

CAPD / ACDP 2016

SATURDAY MORNING

1. Caries Risk Assessment
2. Fluoride Issues
3. Managing Eruption

Fluoride 2016 --- A Decade of Changes

- ❖ Review of how FLUORIDE works
- ❖ What is FLUOROSIS
- ❖ 2001 CDC Fluoride Guidelines
- ❖ 2006 ADA Topical Fluoride Recommendation
- ❖ 2007 ADA Infant Formula & Non-fluoridated H₂O
- ❖ 2008 JADA Systematic review of Fluoride Supplements

Fluoride 2016... Over a Decade of Changes

- ❖ 2010 JADA Causes of Fluorosis in Permanent Incisors -
❖ Iowa Study - Steve Levy
- ❖ 2011 ADA Evidence-Based Clinical Recommendations regarding Fluoride Intake from Reconstituted Infant Formula and Enamel Fluorosis
- ❖ 2011 Dept of Human and Health Services and EPA recommendation for fluoride level in public water systems

Fluoride 2016... Over a Decade of Changes

- ❖ 2012 AAPD Revised Guideline on Fluoride Therapy
- ❖ 2013 ADA Fluoride Toothpaste Efficacy
- ❖ 2014 AAP Fluoride Policy
- ❖ 2015 ABIM Choosing Wisely Statements
- ❖ 2015 "The Harvard Study" ~ Fluoride and IQ
- ❖ 2015 Silver Diamine Fluoride

Mechanism of Action of Fluoride

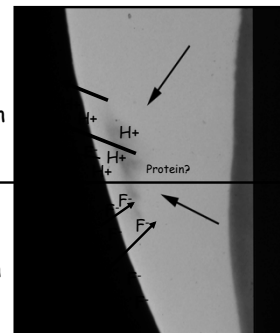
KEY CONCEPT --- primarily a **TOPICAL ACTION**
(even when given systemically):

- ⇒ Reduces enamel solubility
- ⇒ Promotes remineralization of enamel, and may **arrest or reverse** early caries
- ⇒ Inhibits the growth of cariogenic organisms thus decreasing acid production
- ⇒ Concentrated in saliva

Fluoride mechanism

Low pH
favors
Demineralization

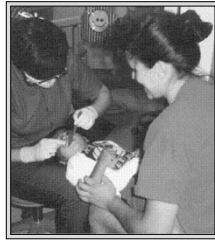
Increased pH
favors
Remineralization



Sources of Fluoride

Systemic fluoride - works topically

- o Community water fluoridation
- o Bottled water with fluoride added
- o Fluoride supplements
- o Swallowed toothpaste



Topical fluoride - works topically

- o Fluoride toothpastes
- o Professionally-applied: gels, foams, rinses, and varnishes

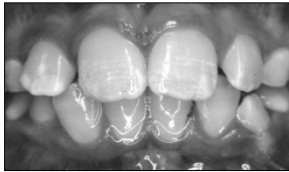
** if too much fluoride is ingested before age 5 - risk FLUOROSIS

The Fluoride Zone

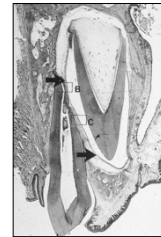
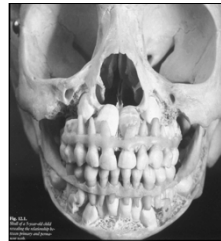
- like sodium
- too little topical fluoride - caries risk
- too much ingested fluoride - fluorosis risk

Amount of FLUOROSIS depends on

- 1) Amount of exposure
- 2) Duration of exposure
- 3) Timing within Enamel Maturation
- 4) Individual susceptibility ~ genetic predisposition ?



Risk Period for fluorosis = while Perm Teeth are developing



Anteriors -> 3months - 5 years of age
Enamel Maturation for all Permanent Teeth - complete by age 8

Critical Risk Period for Fluorosis 3 mos - 5 years of age

Tooth	Hard Tissue Formation Begins	Enamel Complete	Eruption
Permanent Dentition			
Maxillary			
Central incisor	3-4 mo	4-5 yr	7-8 yr
Lateral incisor	10-12 mo	4-5 yr	8-9 yr
Mandibular			

Issue of Fluorosis

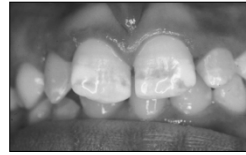
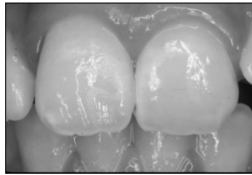


Esthetic and Trauma Concerns

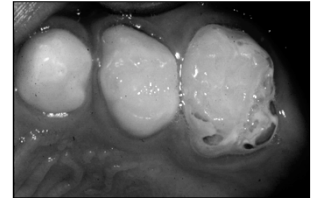
Fluorosis - is treatable



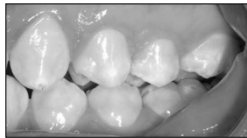
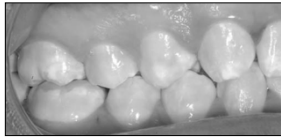
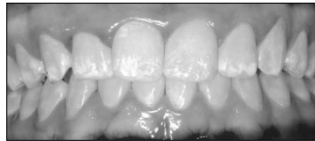
- 1) Cool Dam
- 2) 18% HCL and pumice



Fluorotic Incisors & Molars
SYSTEMIC EFFECT



LD's Generalized Fluorosis



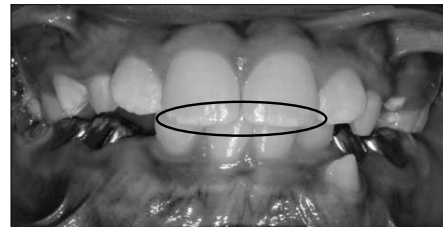
LD's Generalized Fluorosis and Enamel Pitting



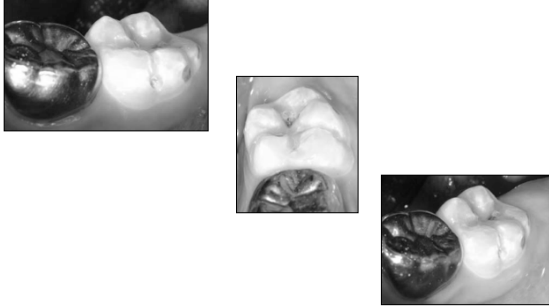
CJ's Fluorotic Incisors & 6 yr Molars



CJ's Fluorotic Incisors & 6 yr Molars



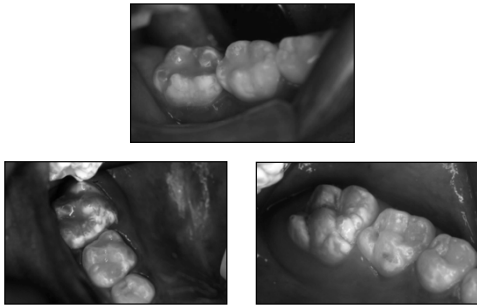
CJ's Fluorotic Molars



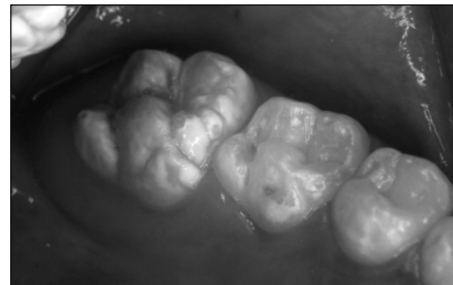
Fluorosis of Primary and Permanent Dentition



Fluorosis of Primary and Permanent Dentition



Fluorosis of Primary and Permanent Dentition



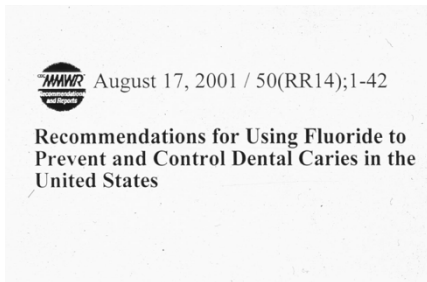
Eureka Moment

FLUOROSIS = SYSTEMIC CONDITION

FLUOROSIS = age limiting condition

Fluoride ... When and Where 2016

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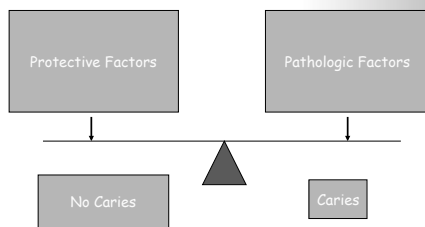


CDC Fluoride Recommendations

Select a fluoride modality according to:

- a caries risk assessment (high or low)
- recognize that an individual's risk can change over time ... change from low to high
- be familiar with the quality of the evidence of each fluoride modality

Weigh the Risks before Rx Fluoride



• Ref - JDB Featherstone. J Dent Res 83 (Spec Iss C): C39-C42, 2004.

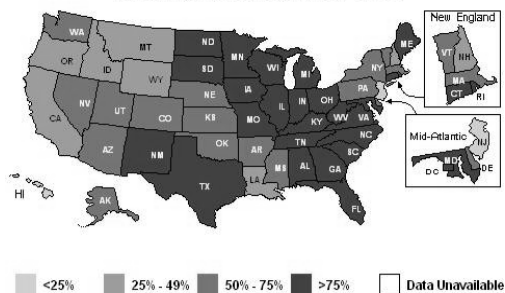
CDC Fluoride Recommendations Public Health and Clinical Practice

- promote community water fluoridation
- counsel parents regarding the risk of swallowing toothpaste, especially <2yo
- target mouthrinsing to high risk
- judiciously Rx fluoride supplements
- apply high-concentration F⁻ products to high risk

Community water fluoridation

- ⇒ 61.5% of US population receiving fluoridated water (2006, CDC Statistics)
- ⇒ 69.2% of US population on public water system receiving fluoridated water.
 - #1 Kentucky 99.8%
 - # 49 New Jersey 22.6%
- ⇒ Difficult to determine how much F in water in many communities.

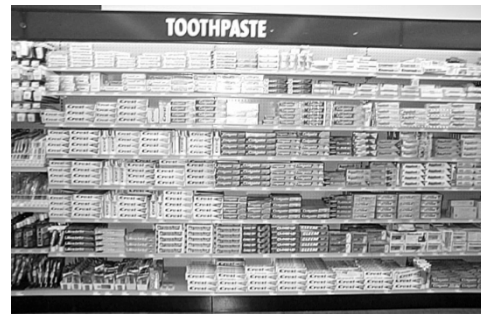
Percent of Population on Public Water Systems Receiving Fluoridated Water - 2006



2001 CDC Tooth Brushing Recommendations



Age	Tooth Brushing Recommendations (CDC, 2000)
<1 year	~ clean teeth with soft toothbrush
1-2 years	~ parent performs brushing
2-6 years	~ pea-sized amount of fluoride-containing toothpaste 2x/day ~ parent performs or supervises



Toothpaste



Fluoride FREE

Contain 0.15% fluoride ion

SAME AS ADULT TOOTHPASTE

Toothpaste and Children

- o Children ingest substantial amounts of toothpaste because of immature swallowing reflex
 - ~ Children < 2 yrs swallow about 60% of toothpaste on brush
- o Early use of fluoride toothpaste may be associated with increased risk of fluorosis
- o Once permanent teeth have mineralized, dental fluorosis is no longer a concern (after age 6 yrs, only molars are still forming)
- o PRIOR TO AGE 2 – DDS can prescribe use of fluoride toothpaste for high caries risk children – use SMEAR

Fluoride rinses



- Recommended to begin after age 6 years.

CDC Fluoride Recommendations

-Self Care

- know the fluoride content of your drinking water
- frequently use small amounts of fluoride
 - drink F⁻ water and brush BID
- supervise children <6yo use of toothpaste
- consider additional fluoride modalities if you are at high risk for caries
- use alternative water if >2ppm & child <8yo

CDC Fluoride Recommendations Consumer Product Industry & Health Agencies

- label bottled water
- promote use of small amounts of toothpaste with children
- develop a low-fluoride toothpaste for children ~ 500 ppm
- collaborate to educate public and health-care professionals

Fluoridated bottles water Alternative to supplement



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Fluoride 2016 ... A Decade of Changes

- ❖ 2006 ADA Topical Fluoride Recommendation
 - ❖ Fluoride Gels
 - ❖ Fluoride Foams
 - ❖ Fluoride Varnish

What should we use in our offices ?

What is the best topical fluoride treatment for our patients ?

VARNISH > 4 minute GEL > 4 minute FOAM

Use of any topical fluoride tx should be based on a caries risk assessment

ADA 2006 Topical Fluoride Recommendations

JADA 137:1151-1159, 2006.



Professionally Applied Topical Fluoride: Evidence-based Clinical Recommendations¹

Assess	Advise				Decide
	Risk group / Age	<6 years	6-18 years	18+ years	
Caries Risk (see back for risk factors) • Low • Moderate • High & Patient Age	Low	Patient may not receive any additional benefit*	Patient may not receive any additional benefit*	Patient may not receive any additional benefit*	<ul style="list-style-type: none"> • whether to apply fluoride • type of fluoride • frequency of application • how often to re-evaluate
	Moderate	Varnish every 6 months	Varnish or Fluoride gel every 6 months	Varnish or Fluoride gel every 6 months	
	High	Varnish every 6 or 3 months	Varnish every 6 or 3 months or Fluoride gel every 6 or 3 months	Varnish or Fluoride gel every 6 or 3 months	

*Fluoridated water and fluoride toothpaste may provide adequate caries prevention in this risk category.
 †Application time for fluoride gel and foam should be 4-minutes.
 ‡Data to limited evidence. These recommendations have not been extrapolated to foams.
 § There is limited evidence differentiating varn and APF gels.

Based substantially on clinical evidence. Each recommendation is based on the best available evidence. The level of evidence available to support each recommendation may differ. Lower levels of evidence do not mean the recommendation should not be applied for patient treatment.

Levels of evidence and strength of recommendations:
 Based substantially on clinical evidence. Each recommendation is based on the best available evidence. The level of evidence available to support each recommendation may differ. Lower levels of evidence do not mean the recommendation should not be applied for patient treatment.

¹ADA Council on Scientific Affairs. Professionally applied topical fluoride: Evidence-based clinical recommendations. JADA 2006;137(8):1151-59. Copyright © 2006 American Dental Association. All rights reserved. Adapted 2006 with permission. To see the full text of this article, please go to [http://jada.ada.org/publications/137\(8\):1151](http://jada.ada.org/publications/137(8):1151). This paper may be used, copied, and distributed for non-commercial purposes without obtaining prior approval from the ADA. Any other use, copying, or distribution, whether in printed or electronic form, is strictly prohibited without the prior written consent of the ADA.

Professionally Applied Topical Fluoride: Evidence-based Clinical Recommendations¹

Determination of Caries Risk

There are many systems to determine caries risk. One such system is offered below that can be used for caries risk assessment.

Individuals' risk factors increasing risk for developing caries may also include, but are not limited to:


<ul style="list-style-type: none"> High levels of cariogenic bacteria Poor oral hygiene Prolonged nursing (bottle or breast) Poor family dental health Developmental or acquired enamel defects Genetic abnormality of teeth Many multifactorial restorations Chemo-radiation therapy 	<ul style="list-style-type: none"> Falling discolors Oral genital abuse Irregular dental care Cariogenic diet Active orthodontic treatment Presence of exposed root surfaces Restoration overhangs and open margins Physical or mental disability with inability to perform proper oral health care
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Risk group	Age	Primary or Secondary Carious lesions in the past three years	Risk factors listed above
Low	All age groups	None	None
Moderate	< 6 years	None	At least one risk factor
	> 6 years	One or two	At least one risk factor
High	< 6 years	Any	Multiple risk factors or Low Socioeconomic status or Developmental or suboptimal fluoride exposure
	> 6 years	Three or more	Multiple risk factors or "Kariostoma" or suboptimal fluoride exposure


*Medication, radiation or disease induced anomalies.

¹ADA Council on Scientific Affairs. Professionally applied topical fluoride: Evidence-based clinical recommendations. JADA 2006;137(8):1151-59. Copyright © 2006 American Dental Association. All rights reserved. Adopted 2008 with permission. To view the full text of this article, please go to <http://ada.org/ADAContent/LinkClick.aspx?linkid=1377861153>.

Role of MDs in Oral Health




22,600 ppm




Shown to be 30-63% effective in preventing ECCs*

*Bader JD, Rozier RG, Lohr KN, Frame PS. Physicians' roles in preventing dental caries in preschool children. *Am J Prev Med*. 2004;26:315-325.

White Fluoride Varnish




Improved taste for children!
Cherry or Melon



Available in single-dose disposable packets

Preventive Role of Fluoride Varnish




Jane Weintraub et al
Fluoride Varnish Efficacy in Preventing Early Childhood Caries
J Dent Res 85(2): 172-176, 2005.

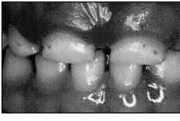
1,2,3 and 4 applications of fluoride varnish & parental counseling were efficacious in preventing ECC

Note - similar findings in NC Gary Rozier study
39% reduction in anterior caries 2007


3 Treatment Scenarios



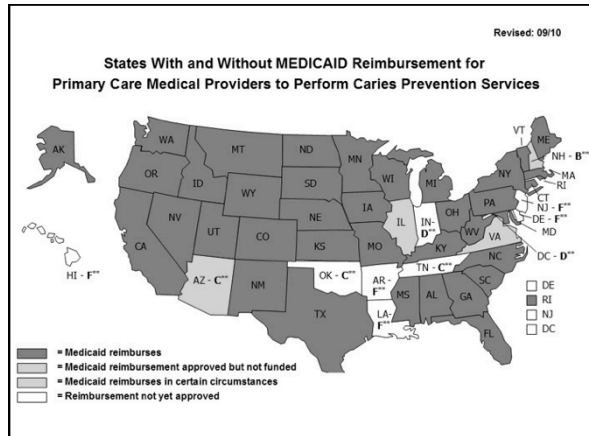
1. White spots - treat chemically



2. Beyond white spots
Beginning breakdown -
ART plus Fluoride Varnish
or
ART w/ Glass Ionomer
(Fuji IX or Ketac Nano)



3. Frank caries - mechanical tx

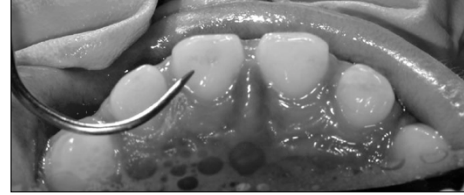


Scenario #1 : Suzanne

- 3yo presents with mild ECC
- Minimal Oral Hygiene



Caries at CEJ of #D,E,F,G



Caries beginning on lingual surfaces - see #E

Treatment Plan

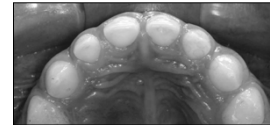
- Apply Fluoride varnish
- Reassess in 6 weeks / 3 months until lesions stabilize or require definitive tx
- D1206 = ADA code



Suzanne- q3 months Fl tx



Lesions are holding stable
2/05 -> 6/07



Suzanne age 3yo-6yo with MILD ECC



Lesions are holding stable
2/05 -> 8/08



Alex 's - Enamel Defects



Scenario #2



- 18 month old presents with mild ECC
- Mild ECC = white spot lesions
- Underlying enamel defects
 - Mother fainted in 3rd trimester
- Breastfeeding during the night
- Supplementing with baby food
- Minimal Oral Hygiene



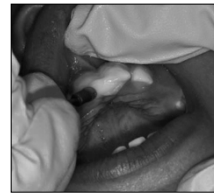
Tamir

Enamel defects
#E,#F and #O,#P



ART =
Alternative (Atraumatic)
Restorative
Technique

- No local anesthesia
- Hand Instrument or Slow Speed removal of soft carious process
- Apply Glass Ionomer
- Fluoride Varnish
- Frequent Recall
- GOAL- stabilize lesion



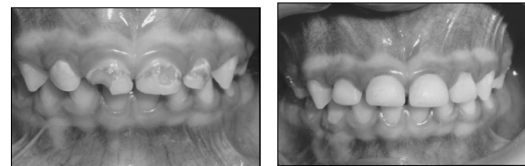
Enamel defects #E,#F and #O,#P

Treat with ART and Fluoride varnish

Scenario #3 - Beyond fluoride varnish



Beyond fluoride varnish



Restorations do NOT fix the bacterial infection in the mouth or the risky behaviors that contributed to ECC!

After the restorations ...



MUST IMPROVE

- Oral Hygiene
- Feeding Behaviors
- Ensure adequate fluoride

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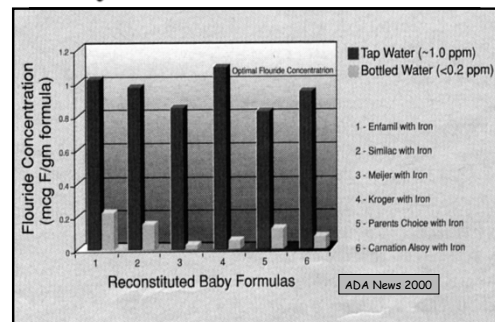
2007 ADA Interim Statement Infant feeding 0-12 months

- 1st choice = breastfeeding
- 2nd choice = Ready-to-feed (premixed)
- 3rd choice = Liquid concentrate or powered formula
• **MIX with FLUORIDE FREE WATER**

2007 ADA Interim Statement Infant feeding 0-12 months

- **ISSUE** - volume of liquid being consumed
- **AAP** 24-32 ounces per day
- **FORMULA** 8 ounces of fluoridated water = 0.25mg fluoride
- **EQUALS** 0.75mg -1mg of fluoride per day

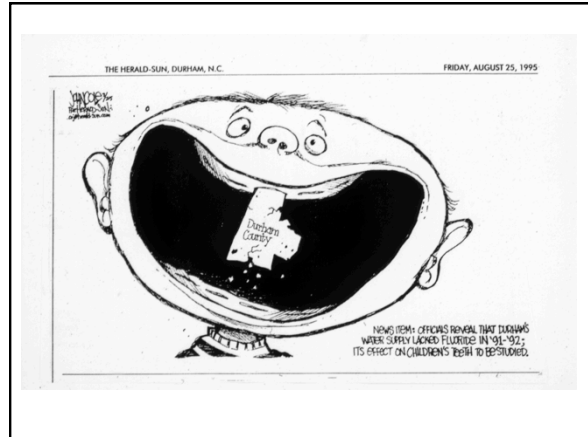
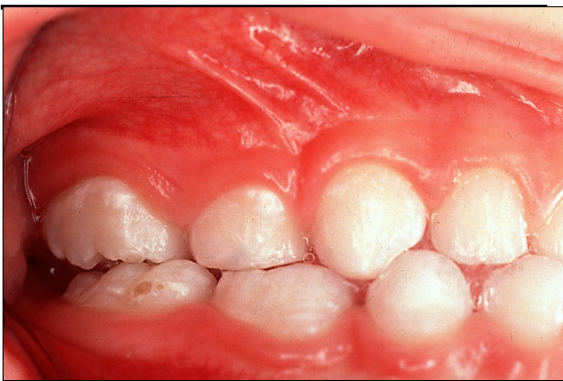
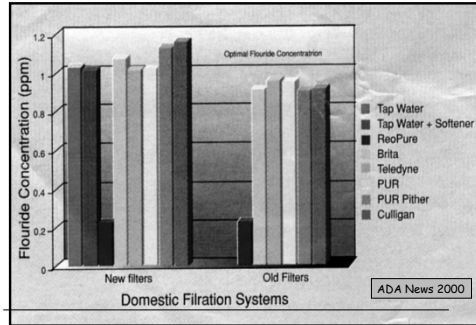
Baby Formula Fluoride Levels

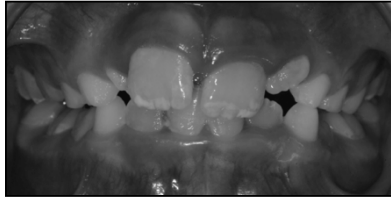


Variable F in Drinking Water

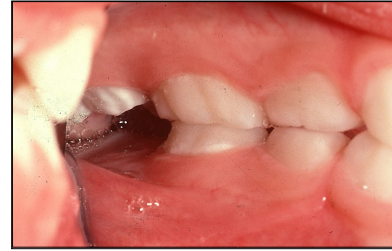


Fluoride Content After Water Filtration

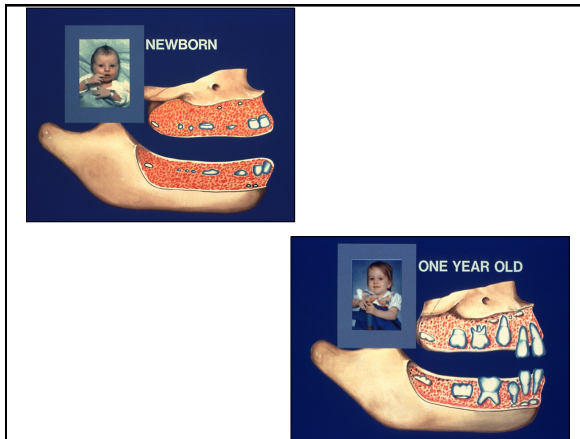




JB - 8yo
 *Had infant formula from 6-12 months
 *1st tooth erupted around 10 months old
 *Now seeing Fluorosis on #K, #T, #8,
 #9, #19, and #30



JB - 8yo
 *Had infant formula from 6-12 months
 *1st tooth erupted around 10 months old
 *Now seeing Fluorosis on #K, #T, #8,
 #9, #19, and #30



AH HA Moment
 potential role of infant fluoride exposure



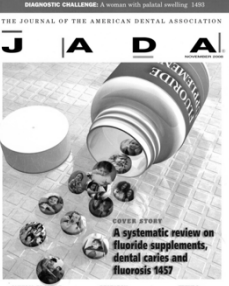
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Fluoride Supplements ???

- Caries-preventive effect of fluoride is almost exclusively **POST-ERUPTIVE**
- Mode of action of fluoride is mainly attributed to its influence on de- and remineralization kinetics of enamel
- Therefore, the main focus should be on **TOPICAL FLUORIDE MODALITIES**

Ref – Hellwig E & Lennon AM: Caries Res 2004; 38:258-262.

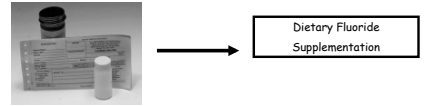


DIAGNOSTIC CHALLENGE: A woman with periodontal swelling 1457
 THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION
J A D A
 COVER STORY
 A systematic review on fluoride supplements, dental caries and fluorosis 1457
 CLINICAL PRACTICE: Preventing pediatric toothbrush abrasion: a review of available literature 1466
 RESEARCH: Risk factor assessment of children and adults 1507
 TRENDS: Report of a study on dental health only dentists 1517
 *All listed articles are online only 2012

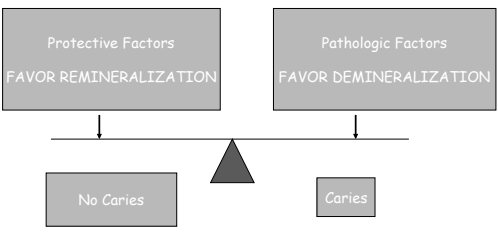
Only Rx Supplements if -
 1) No Fluoride in Water
 AND
 2) HIGH Caries Risk
 Limited Supply ???

Testing H2O for fluoride

- It is Complicated
- If content unknown and child is at high risk for dental caries, test water source.



Weigh the risk before Rx fluoride



Protective Factors
FAVOR REMINERALIZATION

Pathologic Factors
FAVOR DEMINERALIZATION

No Caries

Caries

• Ref - JDB Featherstone. J Dent Res 83 (Spec Iss C): C39-C42, 2004.

Fluoride Dosing Recommendations

TABLE 1. Recommended dietary fluoride supplement* schedule

Age	Fluoride concentration in community drinking water ¹		
	<0.3 ppm	0.3-0.6 ppm	>0.6 ppm
0-6 months	None	None	None
6 months-3 years	0.25 mg/day	None	None
3-6 years	0.50 mg/day	0.25 mg/day	None
6-16 years	1.0 mg/day	0.50 mg/day	None

* Sodium fluoride (2.2 mg sodium fluoride contains 1 mg fluoride ion).
¹ 1.0 parts per million (ppm) = 1 mg/L.

Sources:
 Meskin LH, ed. Caries diagnosis and risk assessment: a review of preventive strategies and management. J Am Dent Assoc 1995;126(suppl):1S-24S.
 American Academy of Pediatric Dentistry. Special issue: reference manual 1994-95. Pediatr Dent 1995;16(special issue):1-96.
 American Academy of Pediatrics Committee on Nutrition. Fluoride supplementation for children: interim policy recommendations. Pediatrics 1995;95:777.

MMWR: Recommendations for Using Fluoride to Prevent and Control Dental Caries in the U.S.: <http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5014a1.htm>

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- 2012 AAPD Revised Guideline on Fluoride Therapy



PERSPECTIVES: Social harassment and the dental workplace 1593
 THE JOURNAL OF THE AMERICAN DENTAL ASSOCIATION
J A D A
 COVER STORY
 Fluoride intake in early childhood and fluorosis 1590
 CLINICAL PRACTICE: Quality of life among dentists: a review of available literature 1592
 CLINICAL PRACTICE: The clinical effect of different bleaching times 1593
 RESEARCH: Caries, smoking and tooth loss 1592

Fluoride ... When and Where 2016

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- ❖ Iowa Study - Steve Levy

❖ WHAT INCREASES RISK OF FLUOROSIS

- ❖1) reconstituted infant formula with fluoridated water ages 3-9 months
- ❖2) water added beverages using fluoridated water ages 3-9 months
- ❖3) higher fluoride toothpaste intake ages 16-36 months

Fluoride ... When and Where 2016

- ❖ 2010 JADA Causes of Fluorosis in Permanent Incisors -
- ❖ Iowa Study - Steve Levy

- ❖ 2011 ADA Evidence-Based Clinical Recommendations regarding Fluoride Intake from Reconstituted Infant Formula and Enamel Fluorosis

- ❖ 2011 Dept of Human and Health Services and EPA recommendation for fluoride level in public water systems

- ❖ 2012 AAPD Revised Guideline on Fluoride Therapy

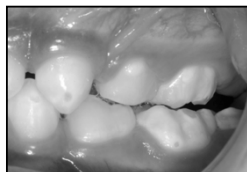
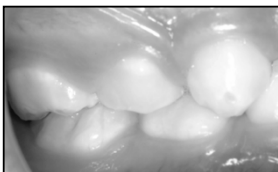
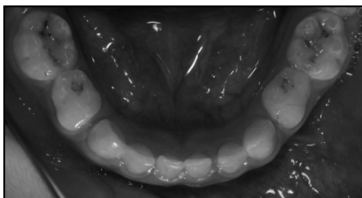
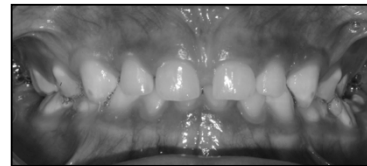
Fluoride ... When and Where 2016

- ❖ 2011 ADA Evidence-Based Clinical Recommendations regarding Fluoride Intake from Reconstituted Infant Formula and Enamel Fluorosis

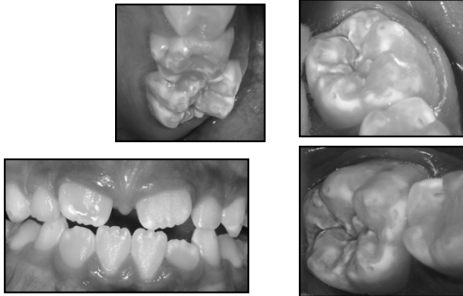
- ❖ okay to mix with fluoridated water -
- JUST advise parents of risk

- ❖ Why okay - because the risk of fluorosis is
- MINIMAL

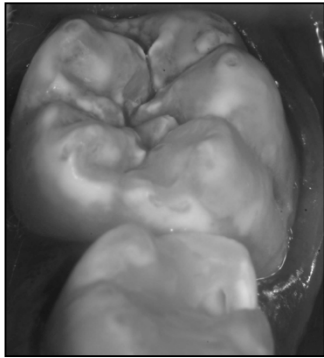
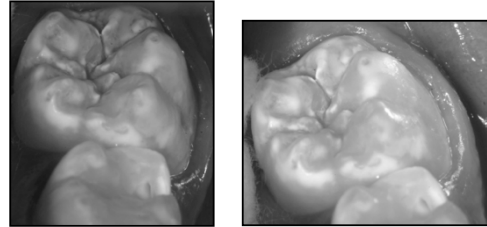
Chloe DOB 10/9/2003
Fluorosis
Infant Formula with FI H2O
Age 6-16 months



Chloe - 7yo
Fluorosis and Groovy 6 year molars



Chloe - 7yo
Fluorosis and Groovy 6 year molars



Fluoride ... When and Where 2016

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❖ Iowa Study - Steve Levy
- ❖ 2011 ADA Evidence-Based Clinical Recommendations regarding Fluoride Intake from Reconstituted Infant Formula and Enamel Fluorosis
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Fluoride ... When and Where 2016

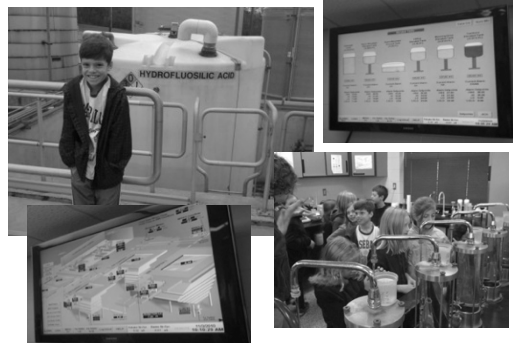
- ❖ 2011 Dept of Human and Health Services and EPA recommendation for fluoride level in public water systems

Previous 0.7 to 1.2 mg of fluoride per liter of water

*** Now recommend 0.7 mg of fluoride per liter of water

" We do NOT need a range of values any more"

Water Treatment Plant- Chapel Hill

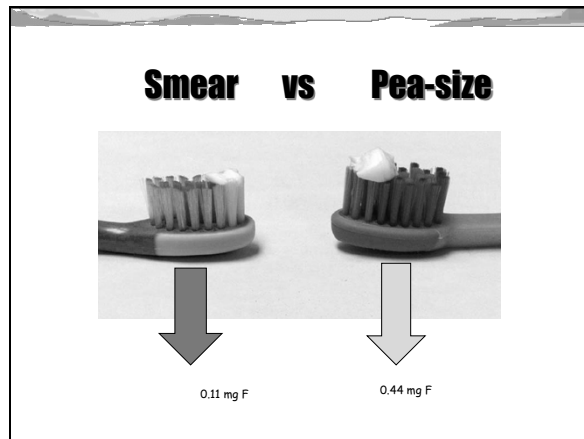


Fluoride ... When and Where 2016

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- ❖ 2012 AAPD Revised Guideline on Fluoride Therapy

Fluoride ... When and Where 2016

- ❖ 2012 AAPD Revised Guideline on Fluoride Therapy
 - Emphasizing twice a day brushing
 - 0-2 years old - SMEAR of Fluoridated toothpaste
 - 2-5 years old - PEA SIZE of Fluoridated toothpaste
 - Minimal or NO RINSING after brushing



Fluoride ... When and Where 2016

- ❖ 2011 Dept of Human and Health Services and EPA recommendation for fluoride level in public water systems
- ❖ 2012 AAPD Revised Guideline on Fluoride Therapy
- ❖ 2013 ADA Toothpaste Efficacy
- ❖ 2014 AAP Fluoride Policy

Fluoride ... When and Where 2016



- ❖ 2013 ADA Toothpaste Efficacy / 2014 AAP Fluoride Policy
 - Emphasizing twice a day brushing
 - * AFTER Breakfast (UGH!!!!!!!!!!!!!!)
 - * BEFORE Bedtime
 - 0-3 years old - SMEAR or GRAIN of RICE of Fluoridated toothpaste
 - 3-6 years old - PEA SIZE of Fluoridated toothpaste
 - Minimal or NO RINSING after brushing

Fluoride ... When and Where 2016

- ❖ 2015 ABIM Choosing Wisely Statements for Dentistry
 - * Don't routinely give professional fluoride treatments to low caries risk patients
 - * Don't use standard recall intervals ~ intervals should be based on patients' risk for dental disease

"Isn't fluoride a poison?"

I read it causes cancer and decreases your IQ..."


HARVARD T.H. CHAN SCHOOL OF PUBLIC HEALTH

News

MENU

Impact of fluoride on neurological development in children

July 25, 2012 – For years health experts have been unable to agree on whether fluoride in the drinking water may be toxic to the developing human brain. Extremely high levels of fluoride are known to cause neurotoxicity in adults, and negative impacts on memory and learning have been reported in rodent studies, but little is known about the substance's impact on children's neu-



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Risks for fluorosis in young children

RISK BEHAVIOR → PREVENTION

- Infant feeding → mix with non-fl water
- Swallowing Fluoride Toothpaste → delay independent toothbrushing until child can spit out toothpaste
- Fluoride Rinse → wait until child is >6yo
- Fluoride Supplements → ck risk & water sources before Rx - need to be HIGH RISK
- Water with >1.2ppm fluoride → drink other water