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 mechanism
Low pH favors Demineralization
Increased pH favors Remineralization

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
Sources of Fluoride

**Systemic fluoride** — works topically
- Community water fluoridation
- Bottled water with fluoride added
- Fluoride supplements
- Swallowed toothpaste

**Topical fluoride** — works topically
- Fluoride toothpastes
- Professionally-applied, gels, foams, rinses, and varnishes

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

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The Fluoride Zone

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

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Amount of FLUOROSIS depends on

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

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Risk Period for fluorosis = while Perm Teeth are developing

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

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

<table>
<thead>
<tr>
<th>Tooth</th>
<th>Hard Tissue Formation Begins</th>
<th>Enamel Complete</th>
<th>Eruption</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Permanent Dentition</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maxillary</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Central incisor</td>
<td>3-4 mo</td>
<td>4-5 yr</td>
<td>7-8 yr</td>
</tr>
<tr>
<td>Lateral incisor</td>
<td>10-12 mo</td>
<td>4-5 yr</td>
<td>8-9 yr</td>
</tr>
<tr>
<td>Mandibular</td>
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<td></td>
<td></td>
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</tbody>
</table>

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Issue of Fluorosis

Esthetic and Trauma Concerns
Fluorosis – is treatable

1) Cool Dam
2) 18% HCL and pumice

LD’s Generalized Fluorosis

CJ’s Fluorotic Incisors & 6 yr Molars
CJ’s Fluorotic Molars

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

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**

<table>
<thead>
<tr>
<th>Age</th>
<th>Tooth Brushing Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;1 year</td>
<td>clean teeth with soft toothbrush</td>
</tr>
<tr>
<td>1-2 years</td>
<td>parent performs brushing</td>
</tr>
<tr>
<td>2-6 years</td>
<td>pea-sized amount of fluoride-containing toothpaste 2x/day</td>
</tr>
<tr>
<td></td>
<td>parent performs or supervises</td>
</tr>
</tbody>
</table>

**Toothpaste and Children**

- Children ingest substantial amounts of toothpaste because of immature swallowing reflexes.
  - Children < 2 yrs swallow about 60% of toothpaste on brush.
- Early use of fluoride toothpaste may be associated with increased risk of fluorosis.
- Once permanent teeth have mineralized, dental fluorosis is no longer a concern (after age 6 yrs, only molars are still forming).
- 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 < 6 yo use of toothpaste.
- consider additional fluoride modalities if you are at high risk for caries.
- use alternative water if > 2ppm & child < 8 yo.
**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

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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?

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**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.*
Role of MDs in Oral Health

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


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
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

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

Suzanne age 3yo-6yo with MILD ECC

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

Alex's - Enamel Defects

Lesions beginning on lingual surfaces - see #E

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

Scenarios #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 powdered 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

ADA News 2000
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

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

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.

Dietary Fluoride Supplementation

Fluoride Dosing Recommendations

| Age        | Fluoride concentration in community drinking water
<table>
<thead>
<tr>
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<tbody>
<tr>
<td></td>
<td>&lt;0.3 ppm</td>
</tr>
<tr>
<td>0-6 months</td>
<td>None</td>
</tr>
<tr>
<td>6 months-2 years</td>
<td>0.25 mg/day</td>
</tr>
<tr>
<td>3-6 years</td>
<td>0.3 mg/day</td>
</tr>
<tr>
<td>6-16 years</td>
<td>1.0 mg/day</td>
</tr>
</tbody>
</table>

* Sodium fluoride (0.2 mg sodium fluoride contains 1 mg fluoride ion).
1 ppm = parts per million (ppm) = 1 mg/L.

Sources:

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
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 Intake**

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

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

**2012 AAPD Revised Guideline on Fluoride Therapy**
Fluorosis and Groovy 6 year molars

Chloe – 7yo

Fluoride ...

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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
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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

Smear vs Pea-size

- 0.11 mg F
- 0.44 mg F

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

- 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

- 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
Isn’t fluoride a poison? I read it causes cancer and decreases your IQ…”

Silver Diamine Fluoride

877-866-9113

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

Impact of fluoride on neurological development in children

July 15, 2013 — 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...