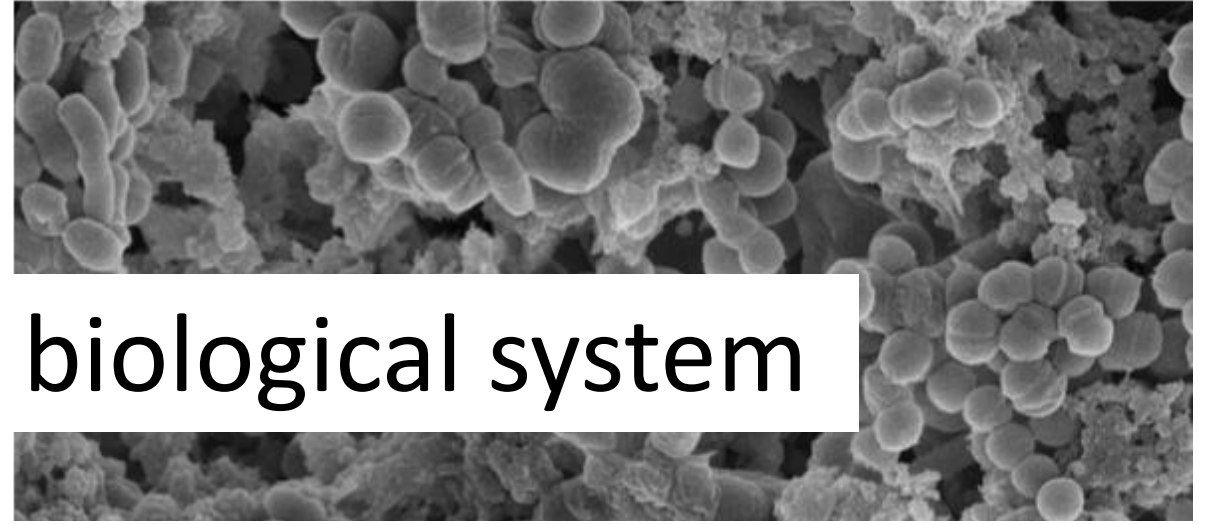
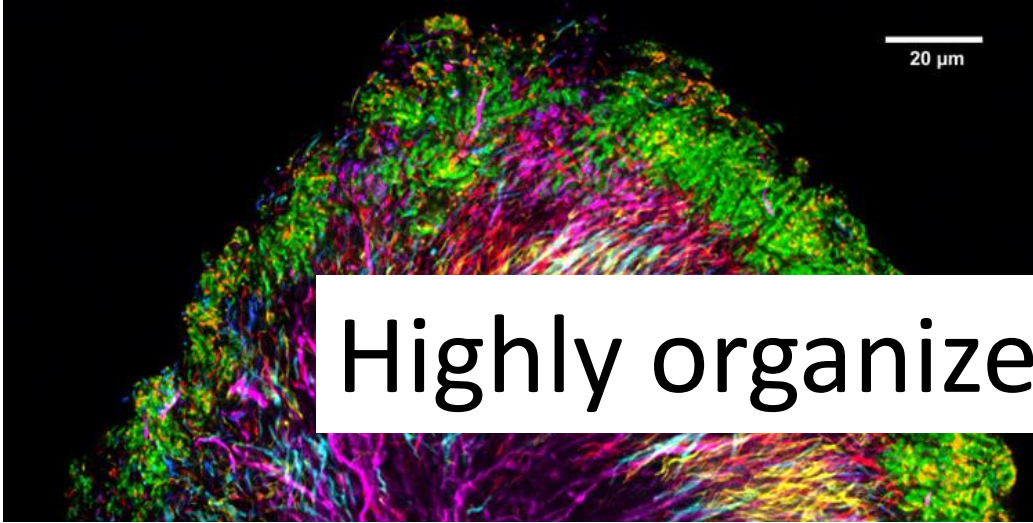


www.microb
ewiki



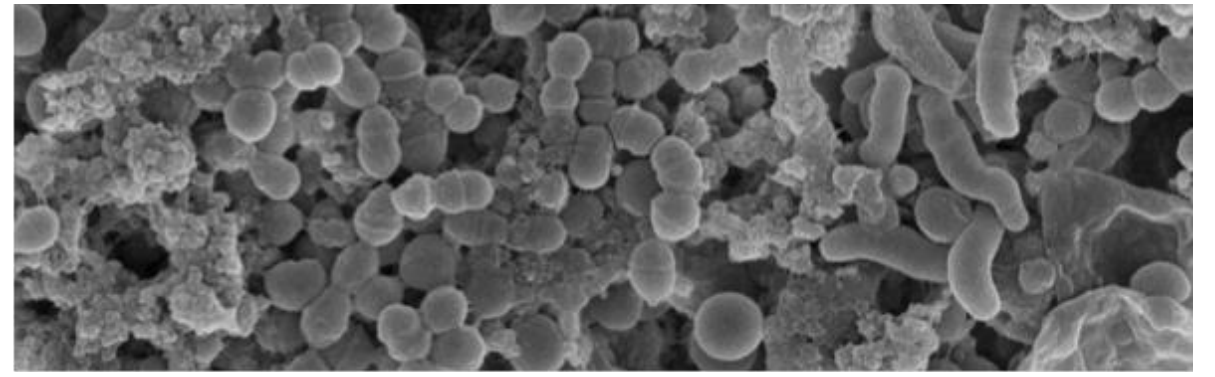
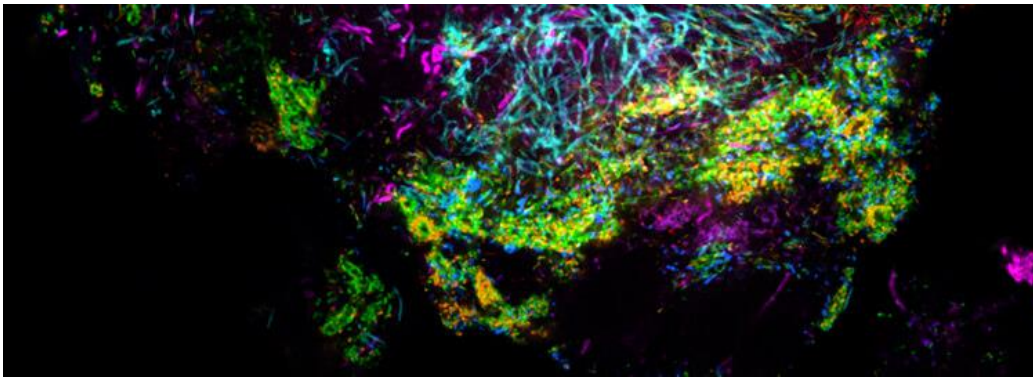
<https://www.niehs.nih.gov>

Microbiome: The super-organism in/on you



Highly organized biological system

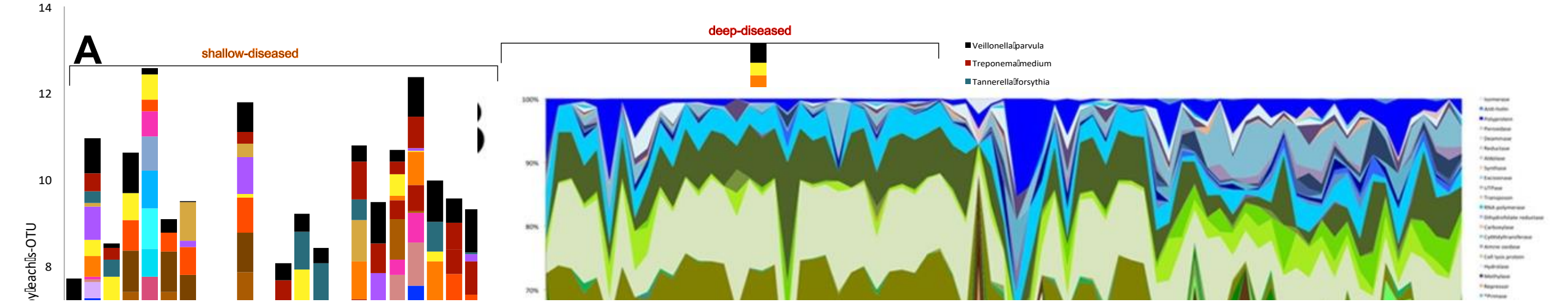
Structurally and metabolically cooperative communities



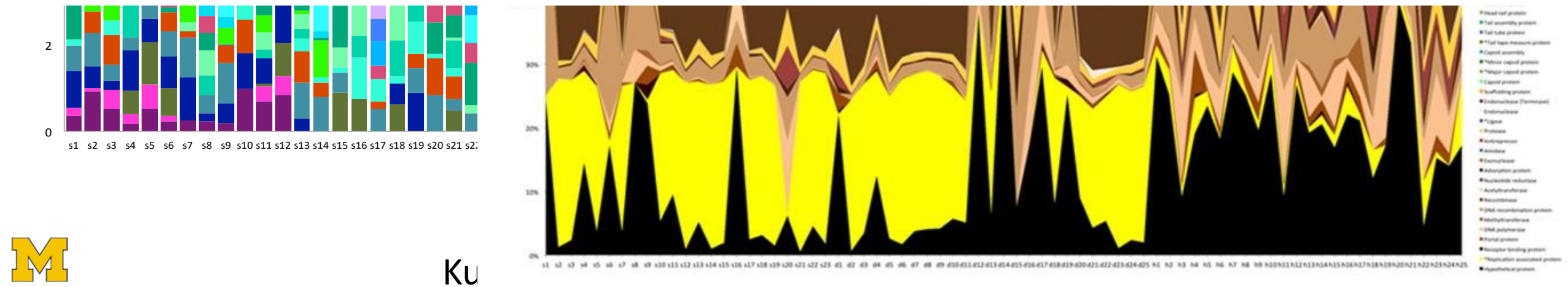
BorisyLab, ADA-Forsyth Institute

Kumar Lab, University of Michigan

Microbiome: The super-organism in/on you



Multi-kingdom communities (bacteria, fungi, virus)
Inter-kingdom interactions drive health or disease



Lessons from antibiotic sensitivity testing

nature reviews microbiology

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[Oana Ciofu](#) , [Claus Moser](#), [Peter Østrup Jensen](#) & [Niels Høiby](#)

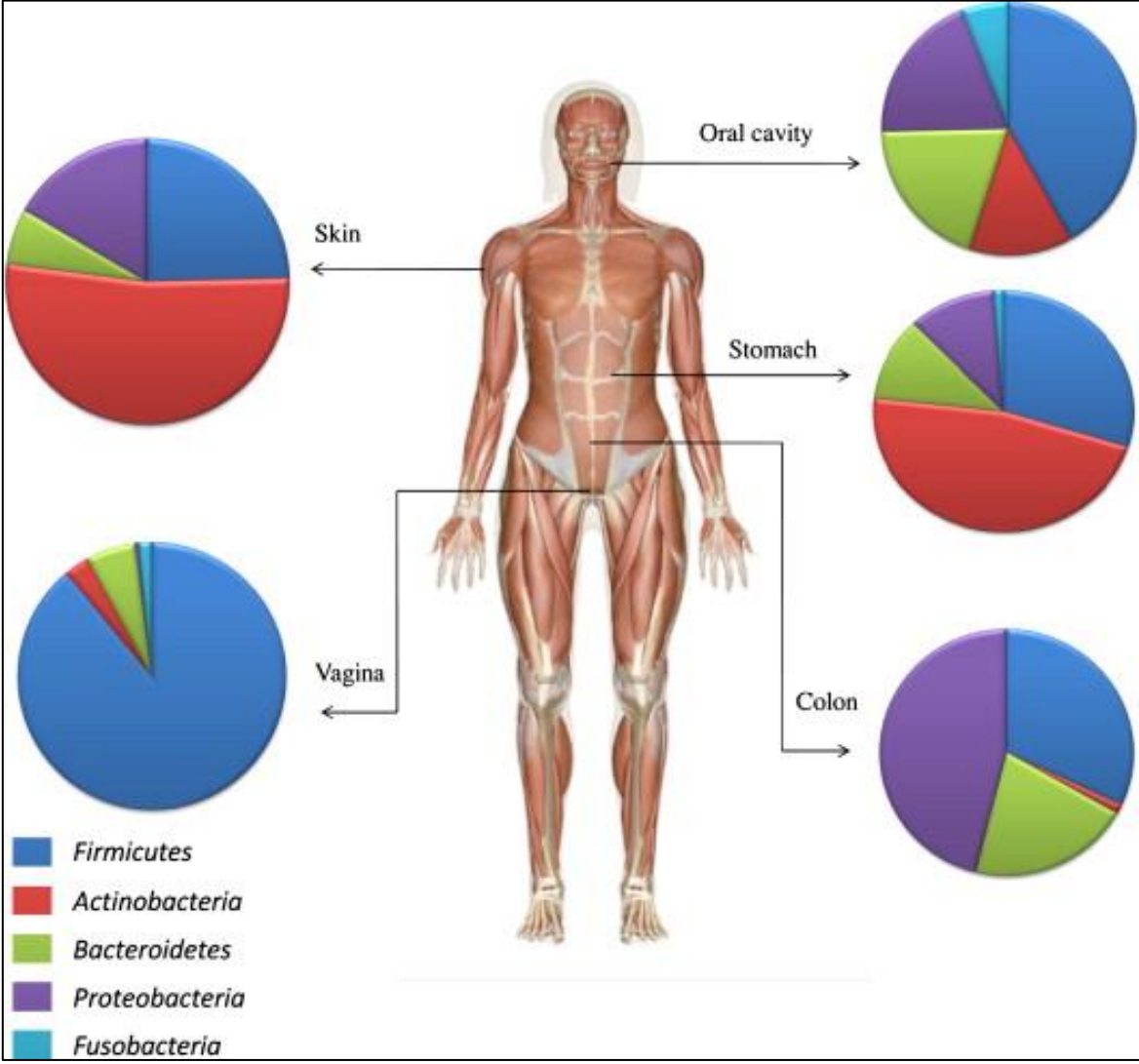
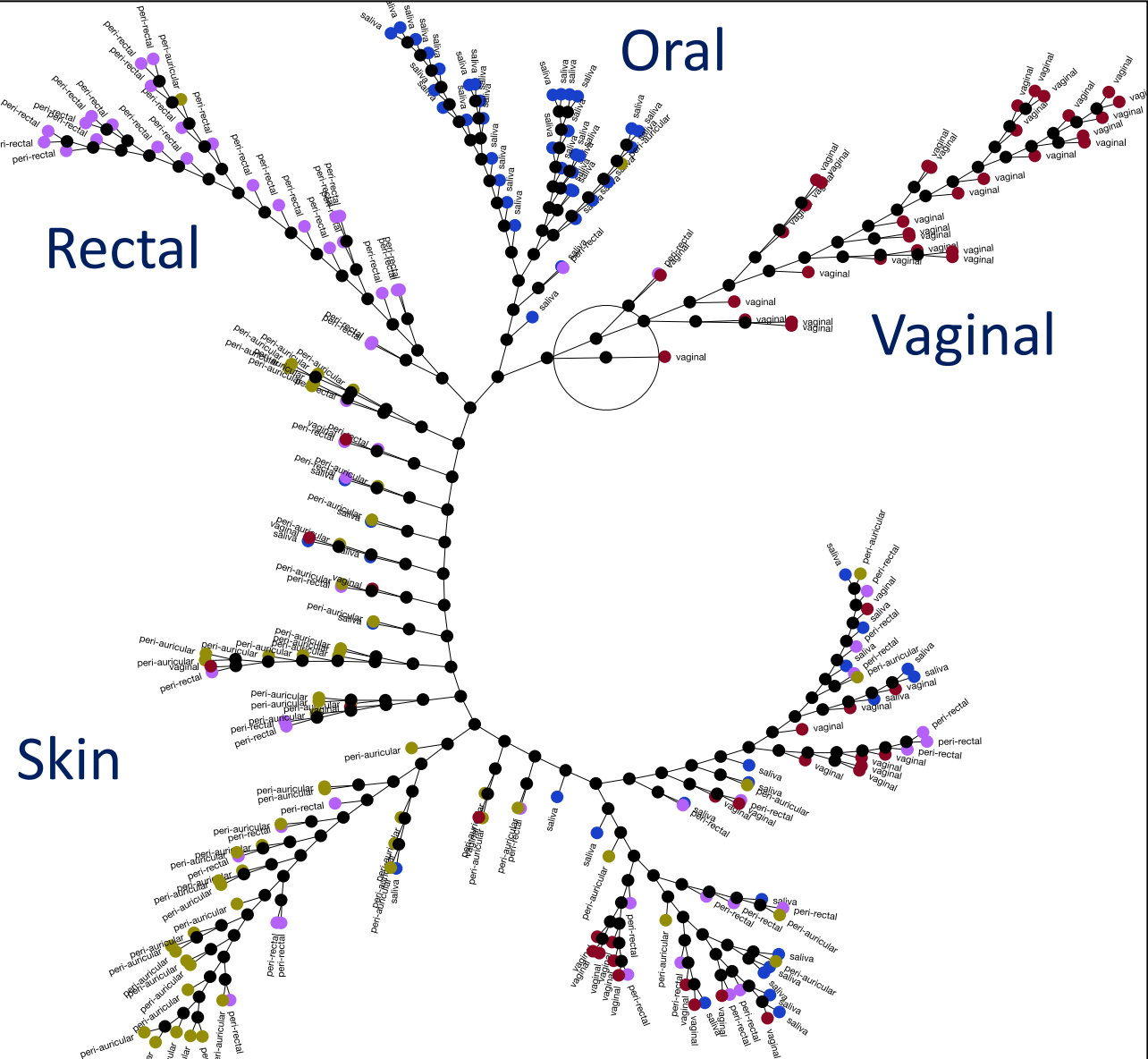


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Microbiome = ecosystem



Microbiome physiology is habitat-specific



Microbiome physiology is habitat-specific

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Journal of
PERIODONTAL RESEARCH

SCFA in gut= Health
SCFA in mouth=Disease

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Review Article | Published: 11 August 2015

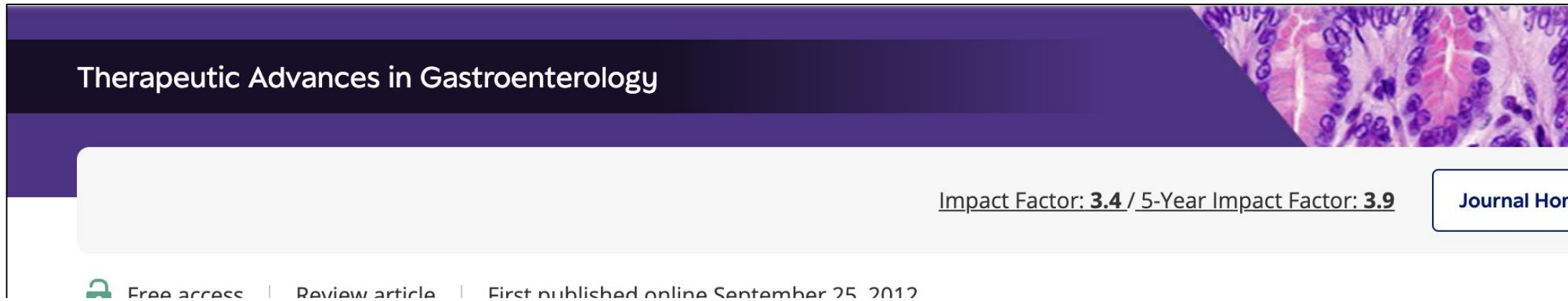
Short-chain fatty acids in control of body weight and insulin sensitivity

[Emanuel E. Canfora](#), [Johan W. Jocken](#) & [Ellen E. Blaak](#) 

[Nature Reviews Endocrinology](#) **11**, 577–591 (2015) | [Cite this article](#)

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Microbiome physiology is habitat-specific



Probiotics in gut= Work
Probiotics in mouth=?

tion and neuromodulation

[Home](#) > [Current Oral Health Reports](#)

Use of Probiotics

Epidemiology (M Laine, Section Editor) | [Open access](#) | Published: 19 October 2017

Volume 4, pages 309–318, (2017) [Cite this article](#)



[Current Oral Health Reports](#)

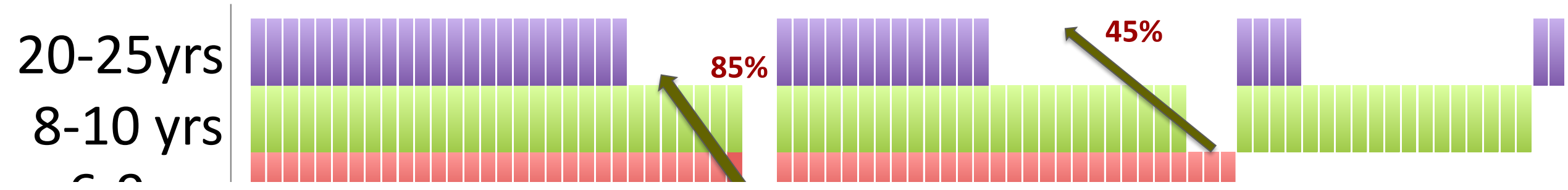
[Aims and scope](#) →

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Foundations of healthy adult microbiome established early in life



Pioneer species are key to long-term health

Streptococcus_HOT.06,
Streptococcus_oligofermentan
Streptococcus_miti
Streptococcus_orali
Streptococcus_parasanguini
Streptococcus_austali
Streptococcus_pneumoniae
Veillonella_parvuli
Veillonella_atypici
Gemella_haemolysan
Granulicatella_adiacen
Streptococcus_infanti
Streptococcus_HOT.07
Streptococcus_HOT.48
Gemella_morbillo
Streptococcus_HOT.05
Veillonella_dispa
Streptococcus_sobrinu
Streptococcus_HOT.48
Streptococcus_HOT.43
Streptococcus_sanguini
Streptococcus_cristatu
Gemella_sanguini
Streptococcus_pyogene
Streptococcus_HOT.07
Streptococcus_salivariu
Streptococcus_HOT.06
Streptococcus_intermediu
Streptococcus_vestibulari
Veillonella_HOT.78
Streptococcus_HOT.05
Veillonella_denticarios
Lautropia_mirabili
Neisseria_sicci
Rothia_dentocarios
Fusobacterium_nucleatun
Haemophilus_parainfluenzae
Terrahaemophilus_aromaticivoran
Neisseria_HOT.49
Neisseria_weaver
Streptococcus_HOT.06
Rothia_aeri
Neisseria_gonorrhoeae
Abiotrophia_defectiva
Leptotrichia_hongkongensi
Neisseria_elongati
Porphyromonas_HOT.27
Capnocytophaga_sputigeni
Kingella_orali
Capnocytophaga_gingivali
Rothia_mucilaginosa
Haemophilus_haemolyticu
Granulicatella_elegan
Kingella_dentrifican
Streptococcus_HOT.06
Neisseria_subflavi
Neisseria_meningitidis
Leptotrichia_HOT.21
Streptococcus_HOT.06
Actinomyces_HOT.18
Streptococcus_perori
Streptococcus_gordonii
Corynebacterium_matruchoi
Actinomyces_HOT.17
Leptotrichia_buccali
Veillonella_rogosai
Capnocytophaga_leadbetter
Streptococcus_downei
Lachnoanaerobaculum_umeaensis
Streptococcus_HOT.07
Leptotrichia_HOT.22
Actinomyces_HOT.17
Haemophilus_HOT.03
Neisseria_flav
Eikenella_corrodens
Streptococcus_HOT.05
Fusobacterium_periodonticum
Aggregatibacter_HOT.51
Actinomyces_naeslundii
Corynebacterium_durum



How does fluoride benefit the **oral** microbiome?

- Interferes with enzymes involved in glycolysis, preventing bacterial energy production
- Inhibits the growth of caries-causing bacteria like *Streptococcus mutans*
- Affects the structure and composition of dental biofilms, making it difficult for pathogen colonization
- Unlike antibiotics, fluoride does not indiscriminately kill good bacteria with bad
- Reduces synergy between cariogenic bacteria and oral fungi

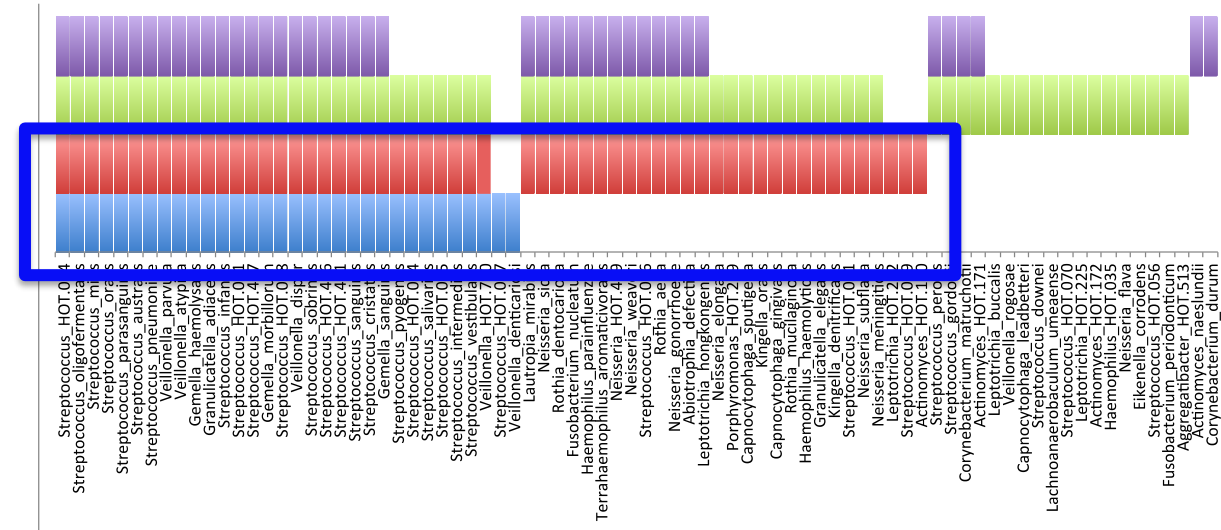


Does fluoride impact the **gut** microbiome?

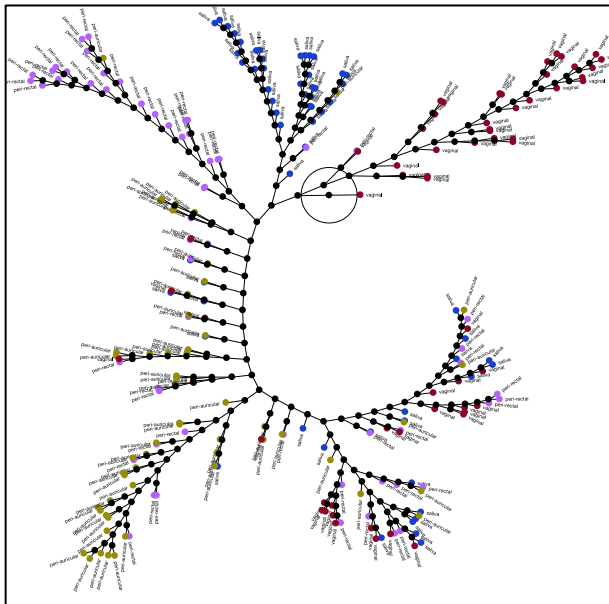
- **Limited/positive** impact on gut biome in **physiologic** doses (Yasuda 2017, Chen 2020)
- Three human studies (all using **fluorosis** model)
 - Coal-fire-pollution related fluorosis in China (Wang 2023)
 - ❖ 32 adults
 - ❖ 745/ 14,199 OTUs differed between groups
 - Coal-fire-pollution related fluorosis in China (Zhou 2023)
 - ❖ 9 children
 - ❖ 15/158 genera differed
 - Adults with early skeletal fluorosis in Pakistan (Bibi et al 2024)
 - ❖ 70 adults (Urban controls and rural fluorosis subjects)
 - ❖ “Dysbiosis or changes were subtle”



Conclusions



Fluoride helps your pioneer species be better “mouthguards”



Habitat-specificity dictates that the gut and oral microbiomes respond differently

Conclusions



Fluoride in low levels has limited impact on gut microbiome



Only reported effects are on subjects with extreme fluoride exposure

Conclusions

- Major methodological limitations in current studies
 - Micro-organisms rather than microbiome
 - Fluorosis model represents extremes of fluoride exposure
 - Very poorly defined fluoride exposure or QofL
 - Many confounding factors (wood burning creates many other pollutants, not just fluorides) that do not explain fluoride as the discriminating factor
 - Poorly controlled groups, small sample sizes
- Fluoride benefits many individuals with poor access to oral healthcare
- Fluoride benefits individuals with restricted motor function
- Provides parents with choices for their children
- Evidence does not support detrimental effects on the gut microbiome



Thank you

kpurnima@umich.edu

Purnima Kumar BDS, MDS, PhD

William and Mary K. Najjar Endowed Professor

Chair, Department of Periodontics, Oral Medicine and Dental Hygiene

University of Michigan





Session 2: Oral and Gut Microbiome
Identifying Safety Concerns and Potential
Risks Associated with the Use of Orally
Ingestible Unapproved Prescription Drug
Products Containing Fluoride

Gary Moran, BA (mod.), PhD, FTCD

Trinity College Dublin



Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin



Identifying Safety Concerns and Potential Risks Associated with the Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride – Gut Microbiome

Prof. Gary P. Moran

School of Dental Science, Trinity College Dublin
& Dublin Dental University Hospital

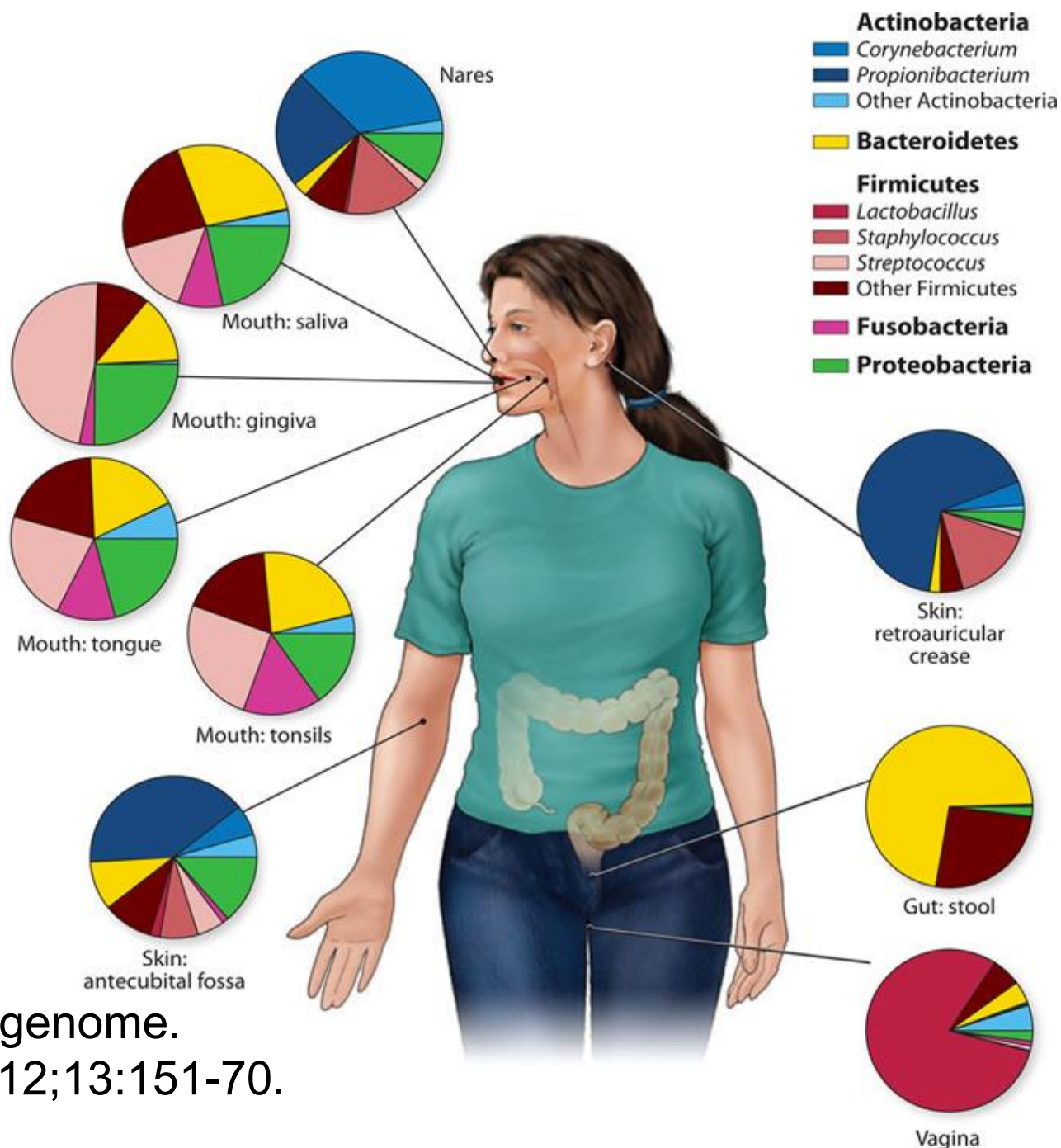
Disclosures

No financial interests in fluoride related products

Member of the Expert Body on Fluorides and Health (Ireland)



NIH HUMAN MICROBIOME PROJECT



The human microbiome: our second genome.
Annu Rev Genomics Hum Genet. 2012;13:151-70.

100 TRILLION

The human microbiome is made up of more than 100 trillion bacteria, fungi, protozoa, and viruses that live on and inside the body.

10X



We have 10 times more microbial cells in our body than human cells and the majority live in our guts—especially the large intestine, or colon.

The bacteria in our microbiomes are essential to human health and aid in biological processes such as:

$E=mc^2$

Extracting
energy from
food

RETINOL
FOLATE
RIBOFLAVIN
BIOTIN
NIACIN

Producing
essential
vitamins



Regulating
our immune
system



Regulating our
glucose levels
and metabolism



Protecting us
against disease-
causing microbes

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Protecting us
against disease-
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Disruption in infancy: allergic disease, obesity

Fluoride

- Strengthens tooth enamel and prevents decay
- Fluoride 50 $\mu\text{g}/\text{Kg}/\text{day}$ considered optimal
- High levels can lead to dental fluorosis
- Skeletal fluorosis



NORMAL



MILD



SEVERE

Ingested Fluoride and the Microbiome?

Fluoride: Intake and Absorption

Water (1.86 $\mu\text{g/Kg/day}$)
Food (5-28 $\mu\text{g/Kg/day}$)
Toothpaste (1.4 $\mu\text{g/Kg/day}$)

+Supplements: 50 $\mu\text{g/Kg/day}$

HF absorbed in stomach and small intestine

Excretion: feces (10%)
and urine (50-70%)

Physiological and Microbiome Impact

Oral Cavity

Caries Prevention

Excess: Dental Fluorosis

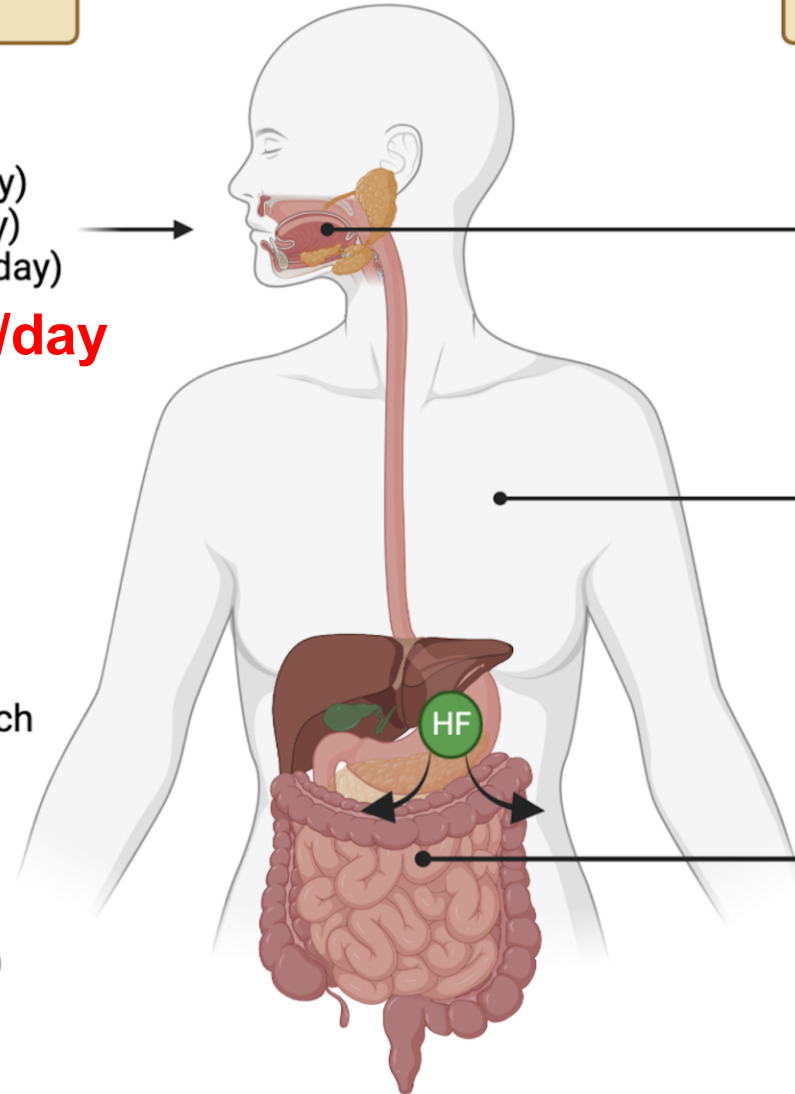
Skeletal System

Fractures (>100 $\mu\text{g/Kg/day}$)
Skeletal fluorosis (>120 $\mu\text{g/Kg/day}$)

Excess: Skeletal Fluorosis

Intestines

Gut Microbiome?



Gut Microbiome: Studies in Animals

- Largely rodent studies
- Differences in fluoride absorption/metabolism
- High Fluoride concentrations used



Zhong et al. (2022)

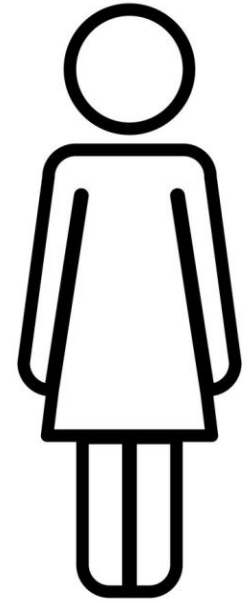
- 25-100 mg/L Fluoride
- Gut barrier disruption
- Gut Microbiome disruption

Yasuda et al. (2017)

- 4 mg/L Fluoride
- Improved oral microbiome
- Limited impact on gut

Microbiome: Studies in Humans

- One study examined ingestible Fluorides (oral)
- No studies have examined community water fluoridation
- Individuals with fluorosis exposed to high concentrations



Studies in Humans: Gut Microbiome

Zhou et al. (2023)

- Guizhou, China, endemic coal-fired-pollution
- Dental Fluorosis (n=9)
- Relatively minor changes in gut microbiome

Wang et al. (2023)

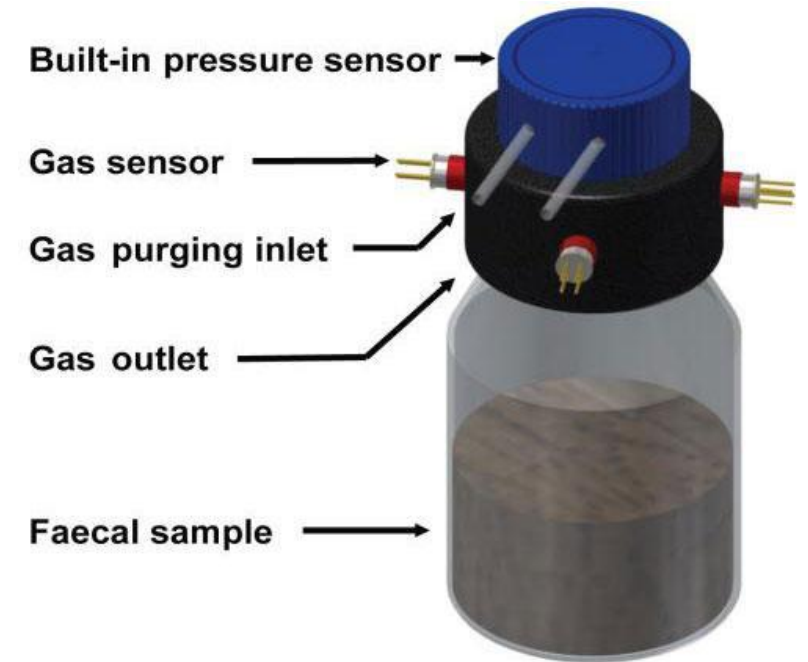
- Guizhou, China, endemic coal-fired-pollution
- Skeletal Fluorosis (n=32)
- Severe changes in Gut Microbiome



Studies *in vitro*: Gut Microbiome

Chen et al. (2020)

- Fecal samples grown in laboratory
- 1, 2, 10 and 15 mg/L fluoride
- Low concentrations positive impact
- High concentrations (>10 mg/L) detrimental



Studies in Humans: Oral Microbiome

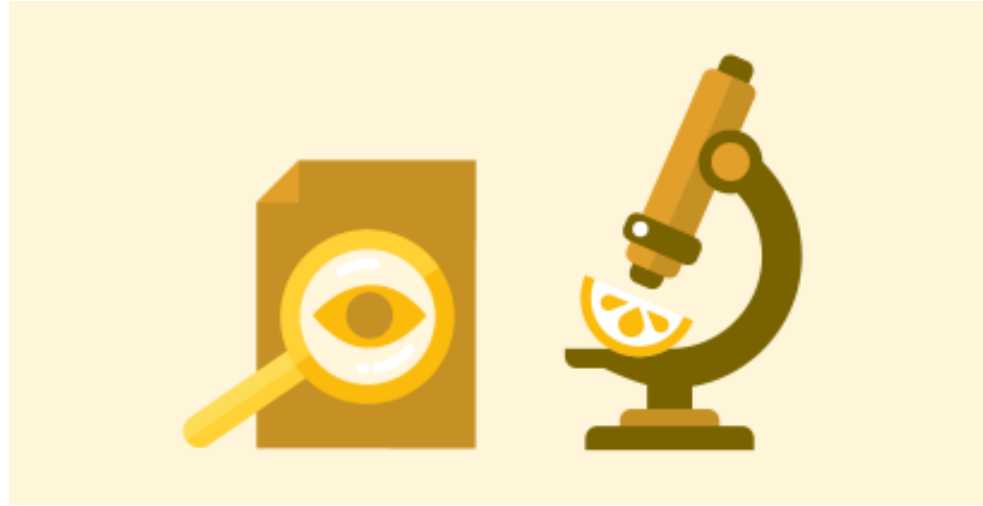
Wang et al. (2021)

- Guizhou, China, endemic coal-fired-pollution dental fluorosis
- Dental Fluorosis (mild n=14, Moderate/Severe n=19)
- Mild fluorosis largely unchanged
- Severe Fluorosis show changes in oral microbiome composition

Wolff et al. (2019)

- Investigated Fluoride salt/tablets exposure in childhood (n=56)
- Adults exhibited some minor changes in oral microbiome composition

Conclusions



- Fluoride consumption at $\sim 50 \mu\text{g/Kg/day}$ probably has limited impact on oral or gut microbiomes
- Increased exposure (fluorosis) may impact on microbiome composition

Future Research

- Over reliance on animal models
- Exposure to ingestible fluorides?
- High quality, large cohort studies in humans
- Longitudinal Studies on early development





Trinity College Dublin
Coláiste na Tríonóide, Baile Átha Cliath
The University of Dublin

Thank you





Session 2: Neurocognitive

Identifying Safety Concerns and
Potential Risks Associated with the Use
of Orally Ingestible Unapproved
Prescription Drug Products Containing
Fluoride

Griffin Cole, DDS, NMD, MIAOMT

International Academy of Oral Medicine and Toxicology



Fluoride Supplements and Neurocognitive Effects

Unapproved, Unproven and Unnecessary

Reagan Udall Foundation for FDA Meeting – July 23, 2025

Griffin Cole, DDS NMD MIAOMT



Only Effective Topically

Journal of Public Health Dentistry, BA Burt, 1999 - Supplements

- Efficacy is weak
- Risk of fluorosis
- Fluoride has little pre-eruptive effect in caries prevention

Journal of American Dental Assn, Featherstone, 2000

- Fluoride in drinking water and in fluoride-containing products reduces caries via topical mechanisms.

CDC 2001: “[F]luoride’s predominant effect is **posteruptive** and topical.”

- Oral Health Division Director Hannen admitted the CDC does NOT recognize any benefit from systemic fluoride in first 6 mos of life - 2018

Cochrane Oral Health Group – 2011

- Supplements fail to reduce decay in primary teeth

Over 70% of US children have fluorosis – NHANES J Dent Res 2019

Fluoride is ubiquitous in foods, beverages and some medicines

Fluoride Supplements – Should Be Removed From Market

- Introduced on 2 False Assumptions
 - F is a nutrient – NOT TRUE
 - F is effective when swallowed – *Also* NOT TRUE
- 2011 Cochrane Collaboration – Supplements neither necessary nor effective (particularly today with so many sources/exposure)
 - NO safety studies
 - NO conclusion about effectiveness in preventing decay in children under 6
- Mounting research showing potential harm to children from ingesting fluoride including low birth weight for Hispanic newborns (Arun et al 2022), lower testosterone in males and lower sex steroid hormones in females (Huang et al 2020), symptoms of sleep disorders in adolescents (Malin et al 2019; Cunningham et al 2021), 2-fold increase in pediatric bone fractures (Lindsay et al 2023), kidney and liver impairment in adolescents (Malin et al 2019), and arguably, most importantly – decreased IQ and more neurobehavioral disorders – 2024 NTP Systematic Review – not to mention over 80 worldwide studies.

Prenatal and Postnatal Studies Confirming Neurocognitive Harm

- Over 80 studies worldwide showing neurocognitive/IQ loss/impairments
 - Bashash (ELEMENT) 2017/18
 - Green (MIREC) 2019
 - Till 2020
 - Goodman 2022 (Combo E & M)
 - NTP Meta-analysis 2025 (Taylor) – 74 Studies
 - Significant INVERSE relationship between F exposure and Children's IQ Scores
- Kumar 2023 - “Association between low fluoride exposure and children's intelligence: a meta-analysis relevant to community water fluoridation.”

NASEM – Did *Not* Find NTP Report Unreliable

What NASEM said:

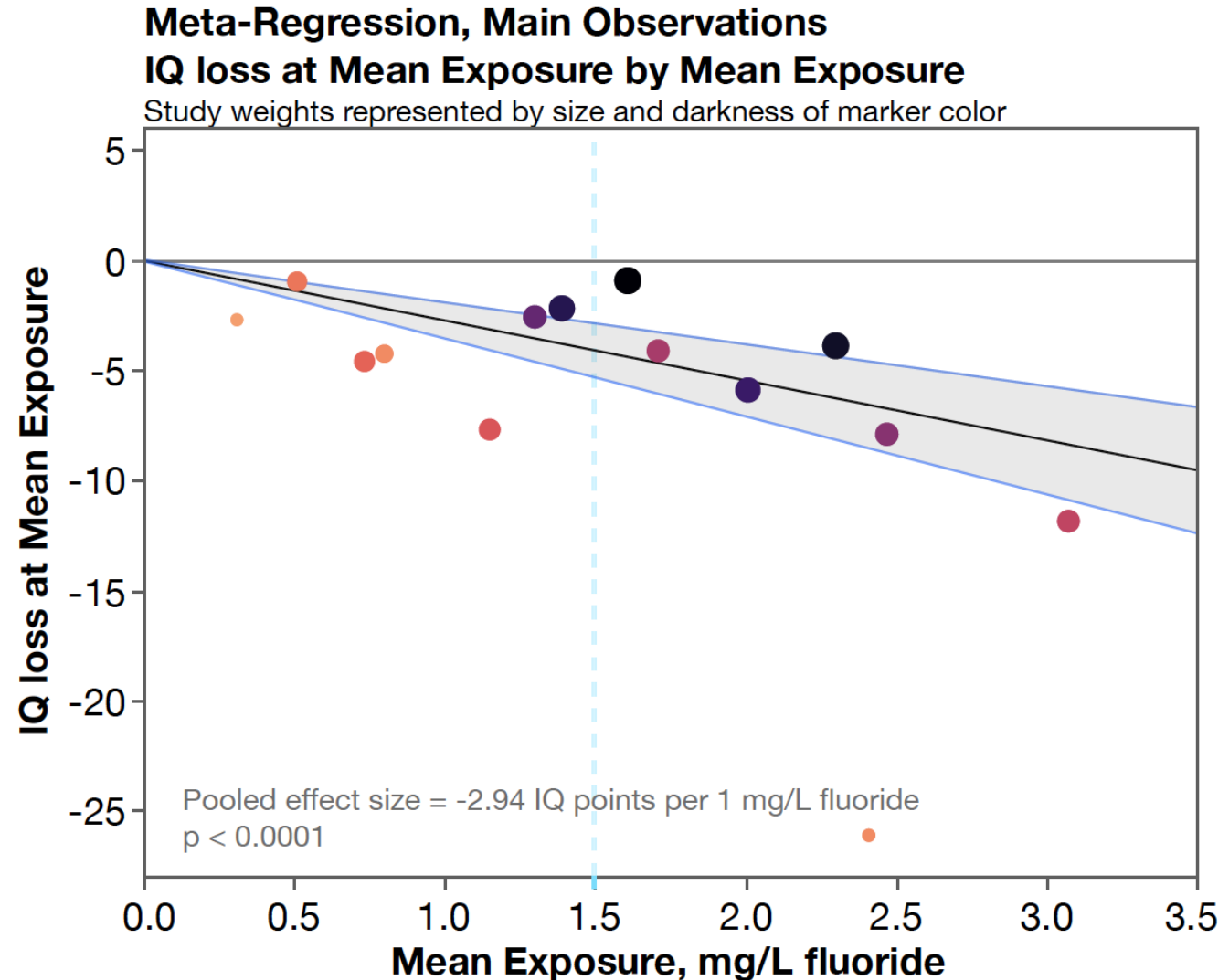
- They did not challenge the scientific basis of the NTP's presumed hazard conclusion
- They suggested ways for NTP's evidence to be used to more strongly support conclusion
- “The committee found the meta-analysis to be a valuable addition to the monograph...the meta-analysis applied standard, broadly accepted methods, and the data shown...and the related evaluations are especially informative (NTP 2020).”
- The only criticism was that the NTP included claims that evidence at exposures below 1.5 mg/L were “inconsistent” and “unclear”.*

*NTP had not done rigorous dose-response analyses so shouldn't offer any conclusions about what dose may or may not be low enough to avoid neurotoxic harm.

Fluoride-IQ Dose-Response curve from NTP meta-analysis

Is 1.5 mg/L a safe
threshold?
(~1.5 mg/day)

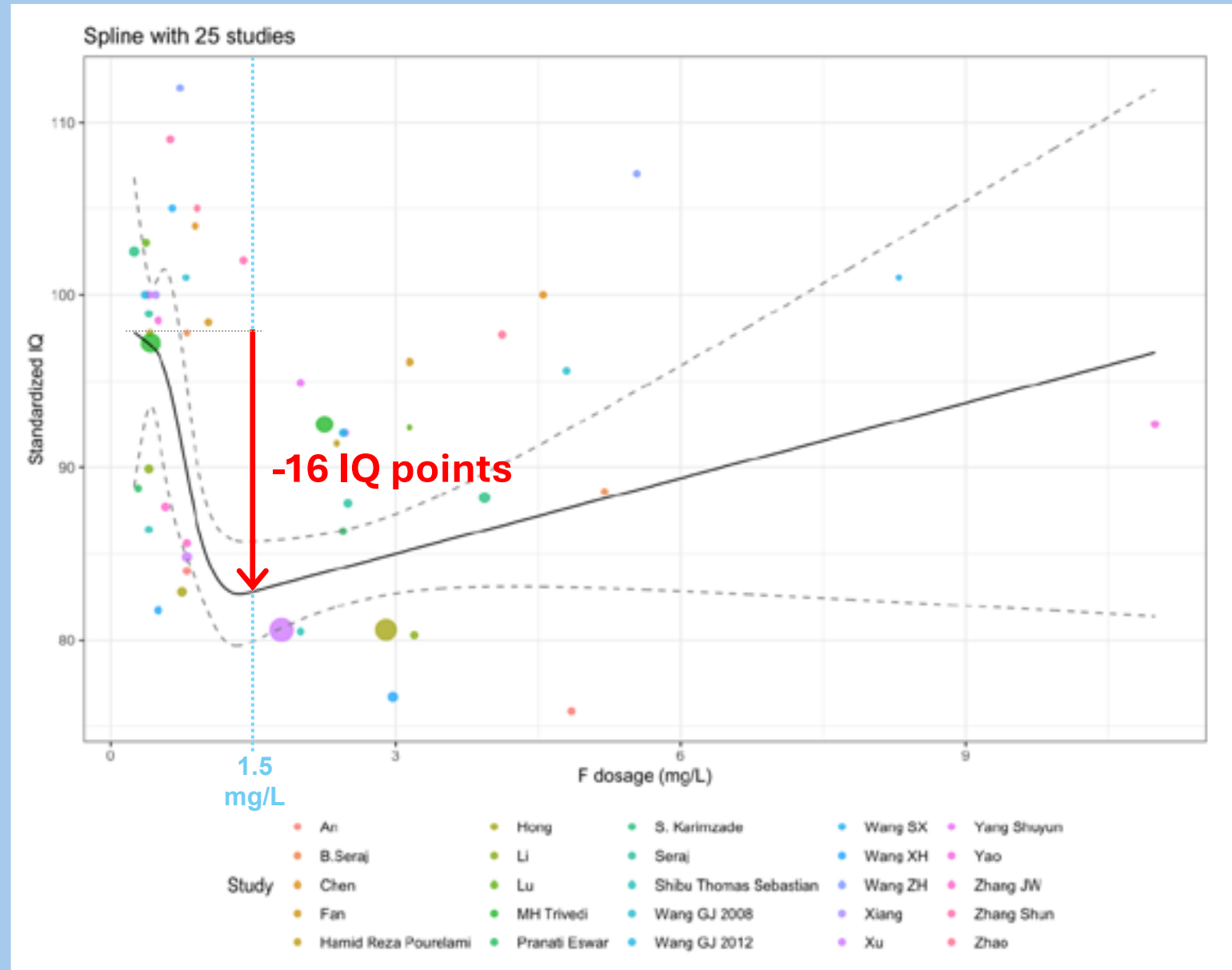
Neurath 2023 Environ
Health Perspectives



Fluoride-IQ Dose-Response curve from meta- analysis

Is 1.5 mg/L
a safe threshold
(~1.5 mg/day)

Kumar –
unpublished data



Time for FDA to Enforce Their “Unapproved” Classification of Supplements





Session 2: Neurocognitive
Identifying Safety Concerns and
Potential Risks Associated with the
Use of Orally Ingestible Unapproved
Prescription Drug Products
Containing Fluoride

Jayanth Kumar, DDS, MPH

Formerly California Department of Public Health

Fluoride Exposure and Children's IQ: A Review of National Academies and WHO Consensus Report Findings

Jayanth Kumar, DDS, MPH

Former California State Dental Director

Reviewer, National Academies of Sciences, Engineering, and Medicine
Consensus Study Report. *Review of the Revised NTP Monograph on the
Systematic Review of Fluoride Exposure and Neurodevelopmental and
Cognitive Health Effects: A Letter Report.* 2021

Disclaimer

The views and opinions expressed in this presentation are those of the speaker and do not necessarily reflect the views or positions of the California Department of Public Health or the California Health and Human Services Agency or the National Institute of Dental and Craniofacial Research, NIH, or the Association of State and Territorial Dental Directors.

Objectives

- Summarize consensus findings
 - Fluoride and IQ
 - Validity of spot urinary fluoride as an exposure biomarker
 - Study design quality and interpretability
- Review findings from recent meta-analyses and cohort studies
- Discuss possible directions for future research

Consensus

- National Academies Consensus Study Report (2021):
 - **Lack of adequate support** for an assessment of presumed cognitive neurodevelopmental hazard
- WHO Assessment of Renal Fluoride Exposure (2014):
 - “Urinary fluoride excretion is **not** suitable for predicting fluoride intake for individuals”
- WHO Radiofrequency Fields on Cancer Risk Protocol (2021)
 - Ecological and cross-sectional studies **do not** allow for calculating the intended measures of effect (Lagorio S. et al <https://doi.org/10.1016/j.envint.2021.106828>)

Does fluoride exposure recommended for caries prevention in the U.S. decrease children's cognition and IQ scores?

Association Between Low Fluoride Exposure and Children's Intelligence: A Meta-analysis Relevant to Community Water Fluoridation

Jayanth V. Kumar, DDS, MPH
Mark E. Moss, DDS, PhD,
Honghu Liu, PhD,
Susan Fisher-Owens, MD, MPH

Public Health.

<https://doi.org/10.1016/j.puhe.2023.03.011>

Conclusions:

- Fluoride exposure at the concentration used in community water fluoridation is not associated with lower IQ scores
- High heterogeneity suggests that the validity of pooled results is questionable
- Uncritical acceptance of fluoride-IQ studies has hindered methodological progress

Mean-effects meta-analysis results - Group Level

No association at concentration relevant to community water fluoridation

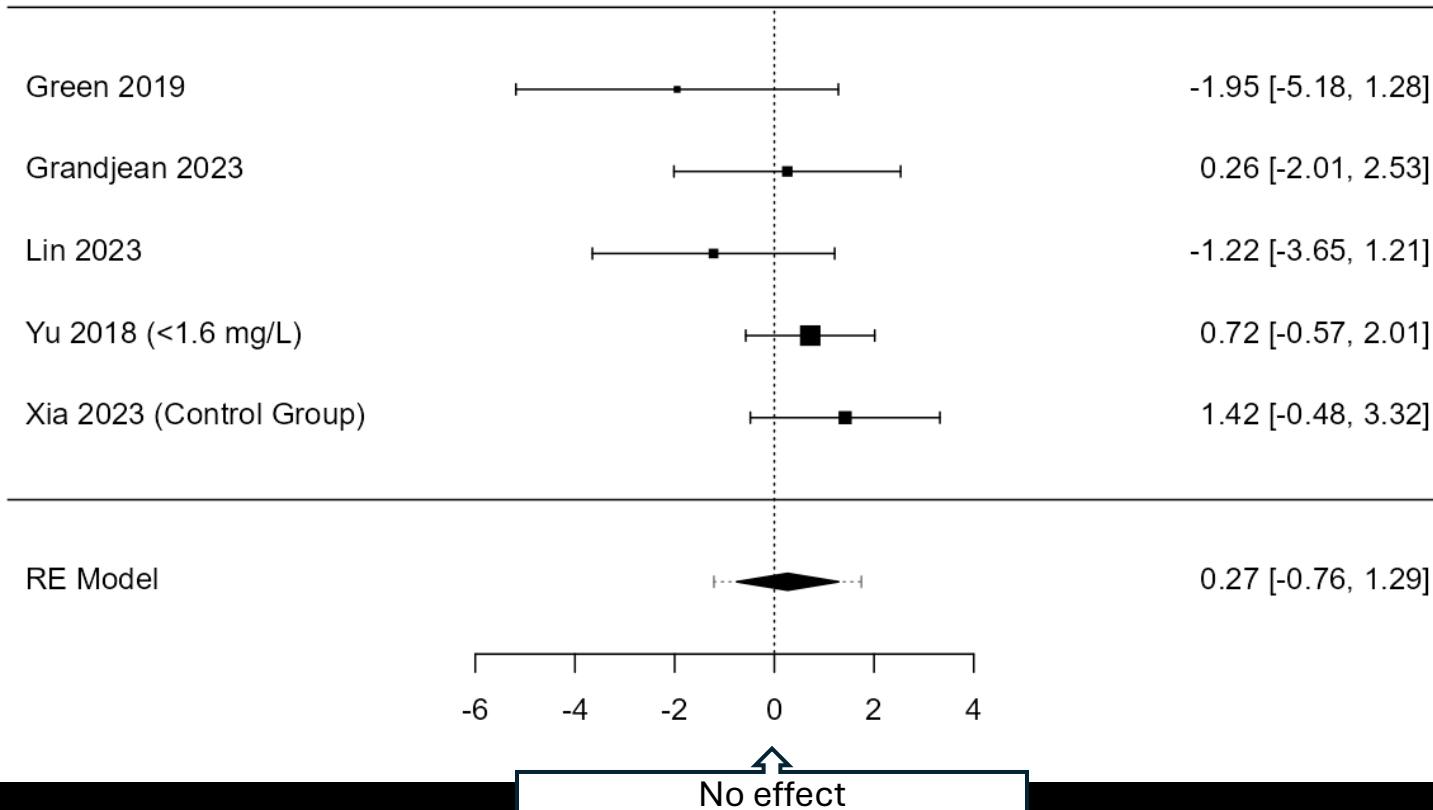
Kumar et al. 2023

Non-endemic/Endemic Fluoride (Mean F)	# Studies	SMD Effect Size	95% CI	I ² Heterogeneity
Non-endemic -Recommended F (0.9 mg/L) vs. Lower F (0.3 mg/L)	8	0.07	-0.02, 0.17	0%
Endemic – Higher F (~3.7 mg/L) vs. Lower F (~0.6 mg/L)	23	-0.46	-0.58, -0.35	81%
Overall	28	-0.33	-0.44, -0.22	83%

Urinary Fluoride and IQ Scores

Exposure matrix Water: n=5 publications (studies from non-endemic areas)

Random-Effects Meta-Analysis of Regression Slopes



Pooled effect of 0.27 is positive, not statistically significant

Source: Antoon and Kumar. JAMA Pediatrics. Letter. May 12, 2025

NASEM Consensus Report 2021: Critique Directed at Dose-Response Analysis

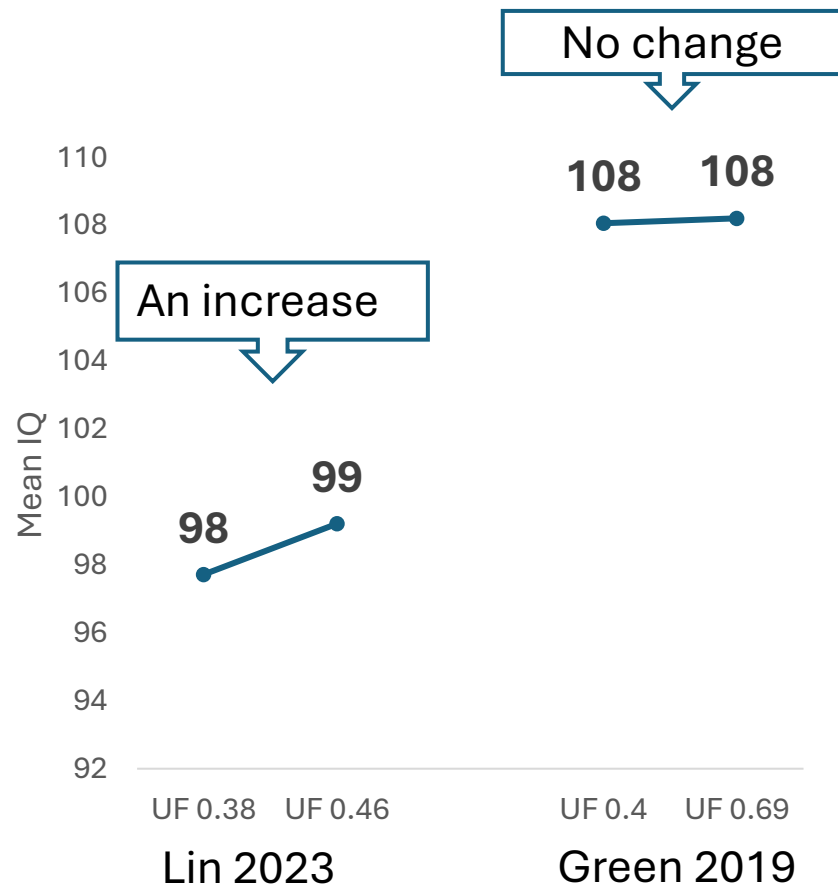
- “Those analyses fall outside the scope of the NTP monograph, which focuses on hazard identification and not dose–response assessment.”
- ***“Given the substantial concerns regarding health implications of various fluoride exposures, comments or inferences that are not based on rigorous analyses should be avoided.”*** page 14

Dose-Response Meta-analysis (<1.5 mg urinary fluoride - Group Level)

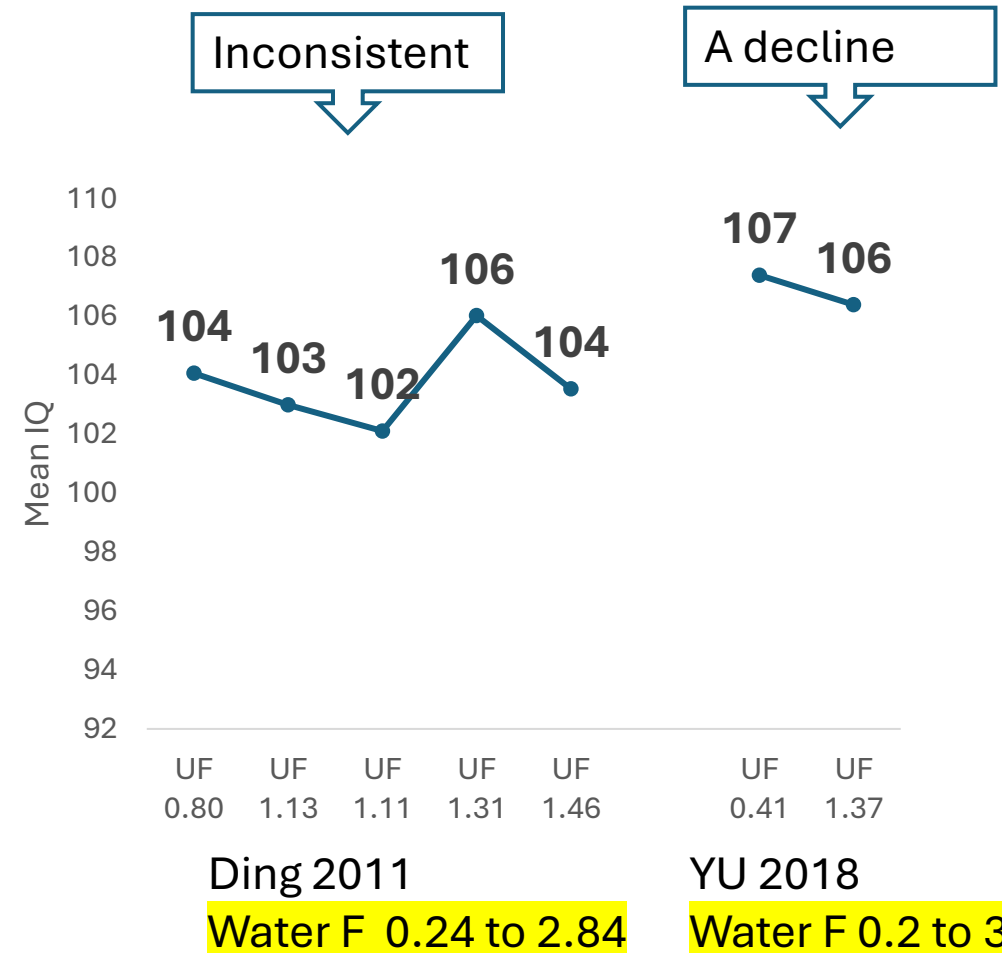
Source: Taylor et al.

IQ and Urinary Fluoride: Inconsistent Response

Non- Endemic (<1.5 mg/L) n=962



Endemic (>1.5 mg/L) n= 3,217



Maternal Urinary Fluoride Exposure Studies (n=4 cohort studies) and Children's IQ

Leave-One-Out Regression Slope Meta-analysis Showing the Influence of Studies

Study	β	95% CI		I^2 (%); p
Taylor et al. (3 studies) - Ibarluzea excluded	-1.70	-4.24, 0.84	NS*	57; p=0.09
Add Ibarluzea (4 studies)	-0.98	-3.58, 1.62	NS*	60; p=0.06
Exposure Matrix: Water				
Delete ELEMENT (Salt)	-0.06	-2.01, 1.88	NS*	12; p=0.23

No clinical significance

*Not statistically significant

Source: Kumar J. Unpublished.

Concerns: Selective Reporting and Publication Bias

Fluoride exposure during pregnancy and its effects on childhood neurobehavior: a study among mother-child pairs from Mexico City, Mexico

Fluoride exposure during pregnancy and its effects on childhood neurobehavior:
a study among mother-child pairs from Mexico City, Mexico

by

Deena B. Thomas

by

Deena B. Thomas

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy
(Environmental Health Sciences)
in the University of Michigan
2014

2014

Doctoral Committee:

Professor Karen E. Peterson, Co-Chair
Professor Howard Hu, Co-Chair, University of Toronto
Associate Professor Niladri Basu, University of McGill
Assistant Professor Sung Kyun Park
Associate Professor Brisa N. Sanchez

NIH Funded ELEMENT Birth
Cohort Study

ELEMENT Birth Cohort Study

Prenatal fluoride exposure and neurobehavior: a prospective study

“Overall, this investigation found **no evidence of a detectable adverse outcome** on offspring neurobehavioral development associated with maternal fluoride exposure during pregnancy.”
[MDI at ages 1, 2, and 3] Page 46



An Evaluation of Neurotoxicity Following Fluoride Exposure from Gestational Through Adult Ages in Long-Evans Hooded Rats

Christopher A. McPherson¹ · Guozhu Zhang² · Richard Gilliam¹ · Sukhdev S. Brar³ · Ralph Wilson³ · Amy Brix⁴ · Catherine Picut⁵ · G. Jean Harry¹ 

- At 10 to 20 ppm of fluoride in drinking water
 - no exposure-related differences in learning and memory tests
 - no alteration of thyroid hormone levels (T3, T4, or TSH)
 - no exposure-related pathology
 - no evidence of neuronal death or glial activation

Conclusions

- Fluoride exposure at the concentration used in community water fluoridation (<1.5 mg/l) **is not associated** with lower IQ scores.
- We must acknowledge the **major methodological limitations** so that robust methods can be developed to test fluoride-IQ hypotheses.
- Decision-makers must take these findings into consideration in proposing policies.
- **Interventional studies** should be used to investigate the fluoride-IQ hypothesis in populations with high fluoride (endemic) exposure.

A solid orange vertical bar is positioned on the left side of the slide.

Thank you



Session 2: Neurocognitive Identifying Safety Concerns and Potential Risks Associated with the Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride

**Susan Fisher-Owens, MD, MPH,
FAAP**

University of California San Francisco

Presentation to FDA on Fluoride Supplements: Toxicology/Neurocognitive?

Susan Fisher-Owens, MD, MPH

Professor of Pediatrics

Professor of Preventive and Restorative Dental Sciences

University of California, San Francisco

Fluoride Consultant, California Dept. of Public Health

7/23/25

*Nothing to disclose except for serving on a DSMB for
a Colgate study of a non-fluoridated toothpaste*



Why Am I Here??
A Pediatrician??

Why Am I Here??
Academic/Researcher

Academic—teaching
brightest minds; must stay
up to date with the
research

- Researcher—understands:
 - Science
 - What can and can't be proven with different types of studies

NOTHING without Risk

Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride in the Pediatric Population

Ingestible vs Topical Fluoride

- Main benefit comes from topical application while swishing before swallowing
 - Remains in plaque on teeth until the next toothbrushing
 - With water, repeated exposures during day
- Toothbrushing insufficient to prevent cavities when community water fluoridation ceased in Calgary (McLaren 2021)

Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride in the Pediatric Population

"Unapproved"

- FDA declined to review fluoride products initially
- *Vast* majority of medications used in pediatrics are not FDA-licensed
- Still, recommended by United States Preventive Services Task Force, American Academy of Pediatrics, American Academy of Family Physicians, World Health Organization, and 100s more

What is the Microbiome?

What Does it have to do with Fluoride?

- NIEHS==“microbiome **is the collection of all microbes**, such as bacteria, fungi, viruses, and their genes, that naturally live on our bodies and inside us”
- One of 4 mechanisms of fluoride: inhibits bacterial growth

What is a “Good Test” for Neurocognition and Fluoride?

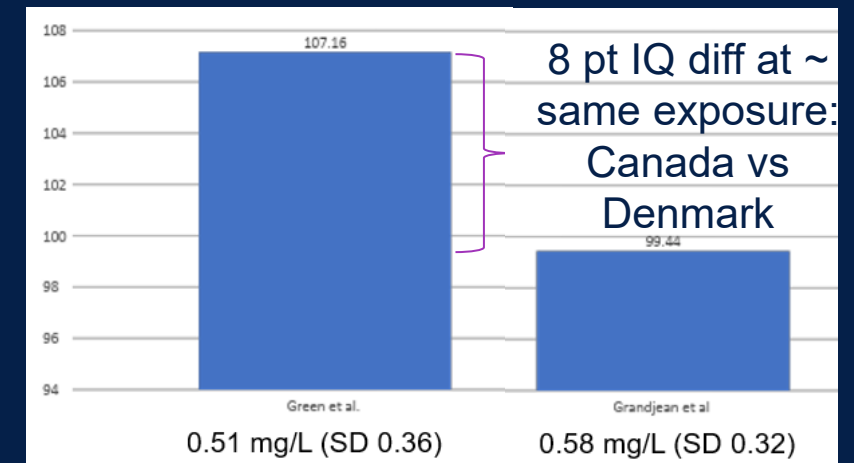
- Does the test ask the right question?
- Results cannot be viewed in vacuum—what confounders?
 - Factors influencing fluoride levels
 - Ventilation (high-F coal), nutrition
 - Background levels of fluoride
 - Location
 - Factors influencing intelligence
 - Coal, arsenic, lead, tobacco
 - Socioeconomic status (Parental/familial levels)

Is Spot Urinary Fluoride a “Good Test”?

- Spot urines are for blood and infection
- Fluoride in urine: varies depending on time of day, diet, season, and trimester of pregnancy

Is IQ Testing a “Good Test”?

- In young kids, no (varies by time of day, esp as relates to nap and snacks)
 - Less accurate at younger age
 - Cultural bias
- Different test can get different results
- Fallacy of pooling results from different tests



Variation in IQ scores by City, IQ Assessor, and Fluoridation Status

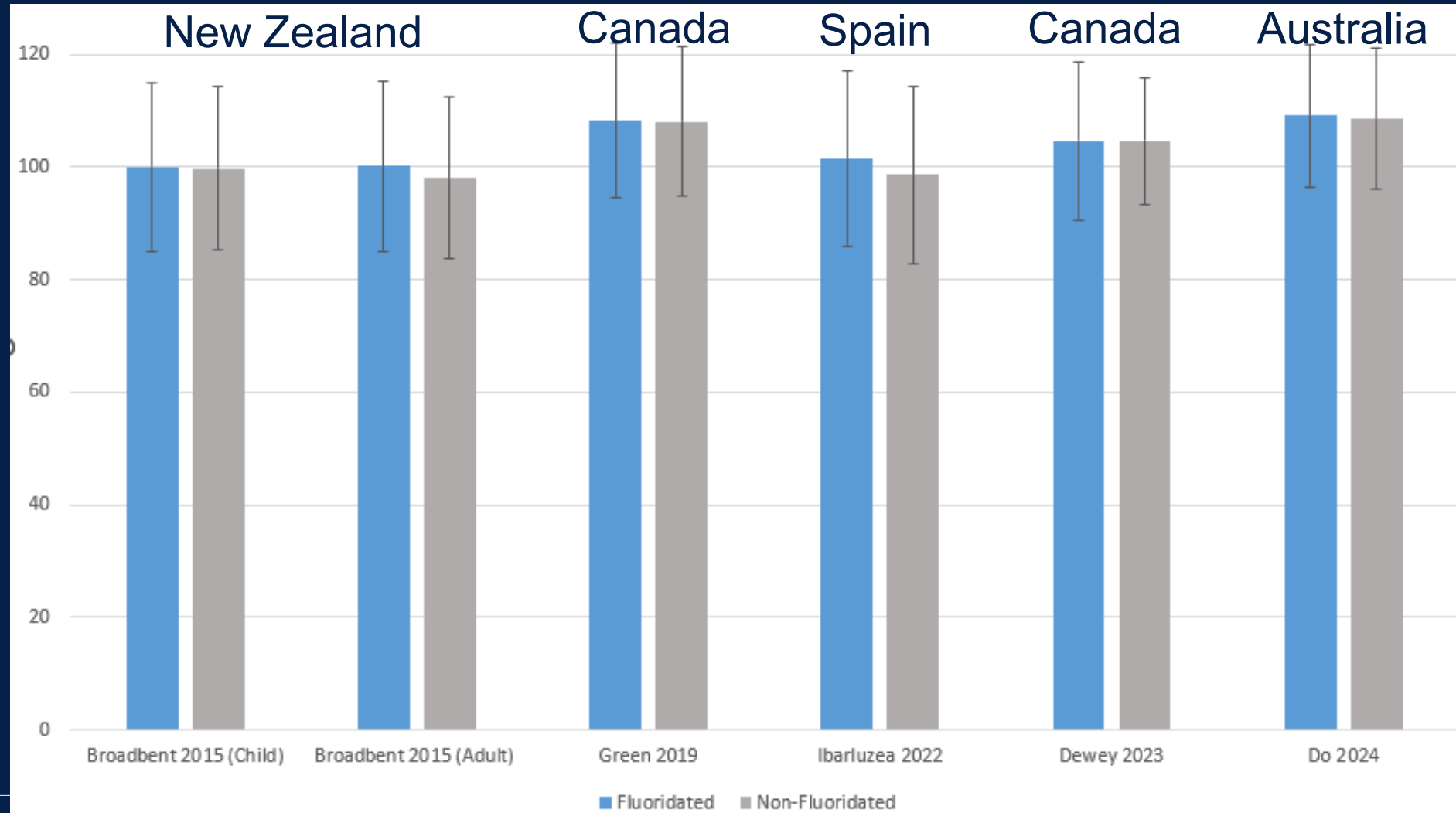
Data from MIREC Study

City	F?	Research Assistant	Number	β	95% CI
A**	NF	1	55	Ref	
B	NF	2	126	-8.05	-12.25, -3.85
C	NF	3	154	-4.24	-8.23, -0.25
D	F	4	72	-3.01	-7.89, 1.86
E	F	5	85	-4.59	-9.34, 0.17
F	F	6	118	-8.49	-12.74, -4.24

Fluoridated = Mean IQ 108; Non-Fluoridated = Mean IQ 108

Mean IQ Scores (unadjusted) by Fluoridation Status

NO difference between fluoridated and non-fluoridated communities



Balancing Risks/Benefits



Normal



Questionable



Very mild



Mild



Moderate



Severe

Source: Fluoridation Forum Report 2002 (Page 126)



Summary

- Studies showing negative effects of community water fluoridation were done outside the United States or not with reliable measurements
- Studies reflecting circumstances in the United States show *no* difference in neurocognition
- Spot urinary fluoride is not a good test for systemic fluoride
- Oral health benefits the entire body, and oral disease is more serious than “just a cavity”
- To protect children’s oral and overall health, fluoride *should* remain on market

Thank you!
Susan.Fisher-Owens@ucsf.edu



Session 2: Neurocognitive

Identifying Safety Concerns and
Potential Risks Associated with the Use
of Orally Ingestible Unapproved
Prescription Drug Products Containing
Fluoride

Kyla W. Taylor, PhD

National Institutes of Health



National Institute of
Environmental Health Sciences
Division of Translational Toxicology

Fluoride exposure and children's IQ

A systematic review and meta-analysis

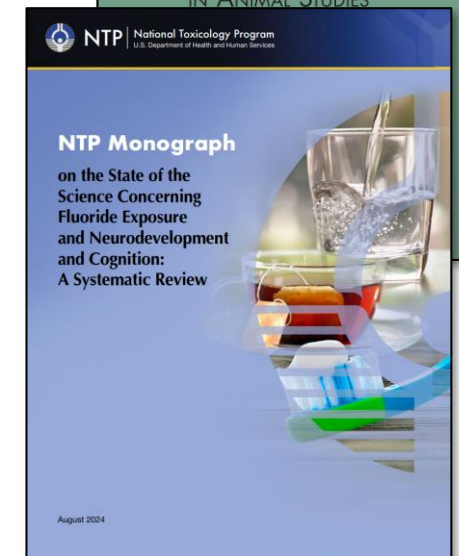
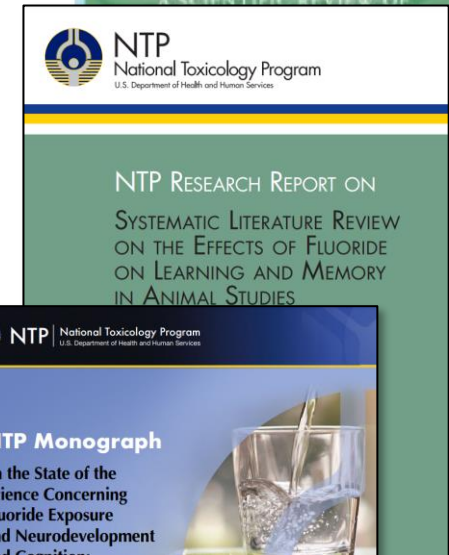
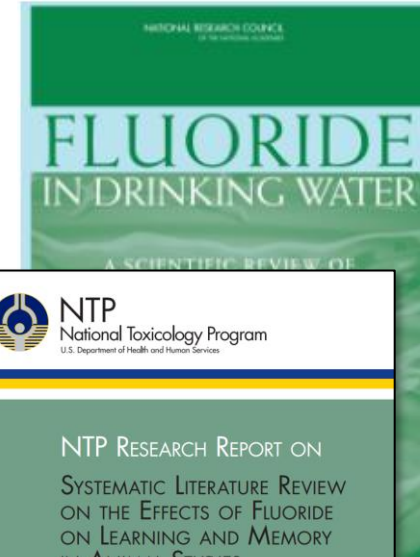
Kyla W. Taylor, PhD

July 23, 2025

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Division of Translational Toxicology
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Fluoride as a topic for National Toxicology Program

- **2006:** National Research Council (NRC) reported evidence of neurotoxic effects of fluoride
- **2015:** Topic of fluoride exposure & adverse health effects nominated to NTP
- **2016:** NTP Monograph (animal studies only)
 - Systematic review found low to moderate evidence of adverse effects on learning and memory
- **2024:** Second NTP Monograph (all studies)
 - *Comprehensive:* Screened >14,000 human, animal, and mechanistic studies; identified >500 relevant studies (167 human)
 - *Rigorous & Reproducible:* Critically assessed study quality; all data documented, available online
 - *Systematic review conclusions:* Based on human studies, concluded with **moderate confidence**, inverse association between fluoride exposure and children's IQ



Systematic review and meta-analysis

Fluoride exposure and children's IQ

- Targeted analysis of 74 studies (N=22 high quality)
- Peer reviewed protocol, two independent reviewers assessed study quality (risk of bias) using *a priori* criteria
- Types of exposure data: Group and individual level, water and urine
- **Three meta-analyses:**

Research

JAMA Pediatrics | Original Investigation

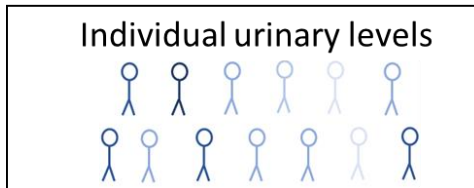
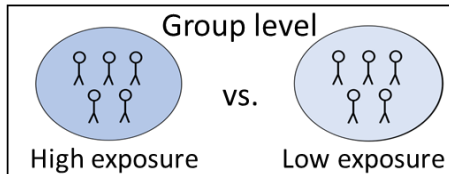
Fluoride Exposure and Children's IQ Scores A Systematic Review and Meta-Analysis

Kyla W. Taylor, PhD; Sorina E. Eftim, PhD; Christopher A. Sibrizzi, MPH; Robyn B. Blain, PhD; Kristen Magnuson, MESM; Pamela A. Hartman, MEM; Andrew A. Rooney, PhD; John R. Bucher, PhD

JAMA Pediatrics
January 2025

Transparency and reproducibility

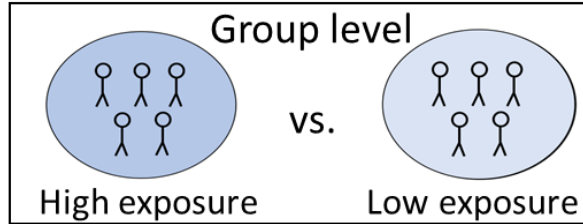
All data **publicly available, downloadable** so researchers can replicate or extend work



1. **Mean effects:** Pooled standardized mean differences (SMDs) in IQ between high vs low fluoride exposure groups
2. **Dose-response mean effects:** Uses SMDs to estimate pooled dose-response curve using linear and non-linear models
3. **Regression slopes:** Pooled regression slopes estimates change in IQ per 1 mg/L increase in urinary fluoride

Results

1. Mean-effects

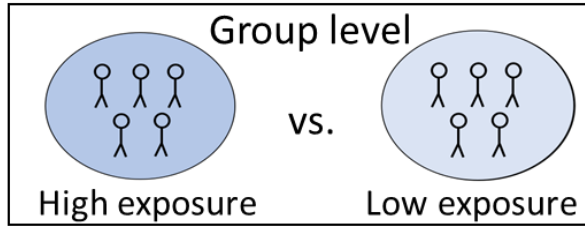


- Standardized mean difference (SMD) calculated for each study
 - Summary statistic to compare same outcome measured in different ways
- Rough conversion* of SMD to IQ points
 $\approx \text{SMD} \times 15$

*Assumes mean IQ=100 and SD=15

Results

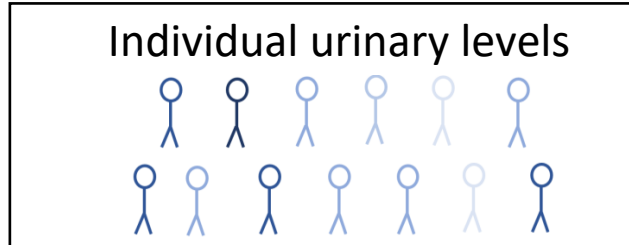
2. Dose-response



- Water (n=12,487 children)
- Urine (n=9,756 children)
 - Valid measure of
total fluoride exposure
(F ingested from all sources)
- Estimated pooled dose-response curve using linear and non-linear models—
linear models were best fit

Results

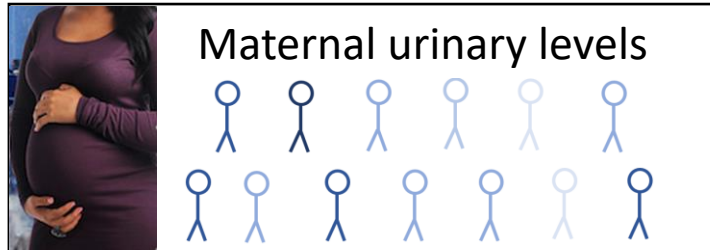
3. Regression slopes



- Urinary fluoride estimates ***total fluoride exposure***
- Estimated pooled regression slopes with random-effects model
- Beta (β) directly estimates change in IQ points

Prenatal fluoride exposure

Maternal fluoride comparable to or lower than the US



- Most susceptible period for brain development
- 3 high quality prospective cohorts, comparable or lower fluoride exposure than United States
 - IQ measured at 7 years
 - Loss of **1.70 IQ points** (95% CI: -4.23, 0.84) per 1 mg/L maternal urinary fluoride
- *Grandjean et al. 2024*, reanalyzed individual data from each cohort, more precise
 - Loss of **2.06 IQ points** ($p < 0.001$) per 1 mg/L increase maternal urinary fluoride

Conclusions

- Statistically significant inverse associations between fluoride exposure and children's IQ
- Inverse association held when restricted to only the *best available evidence* (i.e., high quality studies)
- Evidence of linear dose-response relationship across all data **and** when fluoride exposure <1.5 mg/L (urine and water)
- More studies needed to fully understand the potential for lower fluoride exposure to affect children's IQ
- **Consistent inverse association** across different populations, multiple countries, group and individual level data, various exposure sources, metrics urine and drinking water, study designs
- **High level of consistency** strengths confidence in the inverse association



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Thank you!

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Session 2: Thyroid

Identifying Safety Concerns and
Potential Risks Associated with the
Use of Orally Ingestible Unapproved
Prescription Drug Products
Containing Fluoride

Christine Till, PhD, C. Psych

York University

Fluoride and Thyroid Function

Christine Till, PhD

York University, Faculty of Health
Toronto, ON, Canada

July 23, 2025

Presentation prepared for the meeting on “Use of Orally Ingestible Unapproved Prescription
Drug Products Containing Fluoride in the Pediatric Population”

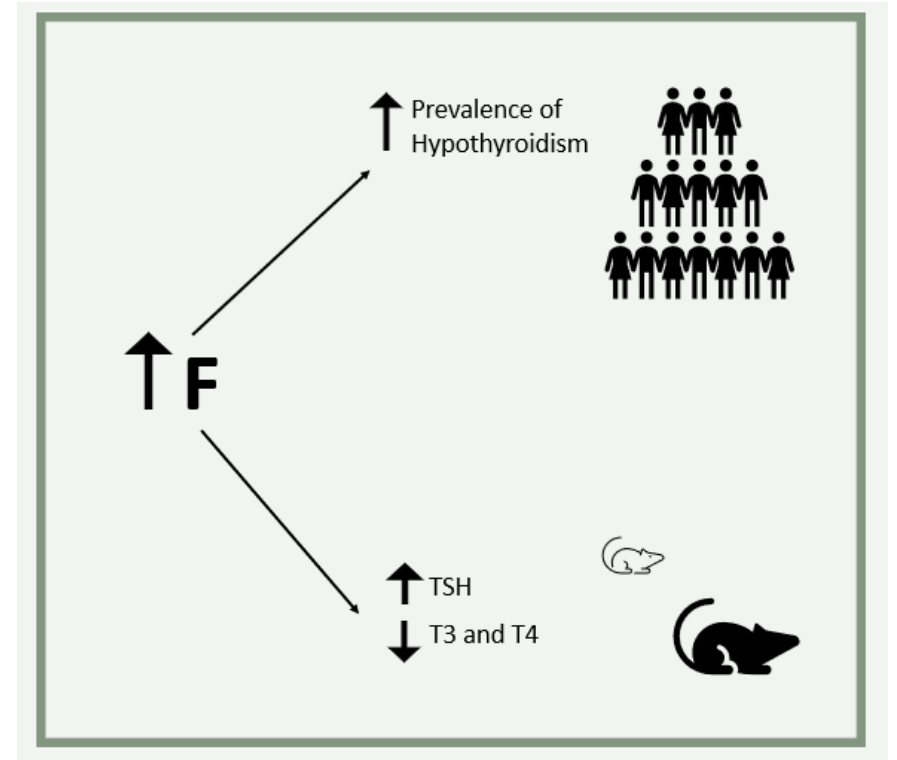


Disclosure

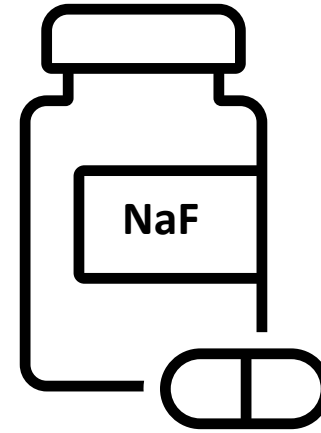
I have no actual or potential conflict of interest in relation to this program/presentation.

Background

- Thyroid hormones
 - play a key role in regulating many biological and physiological functions
 - are essential for brain development and function (Rovet, 2014)
- Fluoride is an “endocrine disruptor” that can interfere with thyroid function (NRC, 2006)
- Thyroid dysfunction is a potential mechanism underlying developmental fluoride neurotoxicity (NTP, 2024)



In the 1950s, fluoride was used to treat overactive thyroid.



EFFECT OF FLUORINE ON THYROIDAL IODINE METABOLISM IN HYPERTHYROIDISM

PIERRE-M. GALLETTI, M.D., PH.D, GUSTAVE JOYET, D.Sc. [Author Notes](#)

The Journal of Clinical Endocrinology & Metabolism, Volume 18, Issue 10, 1 October 1958, Pages 1102–1110, <https://doi.org/10.1210/jcem-18-10-1102>

Published: 01 October 1958 **Article history** ▼

High fluoride levels increase incidence of goiter.

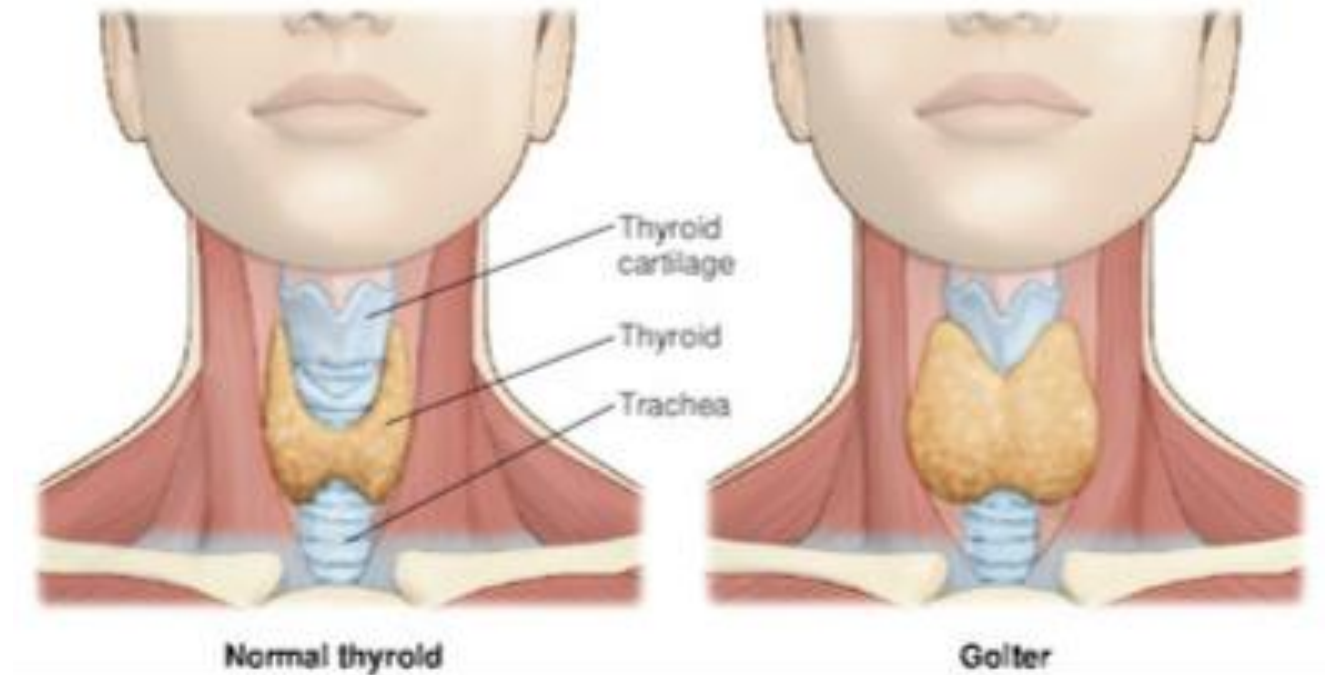
FLUORIDE, WATER HARDNESS, AND ENDEMIC GOITRE

T. K. DAY

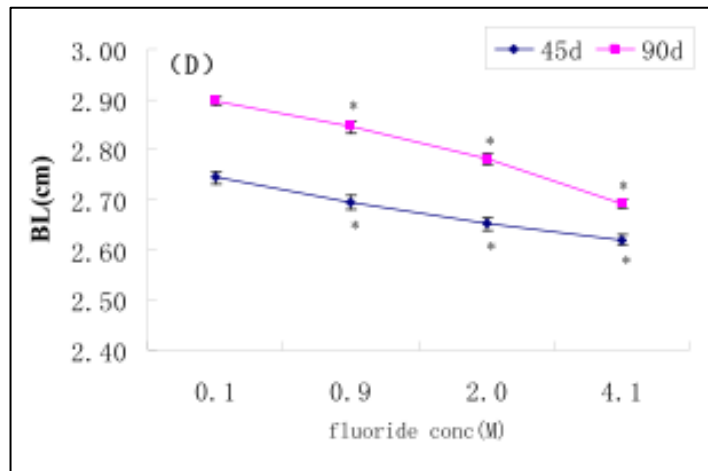
P. R. POWELL-JACKSON

East Wing, Guy's Hospital, London S.E.1

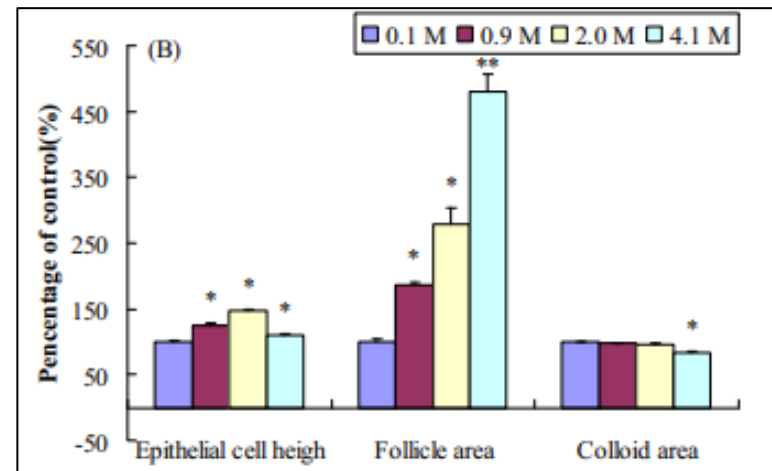
Summary The prevalence of goitre in 17 Himalayan villages has been estimated. Water-samples from each village were taken, and levels of iodine, fluoride, and hardness determined. In 13 villages wide variations in goitre prevalence were not attributable to differences in iodine intake, which remained constant within a narrow range. Instead, variations in goitre prevalence were found to correlate closely with the fluoride content ($\rho=0.74$; $P<0.01$) and with the hardness ($\rho=0.77$; $P<0.01$) of the water in each village. The effects of fluoride and water hardness seem to be independent.



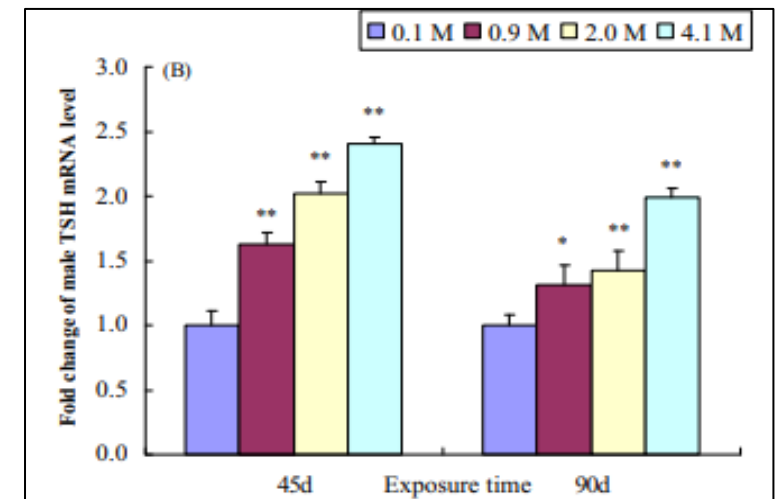
Zebrafish exposed to fluoride show:



↓ body weight & length



Enlarged thyroid tissues



Elevated TSH levels

Systematic Reviews: Fluoride and thyroid function



Contents lists available at [ScienceDirect](#)

Environmental Research 2024

journal homepage: www.elsevier.com/locate/envres

Indian J Dental Res (2018)

Systematic Review

A Systematic Analysis on Possibility of Water Fluoridation Causing Hypothyroidism

Abstract

Background: Community water fluoridation is widely used worldwide and its role in preventive dental health care is well established. However, there is sufficient evidence of the ill effects of excessive fluoride content in water, causing skeletal and dental fluorosis. Alongside, there was also extraskelatal and dental manifestations of excessive fluorides reported. They include the effect on thyroid function, but the literature regarding this is sparse. **Aim:** The present systematic review aims to analyze the data from controlled studies about the effect of fluoride on thyroid function. **Materials and Methods:** A systematic literature search was performed using PUBMED, MEDLINE, EMBASE, COCHRANE Library, EBSCO search, and the internet search, with language restriction to English. The search included published studies which dealt with the association of fluorine with hypothyroidism, from January 1981 to November 2015. Literature search was done using keywords:

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Neeharika Satya
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Hima Priya M,
Alekhya B,
Shaguftha Nauseen**

*Department of Oral Medicine
and Radiology, Principal,
Department of Conservative
Dentistry and Endodontics,
Panineeya Institute of
Dental Sciences, Hyderabad,
Telangana, India*



temic fluorosis and thyroid
fluoride, fluorosis and its
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ation of excess fluoride and
positive correlation between
ill-controlled studies in this
nity network through health

Review article

Does fluoride exposure affect thyroid function? A systematic review and dose-response meta-analysis

Inga Iamandii^a, Lisa De Pasquale^b, Maria Edvige Giannone^a, Federica Veneri^{c,d},
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International Journal of
*Environmental Research
and Public Health*

Review

Fluoride Exposure Induces Inhibition of Sodium/Iodide Symporter (NIS) Contributing to Impaired Iodine Absorption and Iodine Deficiency: Molecular Mechanisms of Inhibition and Implications for Public Health

Declan Timothy Waugh

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Received: 19 February 2019; Accepted: 21 March 2019; Published: 26 March 2019

Review article

Does fluoride exposure affect thyroid function? A systematic review and dose-response meta-analysis

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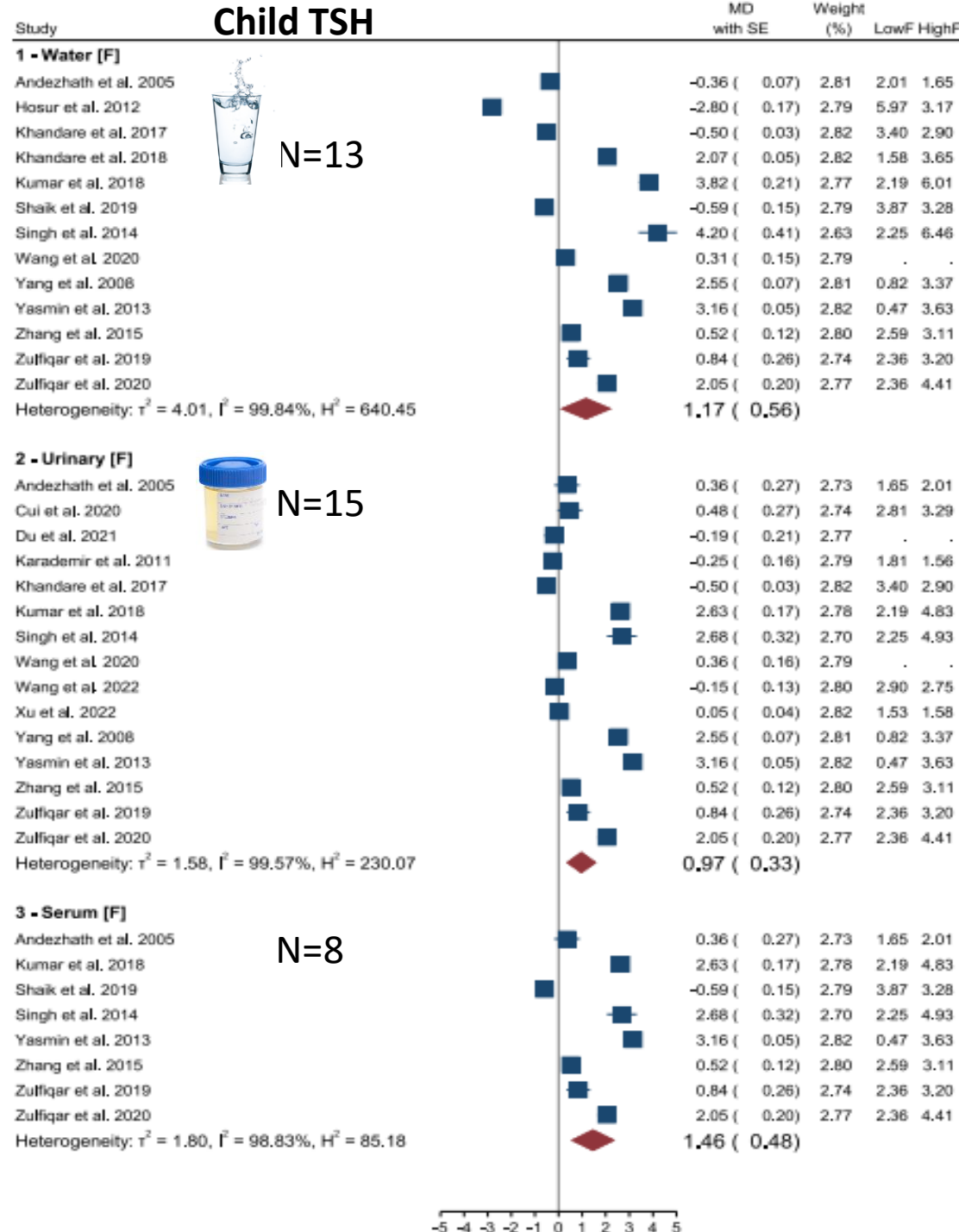
^g Department of Epidemiology Research, Centre for Fetal Programming, Copenhagen, Denmark

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Higher water F, urine F, and serum F levels were associated with higher TSH in children (6-18 yr).



Review article

Does fluoride exposure affect thyroid function? A systematic review and dose-response meta-analysis

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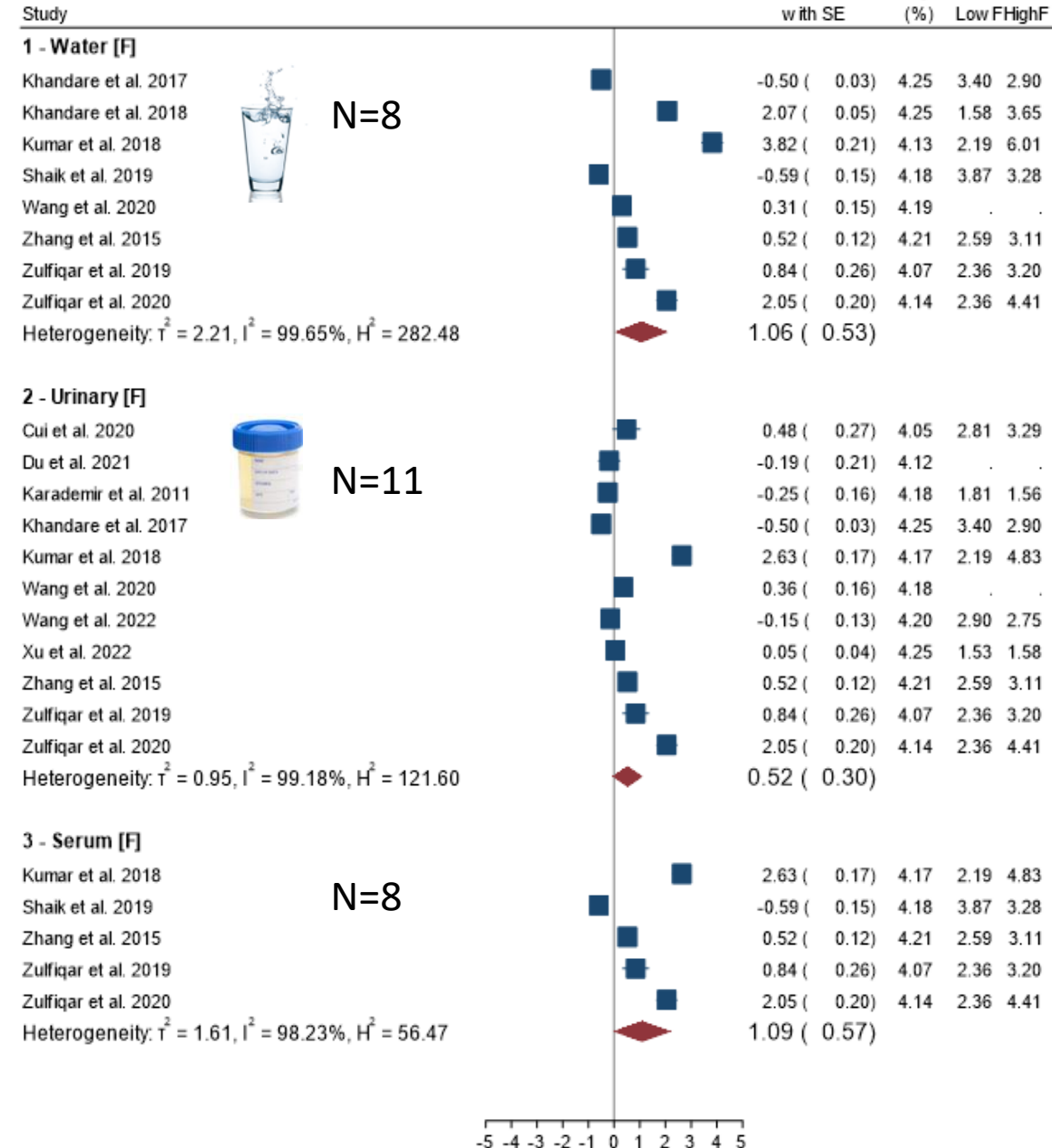
^h Faculty of Food Science and Nutrition, University of Iceland, Reykjavik, Iceland

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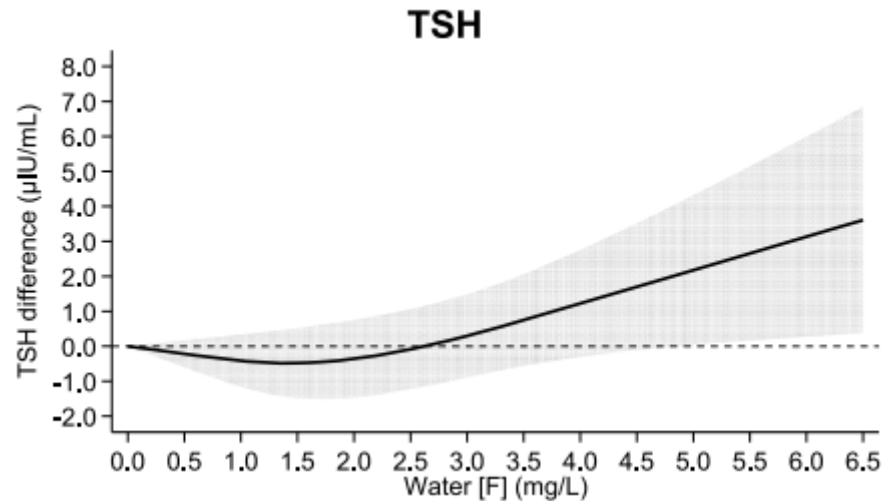
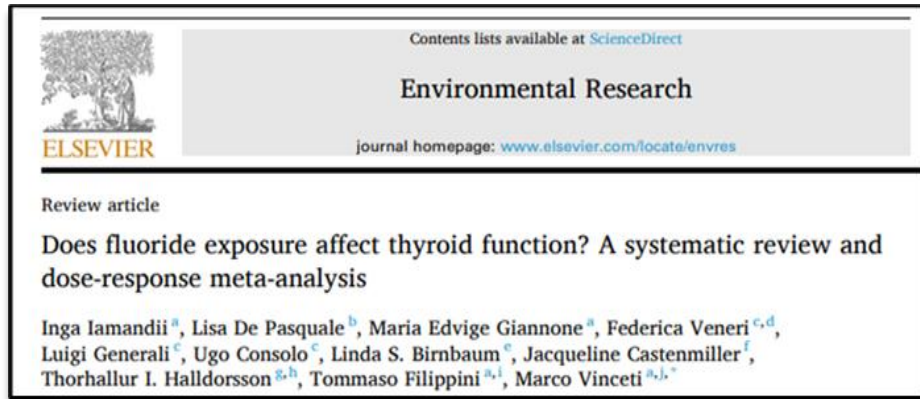
^j Department of Epidemiology, Boston University School of Public Health, Boston, MA, USA

Similar results observed when focusing only on high quality studies.

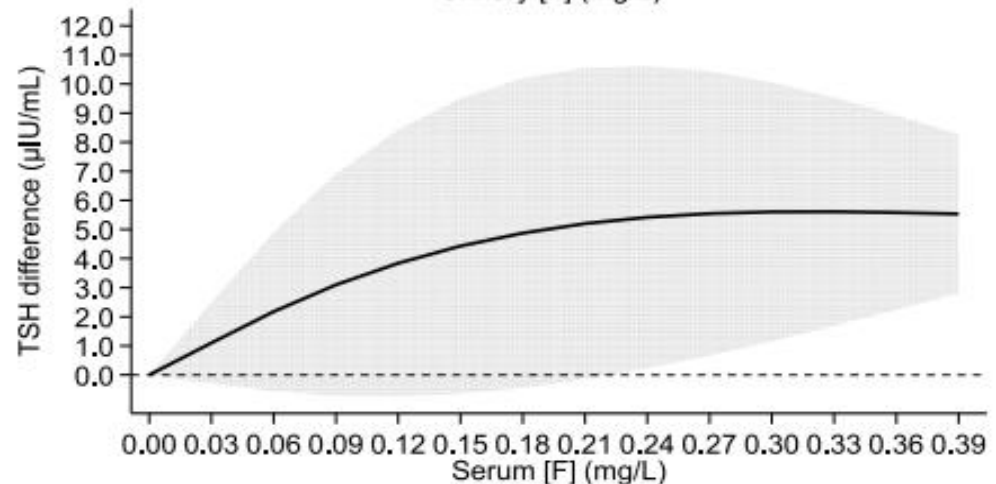
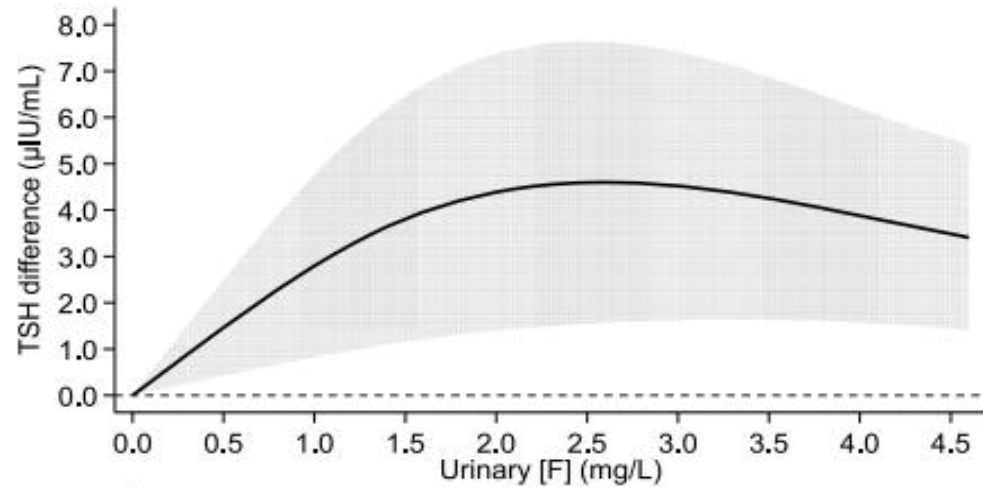
Child TSH



Dose-response meta-analysis of TSH concentrations and exposure to fluoride in children



TSH levels increase at water F levels ~2 mg/L



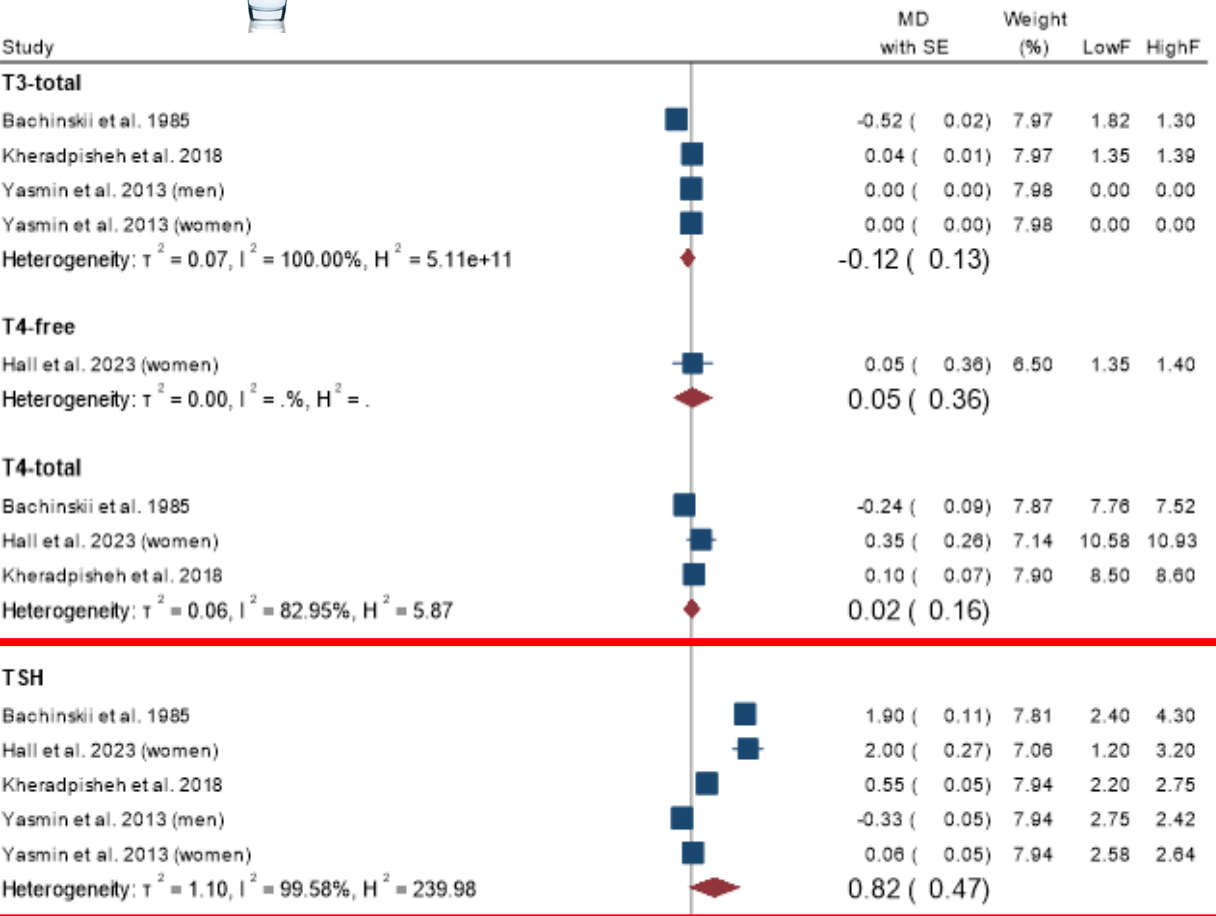
No evidence of a threshold for urinary F and serum F

Review article

Does fluoride exposure affect thyroid function? A systematic review and dose-response meta-analysis

Inga Iamandii^a, Lisa De Pasquale^b, Maria Edvige Giannone^a, Federica Veneri^{c,d},
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Thorhallur I. Halldorsson^{g,h}, Tommaso Filippini^{a,i}, Marco Vinceti^{a,j,*}

Water [F] - adults



Urinary [F] - adults

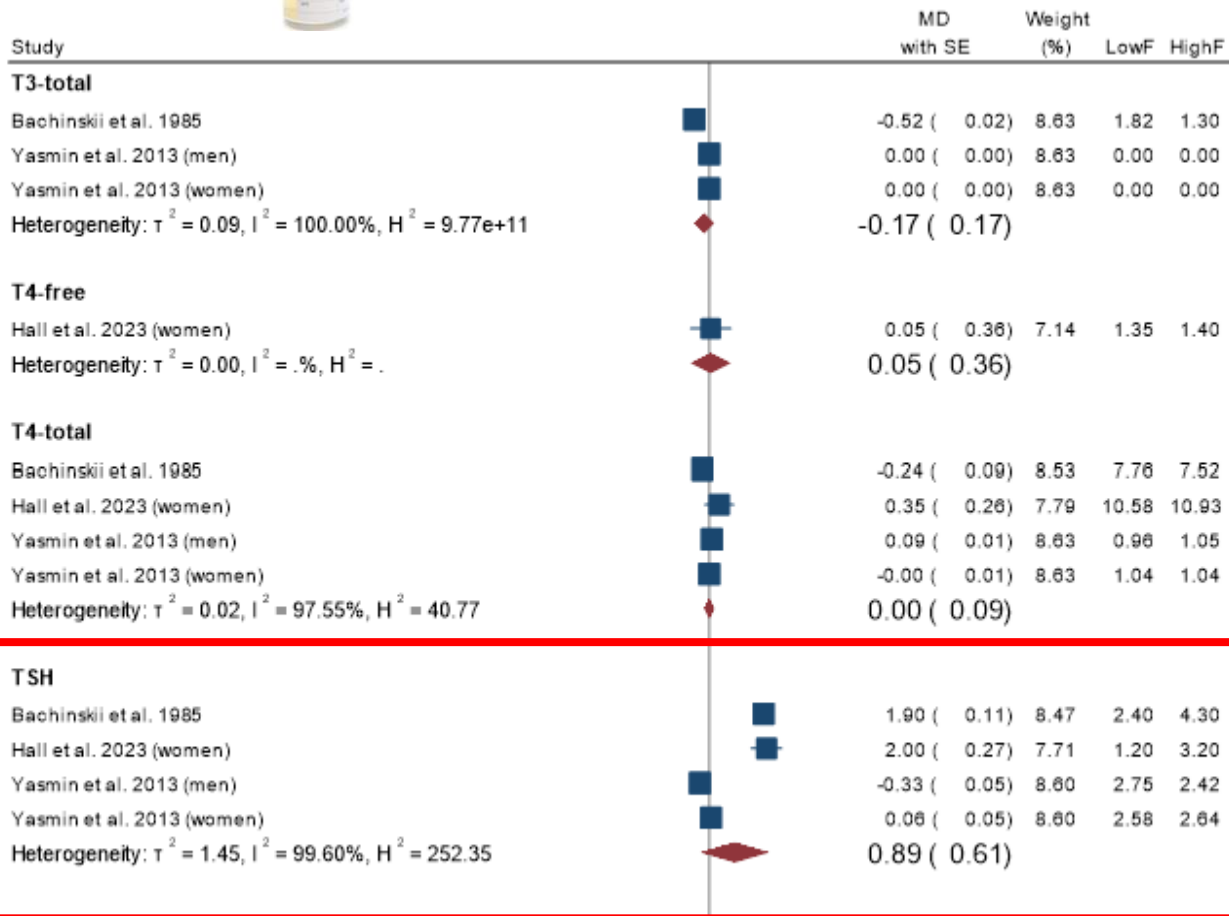


Figure S13

Fluoridated water has been associated with hypothyroidism in adults.

Research report

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

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Centre for Health Services Studies, University of Kent, Canterbury, Kent, UK

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Received 18 September 2014
Revised 16 January 2015
Accepted 18 January 2015

ABSTRACT

Background While previous research has suggested that there is an association between fluoride ingestion and the incidence of hypothyroidism, few population level studies have been undertaken. In England, approximately 10% of the population live in areas with community fluoridation schemes and hypothyroidism prevalence can be assessed from general practice data. This observational study examines the association between levels of fluoride in water supplies with practice level hypothyroidism prevalence.

Methods We used a cross-sectional study design using secondary data to develop binary logistic regression

disorder, there are few population studies that examine the association of this disease with fluoride intake.³

In the UK, management of hypothyroidism is undertaken by primary care physicians (general practitioners, GPs) and patients' thyroid function (levels of thyroid-stimulating hormone and thyroxine) is tested annually as one element of the GP pay-for-performance system, the Quality and Outcomes Framework (QOF).⁷ These data provide a measure of practice prevalence of hypothyroidism which can be geographically mapped against areas with and without fluoride added to the drinking

SCIENTIFIC REPORTS

OPEN

Impact of Drinking Water Fluoride on Human Thyroid Hormones: A Case- Control Study

Zohreh Kheradpisheh¹, Masoud Mirzaei², Amir Hossein Mahvi^{3,4}, Mehdi Mokhtari¹, Reyhane Azizi⁵, Hossein Fallahzadeh⁶ & Mohammad Hassan Ehrampoush¹

Received: 9 June 2017

Accepted: 21 January 2018

Published online: 08 February 2018

The elevated fluoride from drinking water impacts on T_3 , T_4 and TSH hormones. The aim was study impacts of drinking water fluoride on T_3 , T_4 and TSH hormones in YGA (Yazd Greater Area). In this case- control study 198 cases and 213 controls were selected. Fluoride was determined by the SPADNS Colorimetric Method. T_3 , T_4 and TSH hormones tested in the Yazd central laboratory by RIA (Radio Immuno Assay) method. The average amount of TSH and T_3 hormones based on the levels of fluoride in two concentration levels 0–0.29 and 0.3–0.5 (mg/L) was statistically significant ($P = 0.001$ for controls and $P = 0.001$ for cases). In multivariate regression logistic analysis, independent variable associated with Hypothyroidism were: gender (odds ratio: 2.5, CI 95%: 1.6–3.9), family history of thyroid disease (odds ratio: 2.7, CI 95%: 1.6–4.6), exercise (odds ratio: 5.34, CI 95%: 3.2–9), Diabetes (odds ratio: 3.7, CI 95%: 1.7–8), Hypertension (odds ratio: 3.2, CI 95%: 1.3–8.2), water consumption (odds ratio: 4, CI 95%: 1.2–14). It was found that fluoride has impacts on TSH, T_3 hormones even in the standard concentration of less than 0.5 mg/L. Application of standard household water purification devices was recommended for hypothyroidism.

Full length article

Fluoride exposure and thyroid hormone levels in pregnancy: The MIREC cohort

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Christine Till^{a,*}

^a Psychology Department, York University, Toronto, ON, Canada

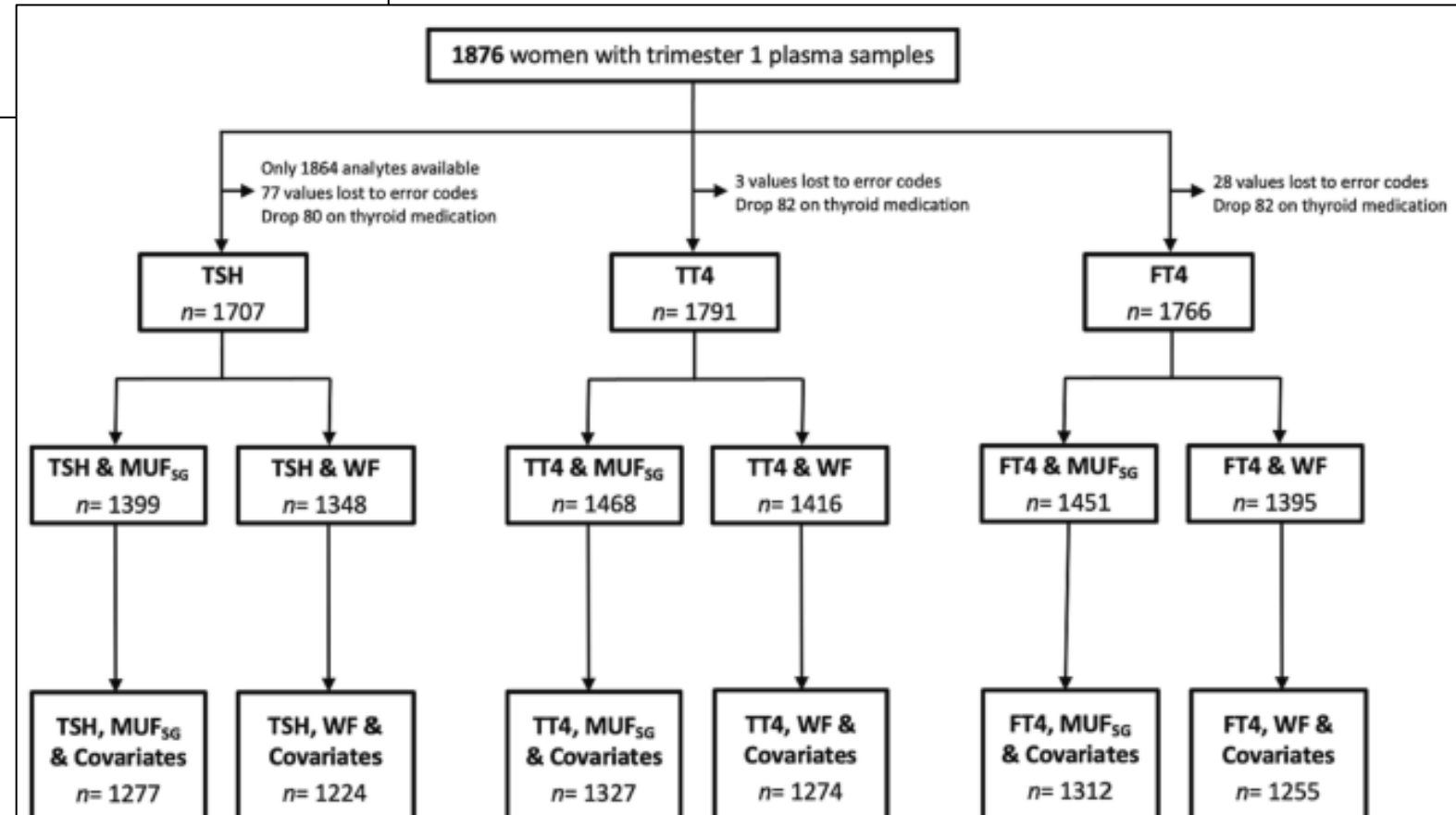
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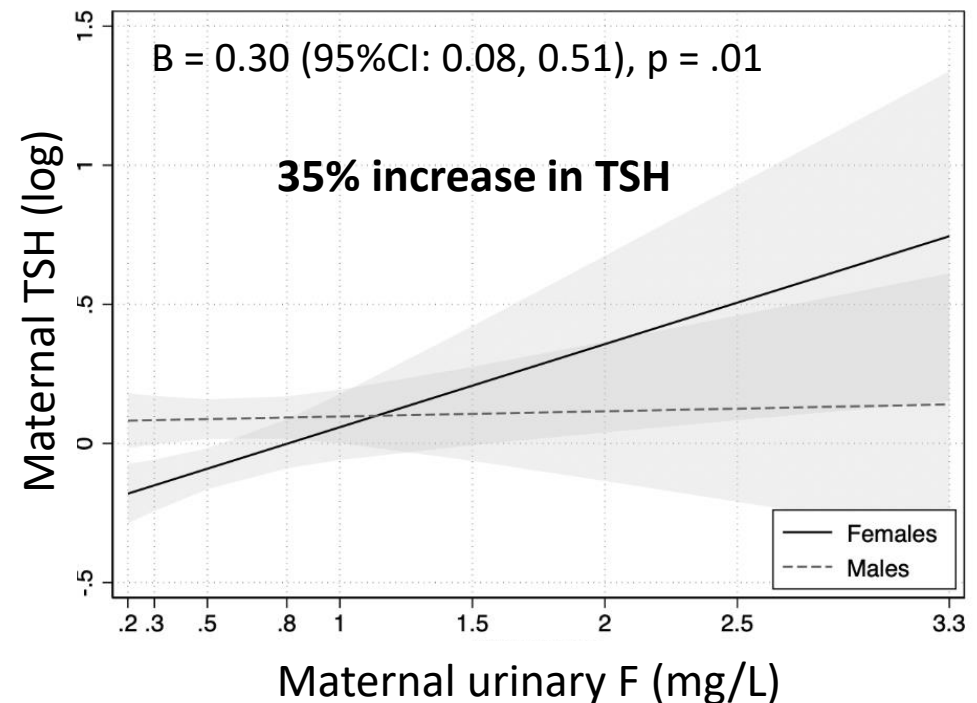
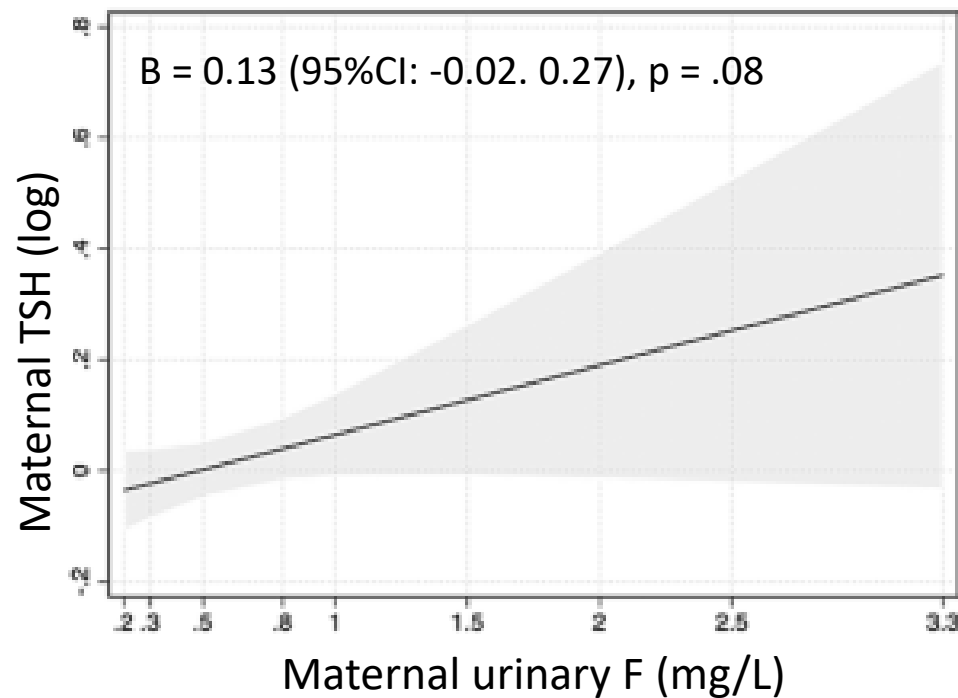
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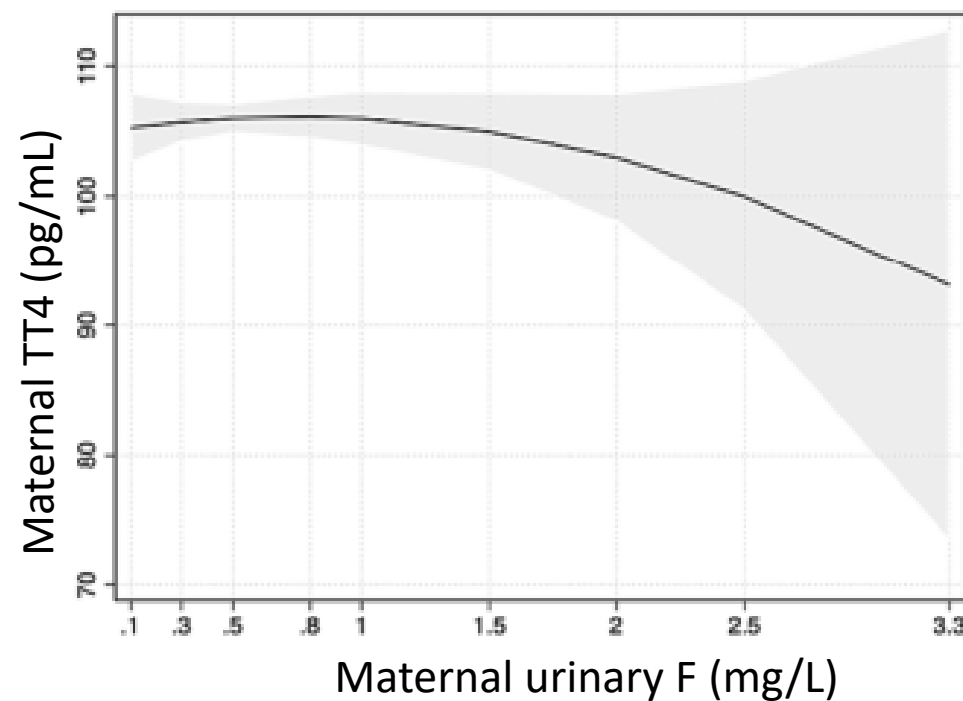
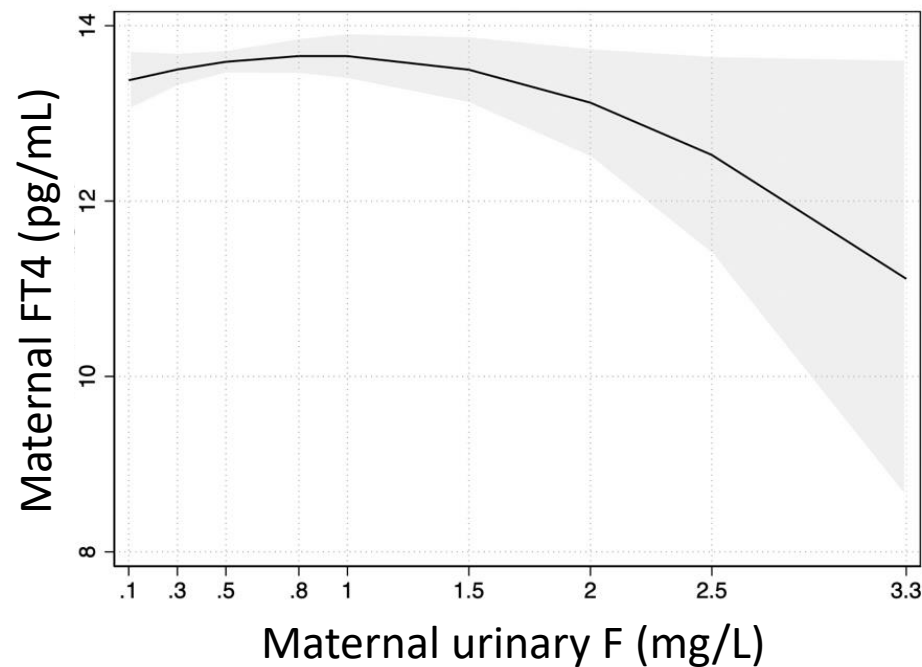
Is fluoride exposure associated with
TSH, TT4, and FT4 in **pregnant
women** living in areas with optimal
fluoridation?



There was a positive association between maternal urinary fluoride and thyroid stimulating hormone (TSH), especially among women carrying females.



Free T4 and total T4 were not significantly associated with urinary fluoride levels in pregnant women.





Fluoride exposure and hypothyroidism in a Canadian pregnancy cohort



Meaghan Hall^a, Bruce Lanphear^b, Jonathan Chevrier^c, Rick Hornung^d, Rivka Green^a, Carly Goodman^a, Pierre Ayotte^e, Esperanza Angeles Martinez-Mier^f, R. Thomas Zoeller^g, Christine Till^{a,*}

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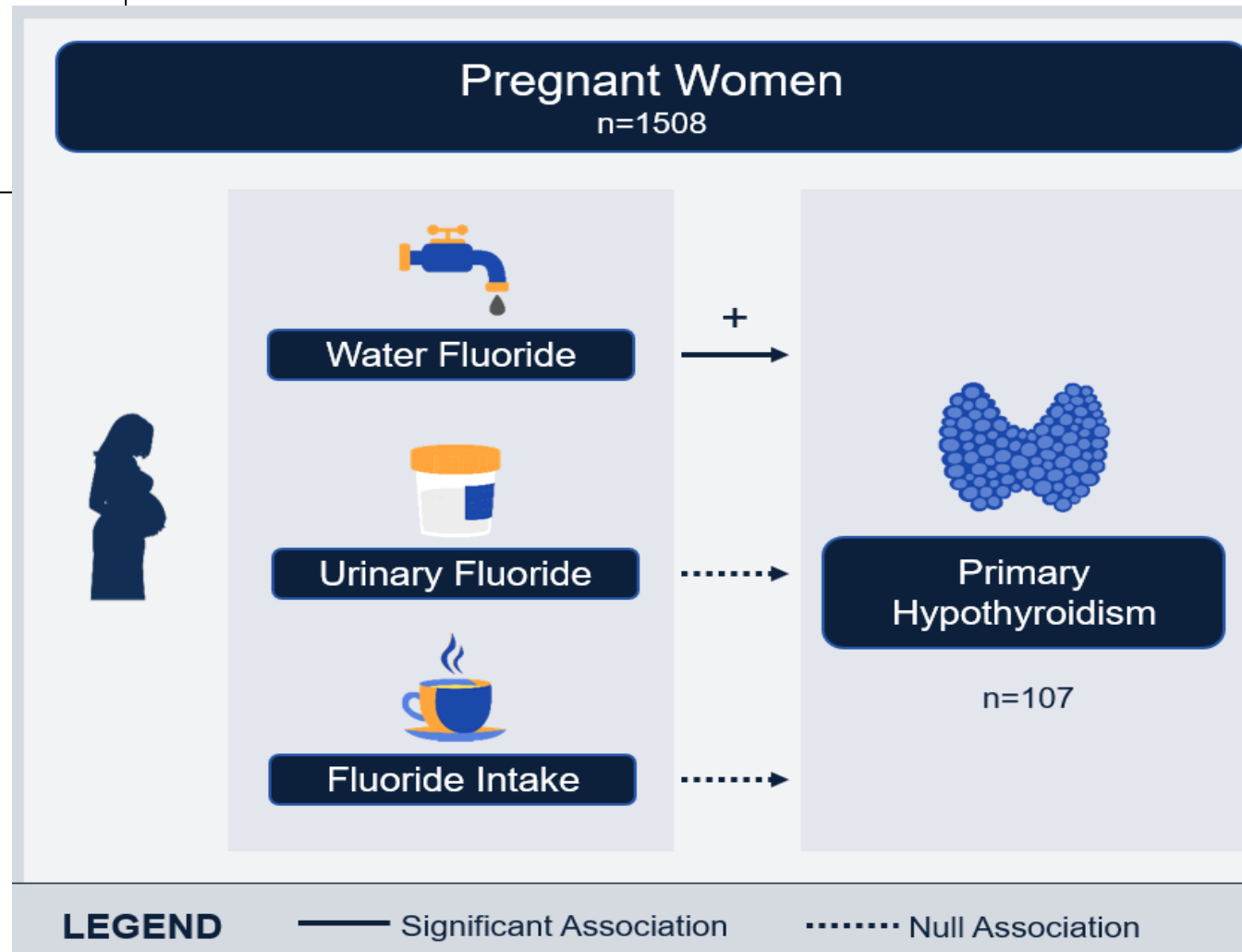
^c School of Population and Global Health, McGill University, Montreal, QC, Canada

^d Retired; Consultant to Psychology Department, York University, Toronto, ON, Canada

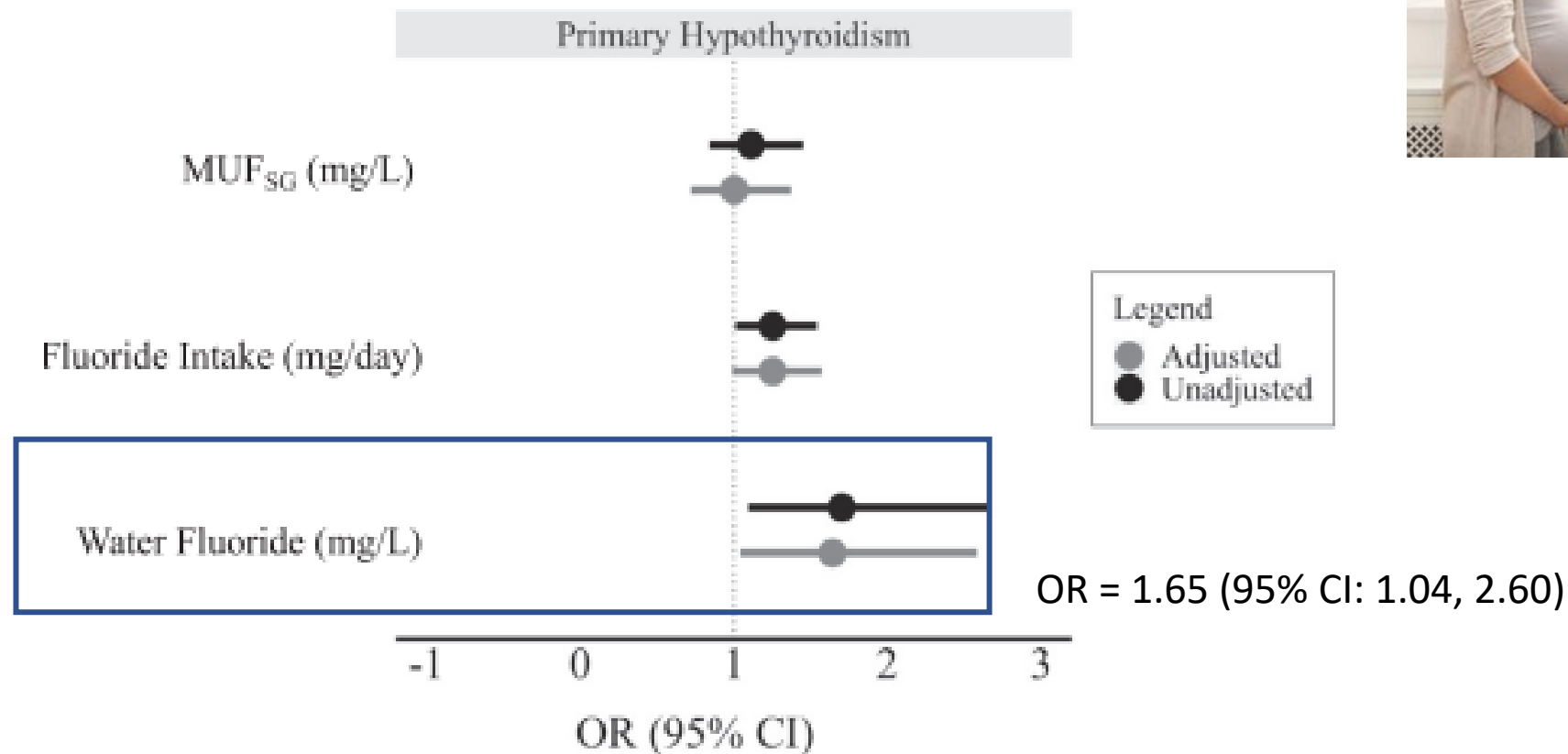
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^f School of Dentistry, Indiana University, Indianapolis, IN, United States

^g Biology Department, The University of Massachusetts Amherst, Amherst, MA, United States



Pregnant women exposed to higher concentrations of fluoride in drinking water were at higher risk of hypothyroidism.



*adjusted for maternal age, pre-pregnancy BMI, maternal education, race, and city of residence
*also: Tg, As, Pb, Mg, Hg, PFAS

Letter to the editor regarding Hall et al. (2023): Fluoride exposure and hypothyroidism in a Canadian pregnancy cohort

Meaghan Hall^a, Bruce Lanphear^b, Jonathan Chevrier^c, Rick Hornung^d, Rivka Green^a, Carly Goodman^a, Pierre Ayotte^e, Esperanza Angeles Martinez-Mier^f, R. Thomas Zoeller^g, Christine Till^a

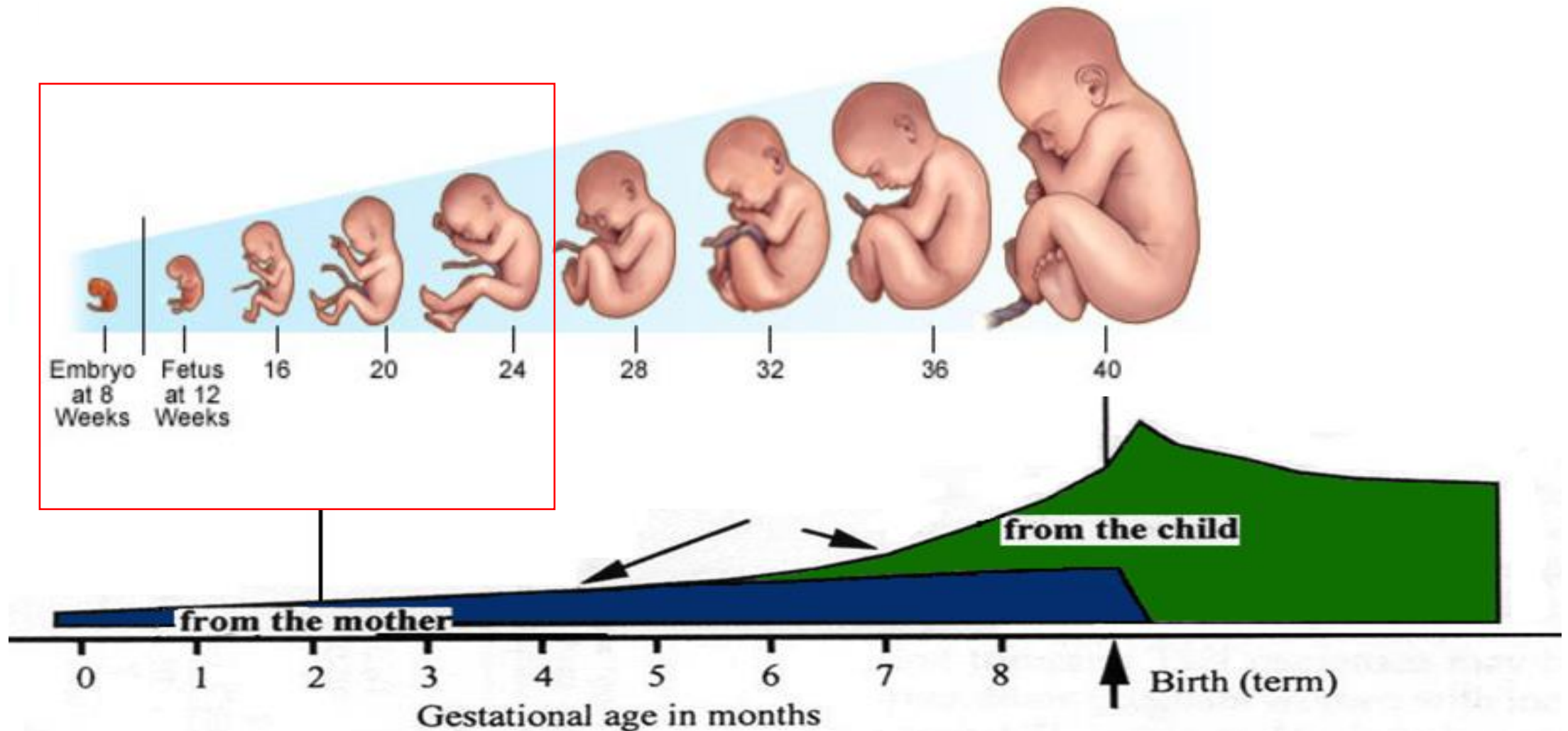
Association between water fluoride concentration and risk of primary hypothyroidism.

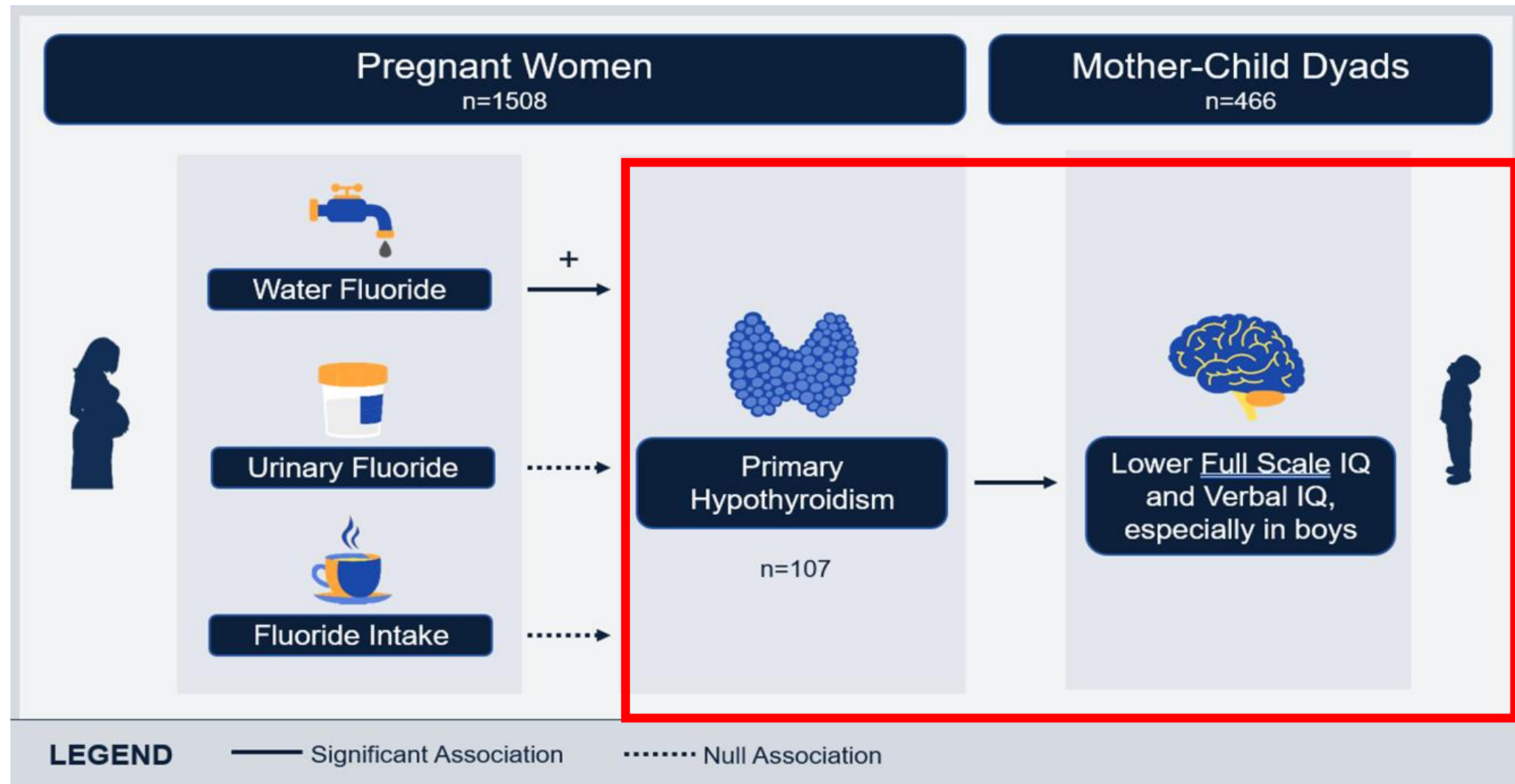
	<i>n</i>	aOR*	95% CI	<i>p</i>
Total Sample	1105	1.65	1.04, 2.60	.03
+ Lived at residence for ≥ 1 year	889	1.80	1.07, 3.01	.03
+ Normal^a TPO Ab Levels	1094	2.85	1.25, 6.60	.01

^a TPO Ab < 5.61 IU/mL.

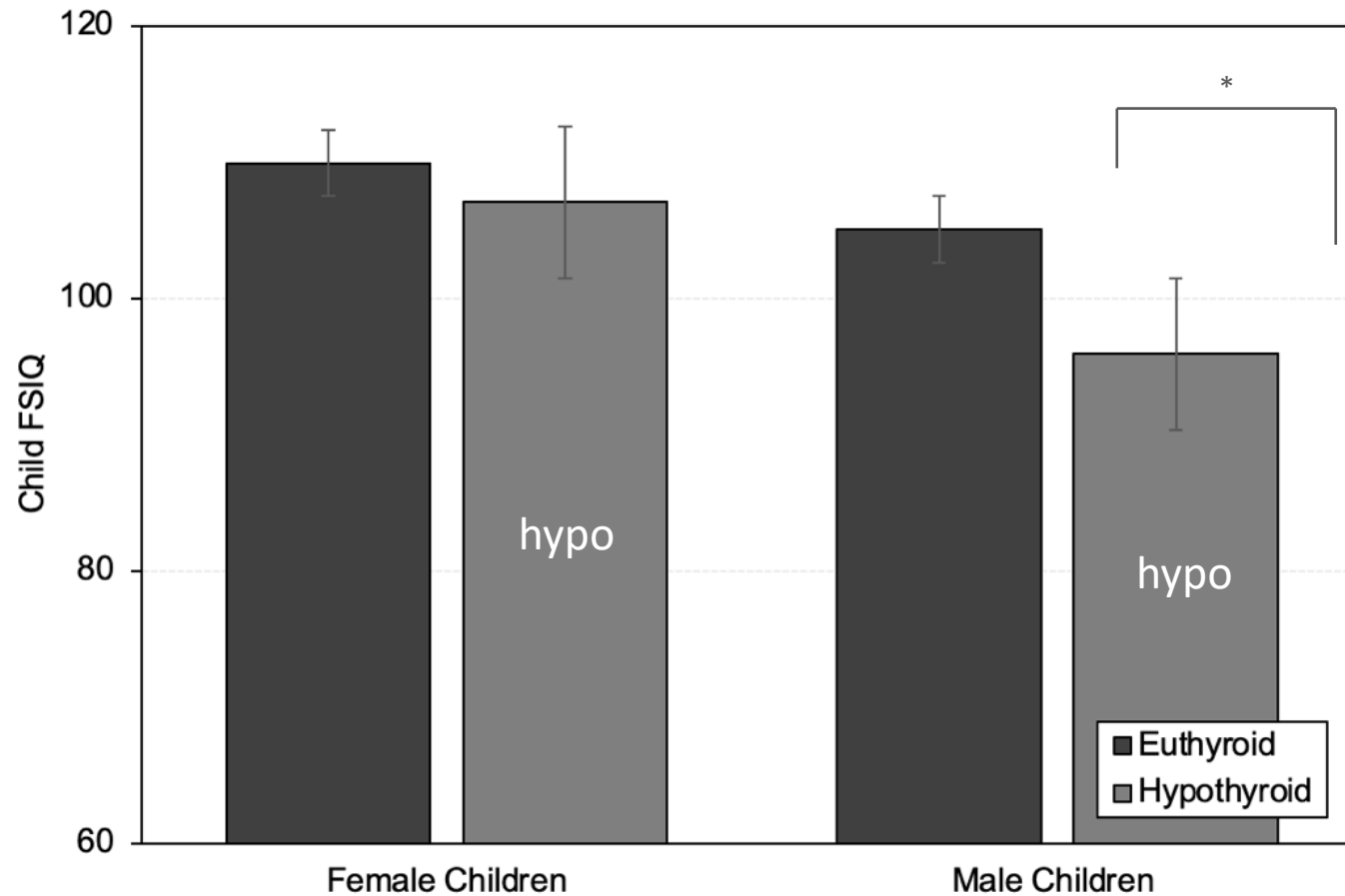
* adjusted OR reported for 0.5 mg/L increase in water fluoride concentration.

Thyroid hormone is critical in gestational development





Boys born to women with hypothyroidism had significantly lower IQ scores than boys born to euthyroid women.



Fluoride, iodine, and thyroid

- Iodine is essential for thyroid hormone synthesis
- Iodine deficiency can exacerbate the thyroid-disrupting effects of fluoride (Jiang et al. 2016; Malin et al. 2018, NRC, 2006)
 - Effects on thyroid function have been reported at fluoride doses as low as 0.01 to 0.03 mg/kg/day in low iodine situations (NRC, 2006)
- Iodine intake in the U.S. population is decreasing
 - 23% of pregnant women have inadequate iodine intakes (Kerver et al, 2021)

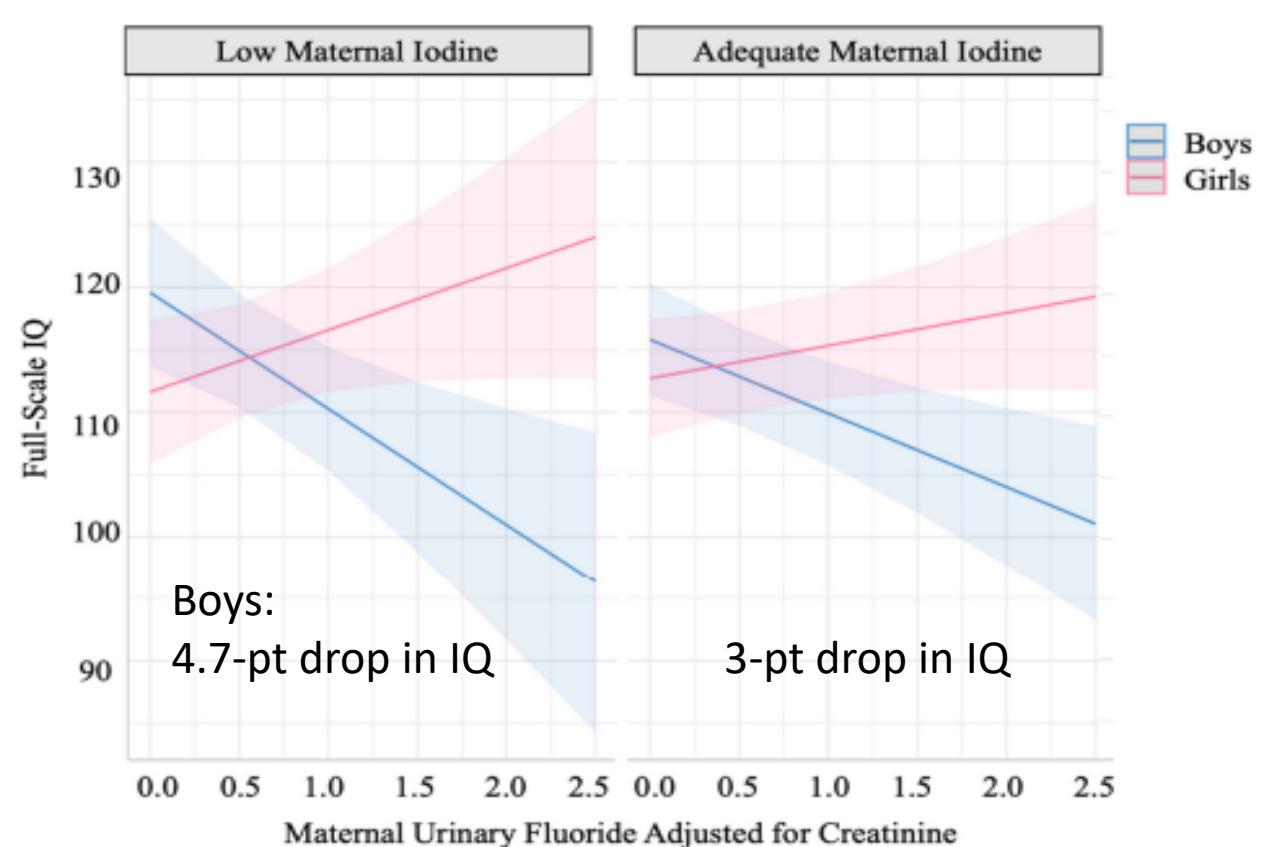
Iodine deficiency in pregnancy may increase risk of fluoride neurotoxicity.



Article

Iodine Status Modifies the Association between Fluoride Exposure in Pregnancy and Preschool Boys' Intelligence

Carly V. Goodman ¹, Meaghan Hall ¹, Rivka Green ¹, Jonathan Chevrier ², Pierre Ayotte ³, Esperanza Angeles Martinez-Mier ⁴, Taylor McGuckin ¹, John Krzeczowski ¹, David Flora ¹, Richard Hornung ^{5,†}, Bruce Lanphear ⁶ and Christine Till ^{1,*}

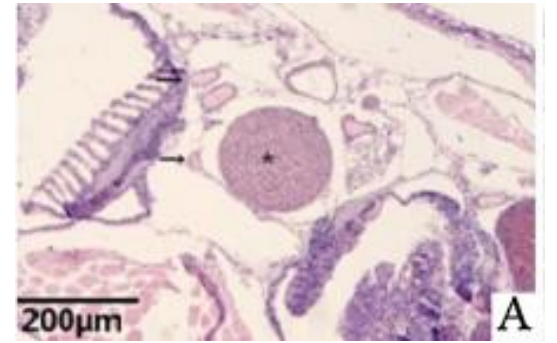


Goodman et al., *Nutrients*, 2022;

*3-way interaction significant for boys ($p = .04$), but not girls ($p = .19$)

How does fluoride interfere with thyroid function?

- Inhibiting effect on deiodinase activity
- Impair T4 conversion to T3
- Disrupt G-proteins of hormone receptors
- Reduced thyroidal NIS expression
- Damage thyroid cells and alter thyroid structure



Take Aways



Experimental and epidemiologic evidence reports associations between fluoride exposure and thyroid dysfunction.



Thyroid toxicity supports the plausibility of fluoride neurotoxicity.



The potential for childhood sodium fluoride treatment to disrupt thyroid function must be taken seriously, particularly for children with suboptimal intakes of iodine.

Thank you



Session 2: Thyroid

Identifying Safety Concerns and
Potential Risks Associated with the
Use of Orally Ingestible Unapproved
Prescription Drug Products
Containing Fluoride

Kathleen Thiessen, PhD

Oak Ridge Center for Risk Analysis

A Risk-Assessment Perspective on Ingested Fluoride and Thyroid Effects

**Use of Orally Ingestible Unapproved Prescription Drug Products
Containing Fluoride in the Pediatric Population
Public Meeting**

**Reagan-Udall Foundation for the FDA
Silver Spring, Maryland
July 23, 2025**

**Kathleen M. Thiessen, Ph.D.
Oak Ridge Center for Risk Analysis
(865) 483-6111
kmt@orrisk.com**

Context

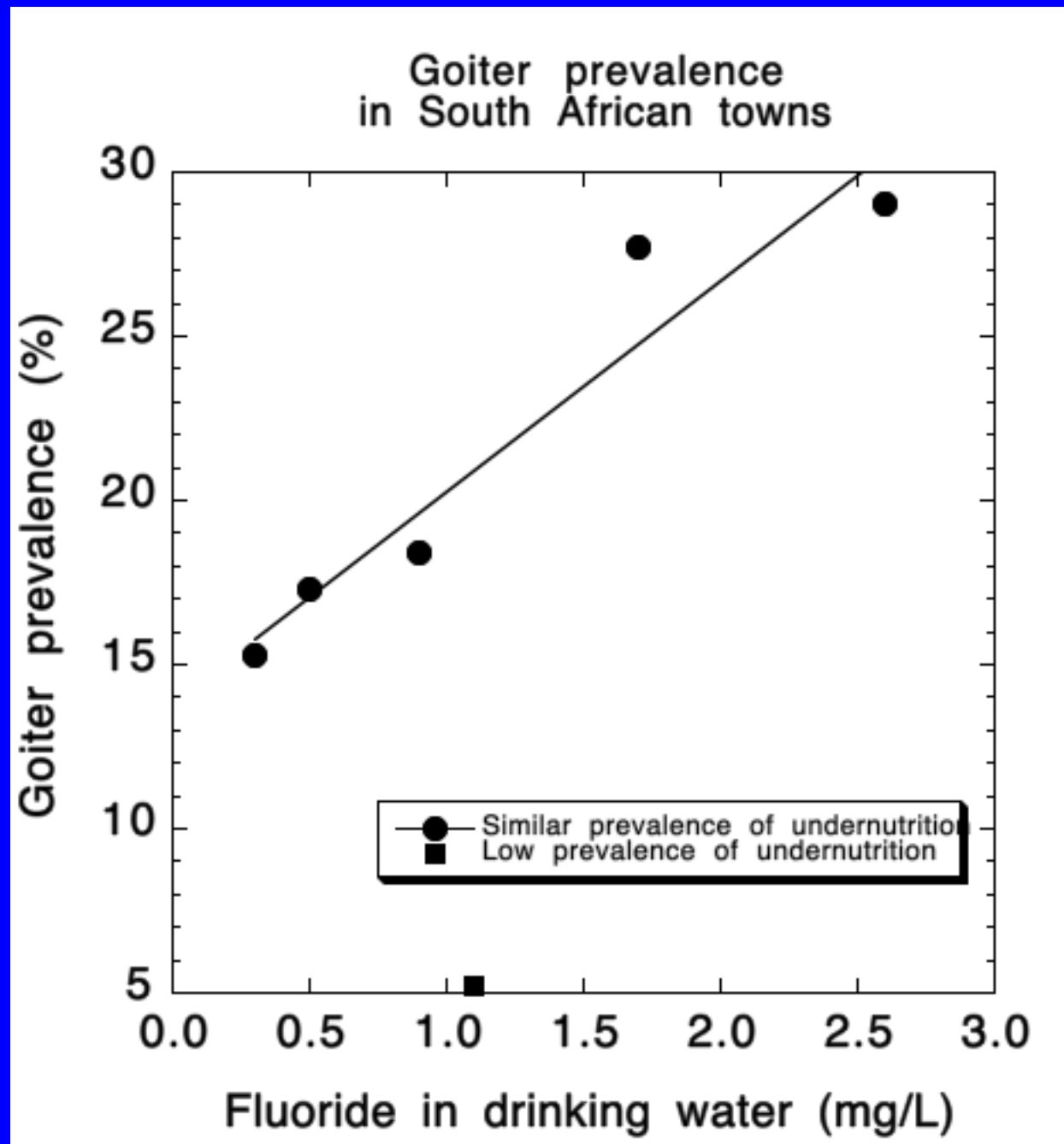
- **Fluoride's predominant effect is posteruptive and topical.** (Centers for Disease Control and Prevention 2001)
- **Fluoride supplements are “a risk factor for dental fluorosis,” and the “risks of using supplements in infants and young children outweigh the benefits.”** (Burt 1999)
- **The “findings suggest that achieving a caries-free status may have relatively little to do with fluoride *intake.*”** (Warren et al. 2009, emphasis in the original)
- **Systemic fluoride ingestion is not beneficial and comes with a number of health risks.**
 - Dental fluorosis (associated with reduced IQ, increased bone fractures, etc.)
 - Thyroid dysfunction
 - Cognitive deficits
 - Other adverse health effects

Normal thyroid function

- **Thyroid hormones**
 - T4 (thyroxine)
 - T3 (triiodothyronine)
- **Modulates a variety of physiological processes**
 - Including normal growth and development
 - Essential for normal development of nervous system
 - Dependent on adequate iodine intake
- **T4 is the major secretory product of the thyroid**
- **T3 is the active form of thyroid hormone**
 - Binds to the thyroid hormone receptor
- **T3 is produced from T4 by the deiodinases**
 - Type I (liver, kidney, thyroid)
 - Type II (nonhepatic tissues, including brain and pituitary)
- **TSH level usually indicative of the status of thyroid function**
- **Maternal thyroid function is essential for the developing child**

Fluoride effects on thyroid function: Human studies

- **Relieved hyperthyroidism in some patients**
 - 0.03-0.14 mg/kg/d
- **Goiter prevalence of at least 20%**
 - 0.07-0.13 mg/kg/d (adequate iodine)
 - ≥ 0.01 mg/kg/d (iodine deficiency)
- **Altered concentrations of T4 and T3**
 - 0.05-0.1 mg/kg/d (adequate iodine)
 - 0.03 mg/kg/d (iodine deficiency)
- **Elevated concentrations of TSH**
 - 0.05-0.1 mg/kg/d (adequate iodine)
 - 0.03 mg/kg/d (iodine deficiency)



Jooste et al.
1999

Thyroid effects of fluoride: Possible mechanisms

- **Decreased production of thyroid hormone**
- **Effects on transport of iodine and thyroid hormones**
- **Effects on peripheral conversion of T4 to T3 and on normal deiodination**
 - **Inhibition of deiodinases**

Thyroid effects of fluoride: Implications

- **Increase in symptomatic individuals**
- **Increased risks associated with subclinical (asymptomatic) thyroid disease**
 - Cardiac disease
 - Increased cholesterol concentrations
 - Increased incidence of depression
 - Diminished response to standard psychiatric treatment
 - Cognitive dysfunction
 - For pregnant women, decreased IQ of offspring

Significance for public health

- **Fluoride exposure ranges necessary for many adverse effects of fluoride are reached by people in the U.S.**
 - Tablets prescribed according to ADA recommendations correspond to 0.02-0.03 mg/kg/d
- **Additional risk factors**
 - Iodine deficiency (common in the U.S., especially among pregnant women)
 - Chronic kidney disease (reduced excretion of fluoride)
 - Calcium deficiency (common in the U.S.)
- **Potential impact of fluoride exposure**
 - At least 50% of US children have dental fluorosis
 - >10% of the US population (1% of children) have hypothyroidism
- **Most “at-risk” for caries are not helped by fluoride exposure**
 - Most vulnerable to adverse effects from ingested fluoride
 - Fluoride exposure does not make up for socioeconomic differences

Session 2 Reactor Panel



Bruce Lanphear, MD, MPH

Simon Fraser University



Charlotte W. Lewis, MD, MPH

University of Washington School of Medicine

LUNCH

A background image featuring a medical professional in a white coat with a stethoscope around their neck. Overlaid on this is a network diagram with a central hub and several peripheral nodes, each containing a medical icon: a heart with an ECG line, a syringe, a clipboard, a shield with a cross, a person, a flask, a heart, a person, a syringe, and an ambulance.

The meeting will resume at 2pm ET



Public Comment Topic





- **Topic 1: Clinical Use and Prescribing Considerations for Pediatric Tooth Decay
Preventions**
- **Topic 2: Safety Concerns**
- **Topic 3: Appropriateness of Pediatric Use Considering Additional
Sources of Exposure**
- **Topic 4: Impact of Removal of Orally Ingestible Unapproved Prescription
Drug Products/Potential Alternatives**

Virtual Public Comment Process



Commenters will be called by name in alphabetical order.

- Make sure your on-screen name matches your registration name.
- We will announce the commenters in sets of three, so you know when your slot is coming up
 - The first time your name is called: **PREPARE TO SPEAK.**
 - Second time your name is called: **TURN ON YOUR CAMERA** 
 - As speaker concludes: **UNMUTE YOUR MICROPHONE** 
 - *Listen for cue from Production Team*

Commenters will have 3.5 minutes to speak. A countdown timer will be provided.

In-Person Public Comment Process



Commenters will be called by name in alphabetical order.

➤ We will announce the commenters in sets of three, so you know when your slot is coming up

- The first time your name **MOVE TO THE STAGE STAIRS**
- Second time your name is called: **MOVE TO THE OPEN PODIUM**
- Once you are introduced, you will **SPEAK FROM THE PODIUM.**



Commenters will have 3.5 minutes to speak. A countdown timer will be provided.

Public Comment

Topic 1: Clinical Use and Prescribing Considerations for Pediatric Tooth Decay Preventions



Peter Pitts



Steven Levy

Dr. Steven M. Levy – Professor at The University of Iowa Colleges of Dentistry and Public Health

- **Tooth decay** (cavities) continues to be a **major, debilitating disease** for many children.
- It is **not practicable to expect** most children/families to **prevent cavities in children by avoiding excessive sugar intake and good dental hygiene**.
- So, **fluoride** continues to be the **best way to prevent cavities**.
- **Many children do not have access to fluoridated water, so:**
 - **Dietary fluoride supplements continue to be an important way to prevent cavities.**
 - **Recommended by the U.S. Preventive Services Task Force (USPSTF)** for caries prevention.
 - Provide **both systemic and topical benefits**.
 - **Even more important now** with 2 states banning community water fluoridation.
 - **Provide parents with individual choice** about children's fluoride exposures .
- From the editorial I was asked to write for *JAMA Pediatrics* ("Caution Needed in Interpreting the Evidence Base on Fluoride and IQ", January 6, 2025):
 - Due to the **limitations of available data and authors' choices** about study inclusion and exclusion criteria, analysis, and interpretation, **caution is needed in interpreting the possible fluoride link to IQ** .
 - No credible evidence of IQ or neurodevelopmental concerns** with fluoride intakes at the levels used in community water fluoridation or from dietary fluoride supplements.
- The benefits of tooth **decay prevention outweighs** the risk of **mild dental fluorosis**.
 - Our two recent publications demonstrated clearly that **fluorosis fades** (is less evident) with time (from 9 to 23).
- Therefore, the bottom line is that, since dietary fluoride supplements provide important caries-preventive benefits for children not receiving fluoridated water and there is no credible evidence of neurodevelopmental risks from fluoride intakes from dietary fluoride supplements or at water fluoride levels below 1.5mg/L,
 - **The use of dietary fluoride supplements should be expanded, not reduced or banned.**



Christopher Fox

Fluoride Supplements: Safe. Effective. Essential.

- **Evidence-based recommendations by major health authorities**
 - USPSTF, AAP, ADA
 - Start at 6 months for high-risk children in low fluoride areas
- **Proven: 24% reduction in cavities**
 - When used appropriately, supports tooth development through adolescence
- **Vital for underserved communities**
 - 52% of U.S. children have tooth decay
 - Needed where water fluoridation is lacking
- **Preserve Access**
 - Base decisions on science and equity



AADOOCR[®]
American Association for Dental,
Oral, and Craniofacial Research

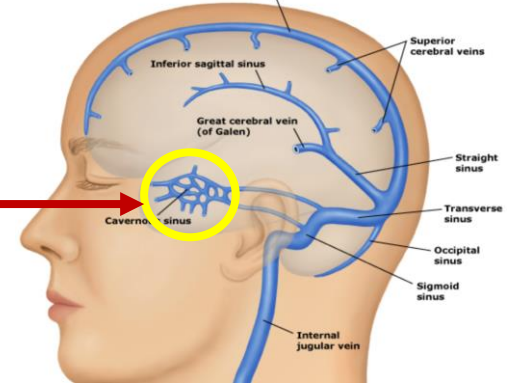


Johnny Johnson

Dental infections: Serious body complications

Pus is going to spread

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



Topic 2: Safety Concerns

Audrey Adams



Michael Connett



Douglass Cragoe



Beverly DeCer



Christina Eve Jensen Kimball



Paula Rabin



Tamara Robison

Fluoride Safety- Science not Speculation

Claims linking fluoride to thyroid dysfunction, cancer, or reduced IQ are based on studies of unregulated, excessive exposure—often in areas with fluoride levels far above U.S. recommendations and lacking controls for confounding factors like arsenic and lead. These findings should not be misapplied to well-regulated public health use. The overwhelming scientific consensus affirms that fluoride at recommended levels is safe, effective, and essential for protecting vulnerable populations from preventable dental disease.

Fluoride Predates the FDA approval process

Fluoride in water and supplements has been used safely and effectively for over 70 years—long before the FDA's current approval framework existed. Instead of working to remove a proven public health tool due to a regulatory technicality, the appropriate path forward is modernization and formal approval—not withdrawal. Science supports fluoride. Policy should too.

Preserve and Protect Clinical Autonomy

Fluoride is not a toxin or contaminant—Like chlorine in water, iodine in salt, and vitamin D in milk, fluoride is a deliberate, science-driven public health measure. These interventions were introduced to prevent widespread, deficiency-related diseases. Fluoride deserves the same recognition and protection as other proven preventive tools. Stripping providers of the right to prescribe fluoride based on individual risk undermines clinical autonomy and jeopardizes care for vulnerable populations, especially low-income children disproportionately affected by dental disease.

Protect Science, Clinical Judgement & Children's Health

Removing fluoride prescribing authority from licensed providers undermines clinical judgment, ignores decades of scientific consensus, and risks worsening a preventable childhood disease. The FDA must stand with science, not ideology—supporting pediatricians, dentists, and public health experts committed to evidence-based care. Children deserve protection rooted in proven tools.

Fear Based Misinformation is Undermining Topical Fluoride Use

Equating fluoride with harmful substances like PFAS or synthetic dyes is scientifically false and erodes trust in proven public health tools. A growing number of well-intentioned, health-conscious parents are now refusing fluoride varnish, toothpaste, and fluoridated water—turning instead to unproven alternatives without fluoride's decades of safety and efficacy data. This fear-driven shift toward limiting fluoride to only topical use is misguided and puts children at increased risk for preventable dental disease.

Fluoride Policy must be Driven by Science

Fluoride is a safe, evidence-based public health tool supported by decades of research and expert consensus. Removing access based on regulatory technicalities, misinformation, or ideological pressure undermines clinical judgment, endangers vulnerable populations, and sets a dangerous precedent. The FDA must uphold science, preserve provider autonomy, and protect children's health with proven interventions.

Do No Harm

If the goal is truly to improve public health, then restricting licensed providers from prescribing fluoride based on individual risk will do the opposite. It undermines clinical judgment, disregards decades of scientific consensus, and removes a proven tool in preventing one of the most common childhood diseases. The FDA must stand with evidence-based care, not ideology—supporting the healthcare professionals committed to protecting children with safe, effective interventions, and to do no harm.

Compounding Suffering

Due to limited access to operating rooms, patients wait 3 to 6 months for essential procedures. These delays compound physical suffering, worsen disease progression, and deepen health inequities. But the impact doesn't stop there—overburdened providers, rising healthcare costs, and strained hospital systems are part of the cascading toll. Timely surgical care is not a luxury; it is essential to protect both individual health and the sustainability of our healthcare system



Jay Sanders



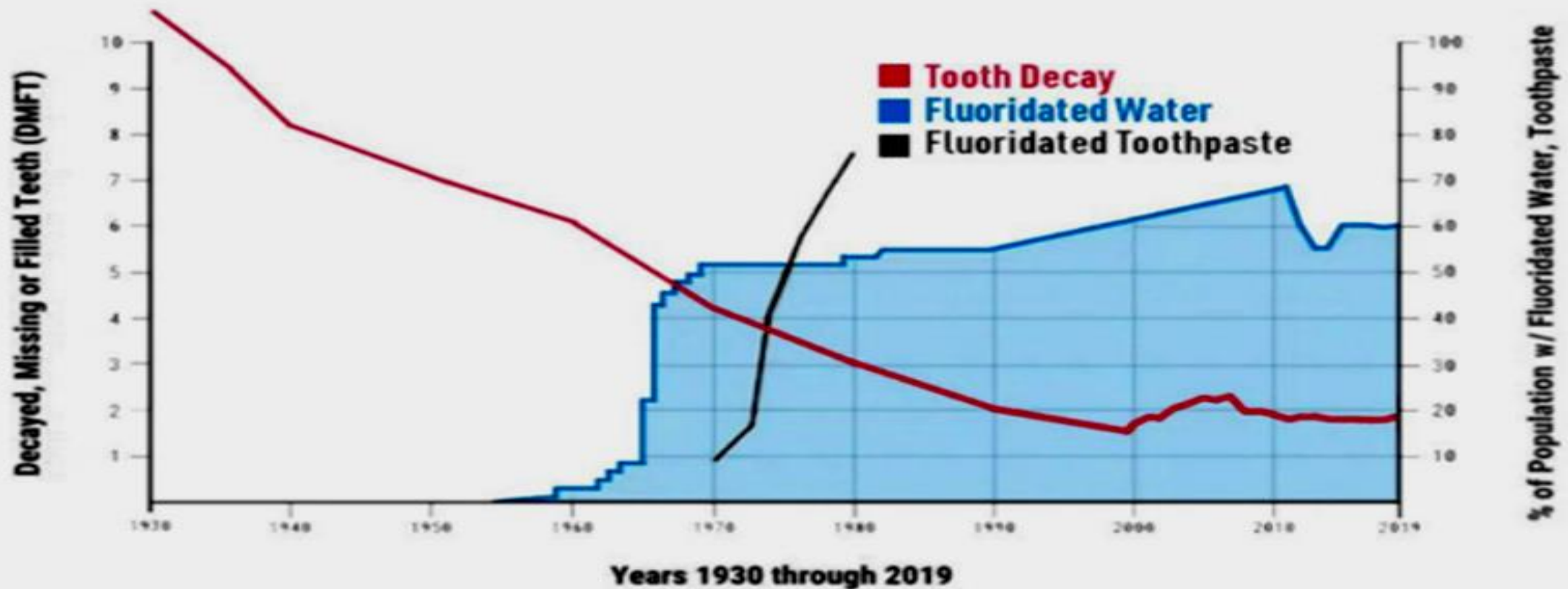
Brett Kessler

Topic 3: Appropriateness of Pediatric Use Considering Additional Sources of Exposure



Gerald Steel

Introduction of Fluoridated Water and Fluoride Toothpaste and Tooth Decay Rate of 5-year-old Children in New Zealand (Updated)



Colquhoun J. (1997). Why I changed my mind about Fluoridation. *Perspectives in Biology and Medicine* 41: 29-44.
www.health.govt.nz/nz-health-statistics/health-statistics-and-data-sets/
www.ehinz.ac.nz/indicators/water/drinking-water-quality/access-to-fluoridated-drinking-water/

Figure 8. 50-year decline in tooth decay of 5-year-olds in New Zealand. Compiled from Health Department records of 5-year-olds' tooth decay, 1930-1990 fluoridation, and fluoride toothpaste sales. Tooth decay (red) was declining prior to the introduction of fluoridated water (blue).

Topic 4: Impact of Removal of Orally Ingestible Unapproved Prescription Drug Products/Potential Alternatives



Clifton Carey

Protecting Children's Oral Health: Preserve Prescription Ingestible Fluoride Access

- **Removal of orally ingestible unapproved prescription fluoride drug products: Doubles the risk of early childhood caries**
 - 80% of dental disease (ages 2-5) disproportionately impacts low-income & minority communities.
 - Leads to increased chronic pain, hindered learning, and avoidable financial burdens.
- **Proven Efficacy & Unique Benefit:**
 - Reduces caries by 40-50% in primary teeth, 50-60% in permanent teeth.
 - Systemic fluoride is incorporated into the developing tooth enamel during its formation (pre-eruptive stage). This makes the enamel more resistant to acid attacks..
 - In contrast to topical fluoride and sealants (which protect *after* eruption), systemic fluoride offers early, long-term protection by fortifying enamel before teeth emerge.
 - No approved alternative provides this critical early, long-term protection.
- **Debunking Myths: Fluoride's Safety for the Gut Microbiome at Prescribed Doses.**
 - Authors from the cited studies clarified that there are no harms to the gut biome at prescribed doses
 - Fluoride is not antibiotic; it slows microbial metabolism and cannot kill gut bacteria.
 - No study has shown that optimal fluoride concentrations cause thyroid disorders, weight gain or decreased IQ
- **Navigating the Unapproved Drugs Initiative: The Case for Prescription Fluoride**
 - FDA initiative targets products that lack robust efficacy data, pose potential risks, or have approved alternatives:
 - Ingestible fluoride drugs are effective and safe at prescribed doses.
 - Crucially, there are no approved alternatives that deliver fluoride to the enamel in its formative stage.
- **Recommendation:** Orally ingestible prescription fluoride products must remain available for professional prescription to safeguard children's dental health.

Clifton M. Carey, PhD



William Maas

Impact of Removal/Potential Alternatives

- More decayed permanent molars & teeth with pits/fissures

Why?

- Permanent 1st/2nd molars are most caries-prone (Macek, 2003).
- Pre-eruptive fluoride reduces decay in pits/fissures (Singh, 2003, 2004).
- Supplements replicate daily fluoride intake of CWF.
- Claims from bench research that F incorporated in teeth is not sufficient to affect acid solubility do not apply to pits/fissures, where F from demineralized enamel remains for remineralization.

Alternative? Less than 1 of 3 children/teens have even one dental sealant.



Sandy Sutton



JoAnn Gurenlian

**Public Comment - Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride in the Pediatric Population
Hybrid Public Meeting 7.23.25**

The American Dental Hygienists' Association supports the use of Fluoride in Prescription Drug Products for Children

- Fluoride is proven to reduce dental caries by 25% in children.
- Caries disease or, cavities, is an infectious condition and remains the most common chronic disease among US children.
- 1 in 3 Americans live in a non-fluoridated community.
 - Orally ingestible fluoride products are essential for children without access to fluoridated water or regular preventive oral health care.
- The public health consequences of removing fluoride products from the market include increasing the prevalence of untreated caries disease, deepening health disparities, and requiring more expensive oral health care thereby placing added strain on families and public health infrastructure.
- ADHA urges the FDA to preserve access to fluoride in prescription drug products as a proven, evidence-based therapy.



Jennifer Holtzman

**Public Comment - Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride in the Pediatric Population
Hybrid Public Meeting 7.23.25**



AMERICAN ASSOCIATION OF PUBLIC HEALTH DENTISTRY

LEADERS IN PROMOTING ORAL HEALTH



Jennifer Johnson

**Public Comment - Use of Orally Ingestible Unapproved Prescription Drug Products Containing Fluoride in the Pediatric Population
Hybrid Public Meeting 7.23.25**



Steven Slott



Tim Wright



AMERICA'S PEDIATRIC DENTISTS
THE BIG AUTHORITY on little teeth®



The consumption of naturally occurring fluoride was discovered to be preventative of tooth decay.

Fluoride makes tooth mineral resistant to acid attack, so that teeth are more resistant to dental caries.

Clinical and animal studies confirm fluoride consumption reduces dental caries in children.

Exposure to fluoride supplements does not cause unhealthy changes in the oral or gut microbiome in children.

Consuming fluoride supplements does not cause negative neurobehavioral or other health concerns in children.

Removing fluoride supplements from the market will cause an increase in dental caries and the associated morbidities.



REAGAN-UDALL



FOUNDATION
FOR THE FDA