Special Interest Group (SIG)

Gerodontology

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The use of fluoride mouth rinses, gels, foams and varnishes for the prevention of dental caries

introduction
The use of fluoride for the prevention of dental caries

- Given a mean of 19 retained teeth in seniors, along with issues of exposed root surfaces and reduced ability to perform oral self-care that accompanies many diseases, caries remains an important issue in oral health care for adults.

- A well-studied tool for reducing caries is fluoride. Although the positive effects are well documented in children, there is recent, less extensive evidence suggesting that fluoride reduces carious lesions in adults.  
  
  Gibson et al. 2011
The use of fluoride for the prevention of dental caries

Do we use self-applied and/or professionally applied fluoride products in the preventive programs of frail elderly people?

As an extra tool in addition to the use of fluoride toothpaste

Root Caries PREVENTION and TREATMENT

Oral health professionals need to be knowledgeable about this common oral condition and understand which patient populations are at greatest risk.

By Lynn Marsh, RDH, EdD
Fluoride mouthrinses

- NaF 0.05% (225 ppm) - 0.2% (1000 ppm)
- (Europe) SnF and Amine F
# Fluoride mouthrinses

<table>
<thead>
<tr>
<th>First author [year]</th>
<th>Design</th>
<th>Number; duration</th>
<th>Age, years</th>
<th>Intervention; frequency; concentration</th>
<th>Control</th>
<th>Preventive fraction</th>
<th>Risk of bias</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wyatt [2004]</td>
<td>RCT</td>
<td>247; 2 years</td>
<td>83 (mean)</td>
<td>FMR; 1/day; 0.09% NaF</td>
<td>placebo</td>
<td>24%(^d)</td>
<td>high</td>
</tr>
<tr>
<td>Petersson [2007]</td>
<td>RCT</td>
<td>100; 1 year</td>
<td>55–81</td>
<td>FMR; 2/day; 250 ppm AmF</td>
<td>placebo</td>
<td>57%(^e)</td>
<td>high</td>
</tr>
</tbody>
</table>

PF = Preventive fraction; SB = school-based; FMR = fluoride mouth rinse; CCT = controlled clinical trial.

\(^a\) Proximal surfaces from bitewing radiographs. \(^b\) Odds for a tooth being decayed (95% CI 0.65–0.96). \(^c\) Risk of developing caries (95% CI 0.26–0.85). \(^d\) Most pronounced in reversing and preventing root surfaces. \(^e\) Root caries reversals.
Prevented fraction

The percentage of cases that can be prevented if a population is exposed to an intervention, compared to an unexposed population.

\[
\text{Prevented fraction} = 1 - \text{RR} = \frac{\text{Incidence of unexposed} - \text{Incidence of exposed}}{\text{Incidence of unexposed}}
\]

Unexposed: (40%)

Exposed: (25%)

40 - 25/40 = 37%
Relative risk reduction

calculated by dividing the absolute risk reduction by the control event rate.

Incidence

Unexposed: (40%)
Exposed (25%)

15/40 = 37%
Fluoride gel

- 2% NaF gel (9050 ppm)
  Acidulated Phosphate-fluoride gel (APF - 12300 ppm)
- Bi-annual application
- Preventive fraction: 20% en 40%
## Fluoride gel

<table>
<thead>
<tr>
<th>Study (yr) (ref)</th>
<th>Caries risk status</th>
<th>Experimental group (n)</th>
<th>Comparative group (n)</th>
<th>Duration</th>
<th>Outcome (exp versus control)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Baysan et al. (2001) (14)</td>
<td>Individual risk: ≥1 RC lesion, Water F: not reported</td>
<td>1.1% NaF paste (5,000 ppm) 1×/day (107)</td>
<td>OTC NaF paste (1,100 ppm) at least 1×/day (94)</td>
<td>6 months</td>
<td>RC remineralization/group 56.9% versus 28.6% (P = 0.002, logistic regression with # of teeth and baseline plaque scores as covariates, and $X^2$)</td>
</tr>
<tr>
<td>Ekstrand et al. (2008) (20)</td>
<td>Population risk: nursing referral of frail elderly, mean # root caries lesions = 2.09, Water F: 0.5 ppm</td>
<td>1.1% NaF paste (5,000 ppm) 2×/day (64)</td>
<td>OTC NaF toothpaste (1,450 ppm) 2×/day (54)</td>
<td>8 months</td>
<td>RC remineralization/subject 54% versus 40% (P = 0.02, ANOVA)</td>
</tr>
</tbody>
</table>
Fluoride varnish

- 5% Sodium Fluoride (NaF) 22,600 ppm
- The fixed-effect pooled preventive fraction was 43% (95% BI 0.30-.057) and 37% (95% BI 0.24-0.51) for the permanent and primary dentition respectively. (Cochrane review – children and adolescents)

Duraphat®

- 5% Sodium Fluoride (NaF)  22.600 ppm
- Treatment every 3 or 6 month
Fluor Protector

- 1.5% ammonium fluoride (7.700 ppm)
- Treatment every 3 or 6 month
The importance of calcium en phosphate

- Can be classified into three types:
  - Tri-calcium phosphate (fTCP)
  - Amorphous calcium phosphate (ACP) and
  - Casein phosphopeptide-stabilized amorphous calcium phosphate (CPP-ACP) nanocomplex (Recaldent®).
The importance of calcium en phosphate

- Can be classified into three types:
  - Functionalized tri-calcium phosphate (fTCP) is a beta-tricalcium phosphate with sodium lauryl sulphate.

A commercial formula, Clinpro™ (3M ESPE), contains fTCP and sodium fluoride.

When the agent comes into contact with saliva, the protective barrier breaks and the ions are released for effective tooth remineralization.
The importance of calcium en phosphate

- Can be classified into three types:
  - Amorphous calcium phosphate (ACP) is an unstabilised form of calcium- and phosphate based remineralization system. ACP is generally viewed as a precursor to hydroxyapatite formation and promotes remineralization by improving fluoride uptake.
The importance of calcium en phosphate

- Can be classified into three types:
  - Casein phosphopeptide-stabilized amorphous calcium phosphate (CPP-ACP) (Recaldent™) is a technology, which stabilizes calcium and phosphate ions in a bioavailable form, along with fluoride ions.
MI Varnish™

- 5% NaF en CPP-ACP (Recaldent™)
## Fluoride varnish

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<th>Duration</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Ekstrand et al. (2009) (20)</td>
<td>Population risk: nursing referral of frail elderly; mean # of RC lesions = 2.09 Water F: 0.5 ppm</td>
<td>5% NaF varnish (22,600 ppm) 1×/mo, applied to active carious lesions by hygienist after brushing with NaF toothpaste (1,450 ppm) 1×/mo</td>
<td>OTC NaF toothpaste (1,450 ppm) 2×/day (54)</td>
<td>8 months</td>
<td>RC remineralization/subject 65% versus 40% (P &lt; 0.001, ANOVA)</td>
</tr>
</tbody>
</table>
Seven of the studies evaluated in this review addressed the use of 5,000 ppm NaF gel. Four of these studies had quality scores greater than 75 percent. Three of the studies, Baysan et al., DePaola, and Ekstrand et al. demonstrated an RRR of 35-122 percent regarding remineralization of root lesions, and there was an overall consistency of these studies to show improvement, primarily in adults with root caries.
SR: Supplemental fluoride use for moderate and high caries risk adults. Gibson et al. 2011

- The studies included follow closely with the recommendations presented in the ADA’s evidence based clinical recommendations. Two studies, Ekstrand et al. and Schaeken et al., addressed the use of **NaF varnish** in older adults. Both of the studies showed moderate effect magnitude, with RRRs of 50 percent regarding new root caries surfaces (Schaeken) and 63 percent regarding root lesion remineralization (Ekstrand), and consistently show improvement in caries rates.
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