Modern Chemotherapeutic Agents for the High Caries-Risk Patient

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Traditional Preventive Regiments
- Fluoride
- Saliva substitutes
- Oral hygiene emphasis, 2X2s, Water Pik
- Diet modification
- Smoking cessation
- Frequent debridement
- Threats of losing more teeth

OUTLINE
- What is the Status of Caries?
- What Have We Used So Far to Prevent Caries?
- Unique Conditions of the Maxillo-Facial Patient
- Modern Chemotherapeutic Agents
- Prevention/Treatment Approaches
- CHEMISTRY CLASS 2010
What is the Status of Caries?

Caries Prevalence is Increasing

- Bottled water
- Increase in sweets
- Past success not valid
- Root caries
- Non vital teeth
- Aging population

Caries increases during teenage years

- 26% of children ages 5-11 have caries
- 62% of children ages 12-17 have caries

Brown, JADA, Mar. 1996
Importance of Topical Fluoride for Orthodontic Patients

50% of orthodontic patients develop demineralized areas

Ripa, NYSSJ, Feb. 1992

Root Caries Incidence

By age 45, 33% have adult root caries
By age 64, 59% have adult root caries
91% of root caries can be arrested by use of fluorides

Burton, JADA, Jan. 1994
Miller, Natl. Survey Oral Health in US

Root Caries - Etiology

• Demineralization: critical pH = 6.7
• Lesion progression and mineral loss
  – 2.5 x greater than enamel
• Rapidly develops; slower thereafter
• Root surfaces have greater F uptake than enamel
• Greater deposition of CaF
• Reverse lesions; prevent/arrest via topical F

Ripa, G.J. Clin. Perio

What is the pH for occlusal caries?

5.5

Dental Fluid Transport

By Clyde Roggenkamp

Proportional area of volume of gland

parotid gland
submandibular gland

Age group (years)
A Fluid Transport System and the Prevention of Caries

• In the absence of sugar, there is dentinal fluid flow from the pulp through the dentin.
• In the presence of sugar, there is no fluid flow.
• This is caused by the hypothalamic-parotid gland endocrine axis...Dr. Ralph R. Steinman, “the parotid gland is responsible for dentinal fluid flow”.

A Fluid Transport System and the Prevention of Caries, cont.’

• Maintaining parotid function (absence of sugar) can decrease caries by 80-100%.
• A malfunctioning pulp is the physical basis of caries susceptibility.
What Value Do People Place Upon Their Front Teeth?

In a recent article in the Los Angeles Times, it was reported the American Association of Endodontists had conducted a survey of 1,000 adults, asking them this question: "If a very wealthy person came by and offered you money for a healthy front tooth, could be removed without pain, what's the minimum you'd accept?"

According to Joseph D. Maggio, the association president, respondents wanted an average of $305,000 for just one tooth.

Maggio said: "When you consider that the value of the chemical components of a tooth is about $12 cents, that's quite a return."

Of respondents aged 45 or older, 41 percent said they would not exchange a front tooth for any amount of money, and 13 percent said they would not sell a front tooth for less than $1 million.

Maggio said the survey results indicated that the trend toward preventative health has grown to encompass the preservation of natural teeth.

The True Cost of a Cavity

When a Little Hole Becomes a $2,000 Money Pit

New data shows that, over a person's lifetime, a single, initial cavity has serious economic consequences. That's the conclusion of a new report from the Data and Analysis Center (DAC), the nation's largest claims-based dental health data warehouse, which found that the average cost to maintain a restored cavity in the molar of a 10-year-old reaches $2,187 by the time he or she is 79. If a person has several cavities, the cost explodes accordingly.

"There are currently no permanent restorative materials available to treat cavities, so the lifetime cost of maintaining teeth that have been treated for decay far outpaces any out-of-pocket costs you might spend to prevent decay in the first place," said May Arvidson, the report's lead author.
What Have We Used So Far to Prevent Caries?

Types Of Fluoride Agents

- Systemic Fluoride
- Topical Fluoride

FLUORIDE TOOTHPASTE

Daily brushing with a fluoride paste alone is unlikely to prevent all new carious lesions.

Saporiti et al.
Types of fissures

Narrow "I" shaped fissure branching at base
shallow "V" shaped fissure

Occlusal surfaces surface topography

Occlusal fissure
Buccal pit

Progression of caries

Caries developing along cuspal inclines
Caries progressing to the fissural base with lateral spread of the lesion at the DEJ

Restorative Interventions CLASS I- OCCLUSAL PIT AND FISSURE

no caries
minimal isolated carious pits
all pit and fissures carious

REEVALUATION SEALANT PRR COMPOSITE-RESIN AMALGAM
Traditional fissure caries model

Probe does not stick
“No caries”

Traditional fissure caries model

Not diagnosed by mirror, probe and x-ray examination

1 mm deep “cavity”

2 mm deep “cavity”

3 mm deep “cavity”
Current Caries Model

DO WE KNOW WHAT WE ARE DOING?

• What is caries?
• Can we detect it? How?
• When we do, what should we do with it?
• Can we keep it from re-occurring?
Modern fissure caries model

These areas may not be decalcified, and a probe won’t stick

Modern Fissure Caries Anatomy Model
(Summary of realistic ‘coke bottle’ shape)

Organic plug
(This area may not be decalcified thus a probe won’t stick)
Enamel defects in fissure wall
Decalcified or hypocalcific enamel (caries in this zone is undetectable by probe)
De-mineralizing dentin

KaVo DIAGNOdent Laser

ARE WE SLOW TO CHANGE?

Modern Chemotherapeutic Agents

**GC Fuji TRIAGE™**
- Highest fluoride content
- Insensitive to moisture
- Self adhesive
- Retentive
- High depth of penetration
- Pink shade is halogen light curable
- Applicable for outreach communities
- Cost effective

**Marginal Integrity**
(Delton only)

**Marginal Integrity**
(Delton with P&B NT)

**GC Fuji Triage**
ACP-AMORPHOUS CALCIUM PHOSPHATE

CPP- CASEIN PHOSPHOPEPTIDE
MI Paste for Interproximal incipient lesions

February 18, 2008
March 12, 2008

The patient applied MI Paste topically each night and then flossed interproximally. This result was from one tube of MI Paste.

Courtesy of Dr. Scott Dillingham, Syracuse, NY.

Fluoride Gels

- Provide a 28% reduction in caries
- Tray application for 5 minutes
- 4/year
- Applied in a tray: 19-70% can be swallowed depending on saliva ejector effectiveness

- Edwina Kidd, 2005, Oxford Univ. Press

Fluoride Varnishes

- Reduce caries in deciduous dentition by 33% and 46% in permanent dentition
- This was a sodium fluoride varnish at 22mg/ml
- Needs to be applied only to vulnerable areas

Marinho, et al., Cochrane Review, 2003

WAIT AND WATCH????

What are we watching?
“In just one patient visit, Icon can arrest the progression of early enamel lesions and remove white spot lesions.

DMG America introduces a revolutionary approach to treating incipient caries—Icon, a caries infiltrant. Caries infiltration is a major breakthrough in micro-invasive technology that fills, reinforces, and stabilizes demineralized enamel without drilling or sacrificing healthy tooth structure.”

Uses specially designed dental wedges; patented perforated applicator tips for the materials; individual syringes filled with Icon-Etch, 15% HCL, Icon-Dry (ethanol), Icon-Infiltrant; and both written and illustrated instructions.

Preventive aspects of root caries.
Fluoride is the cornerstone of root caries prevention. In addition, antimicrobials, in particular chlorhexidine, can be helpful in inhibiting root caries development.


Evaluation of different fluoride treatments of initial root carious lesions in vivo.

CONCLUSIONS:
It can be concluded that the frequent topical application of fluoride could be a successful treatment for incipient root carious lesions, irrespective of the type of fluoride treatment used.

The use of ozone in dentistry and medicine
Ozone and root caries
Initial studies have indicated that an application of ozone for a period of either 10 or 20 seconds is capable of clinically reversing leathery root carious lesions.


CONCLUSIONS: Any treatment that preserves teeth and avoids fillings is welcome. However, the current evidence base for HealOzone is insufficient to conclude that it is a cost-effective addition to the management and treatment of occlusal and root caries.


Double blind clinical trial of a remineralizing dentifrice in the prevention of caries in a radiation therapy population

TEST PRODUCTS: The products compared both contain equivalent quantities of fluoride (1150 ppm). The remineralizing toothpaste also delivers soluble calcium and phosphate ions, the essential components of teeth. CONCLUSIONS: The results to date indicate that the remineralizing toothpaste is significantly superior to the conventional fluoride dentifrice in preventing root caries in high risk patients.


CLAIMS and MYTHS

• In 1859, John Tomes [1859] wrote, ‘it is better that a layer of discoloured dentine should be allowed to remain for the protection of the pulp rather than run the risk of sacrificing the tooth’,
• but in 1908, G.V. Black [1908] disagreed claiming ‘...it will often be a question of whether or not the pulp will be exposed when all decayed dentine overlaying it is removed ...’
• it is better to expose the pulp of a tooth than to leave it covered only with softened dentine’.

XYLITOL containing products

• Chewing gums
• Candies
• Cough Drops

Xylitol

• Naturally occurring, diabetic-safe, low calorie sugar
• Not metabolized by MS
• Starves the MS
• Inhibits attachment of MS to teeth
• Decreases the vertical transmission of MS
• Increases the buffering capacity of saliva
**Xylitol**

Patients chewed 3-5 times daily for 20-40 months

30-63% CARIES REDUCTION IN HIGH RISK POPULATIONS

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**CHLORHEXIDINE**

Effect of chlorhexidine-thymol varnish on root caries in a geriatric population: a randomized double-blind clinical trial


Varnishes were applied twice in the first week, 1 month later, and every 3 months until the end of the study.

RESULTS: The clinical evolution of lesions was significantly better in the Cervitec Plus group as opposed to the placebo group in terms of width, height, color, and texture. The increase in root caries was significantly lower (p=0.039) in the Cervitec Plus group.

CONCLUSION: According to these results, Cervitec Plus may help to control established root lesions and reduce the incidence of root caries lesion among institutionalized elderly.

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**Effects of Fluoride and Chlorhexidine on the Microflora of Dental Root Surfaces and Progression of Root-surface Caries**

The increase in the number of decayed and filled root surfaces after one year was significantly lower in the experimental groups than in the control group. After treatment with chlorhexidine varnish, significantly more initial root-surface lesions had hardened than in the other groups.


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**Effects of Chlorhexidine-Containing Gel and Varnish on Abutment Teeth in Patients with Overdentures**

Chlorhexidine varnish and chlorhexidine gel applications significantly suppressed mutans streptococci on the abutment teeth used in patients with overdentures for four and eight weeks, respectively.


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**Mechanism of Action**

CHX docks to the negatively charged/polarized receptors in the oral cavity.
Disadvantages of high concentrations of CHX and repeated application

- Discoloration of teeth, the mucous membrane and composite restorations
- Irritation of the oral mucous membrane
- Impaired taste sensation
- In extreme cases, shift of the ecological balance in the oral cavity

Problem with using a CHX-containing mouth rinse

Gjermo 1989

Rinse mouth for 1 min.

70% loss
30% retention

Effective concentration of active ingredients

CHX in general
- Targeted protection
- Controlled risk

Cervitec® Plus
Protective varnish: containing chlorhexidine & thymol

- 1% chlorhexidine
- 1% thymol

Varnish dries
~10% chlorhexidine
~10% thymol

Chlorhexidine Varnish vs. Rinse

- Clear, esthetic
- Single application
- Lasts 3 months
- 1% - 10% Chx
- No taste
- Professionally applied
- $7.50

- Brown stain
- Twice daily rinse
- 0.12% - 2% Chx
- Taste alteration
- Patient compliance
- $53.70

Effective concentration of active ingredients

Chlorhexidine-containing protective varnish of the next generation

- Cervitec Plus is based on the established protective varnish Cervitec.
- Cervitec stands for
  - ... more than 10 years of clinical experience.
  - ... more than 10 years of success on the market.
  - ... proven effectiveness.

(Zhang et al. 2006)
The advantage of the varnish:
- Targeted treatment of susceptible areas,
- Independent of patient compliance,
- High effectiveness with: 10% chlorhexidine plus 10% thymol,
- Longer CHX retention,
- Prevention of unpleasant CHX side effects.

**Professional Application**

**Delivery forms**

- Free Stand Single Dose Assortment
  - 20 Single Doses, 0.25 g each
  - Various accessories
- Assortment
  - 1 Dropper Tube, 7 g
  - Various accessories
- Refill
  - 2 Dropper Tubes, 7 g each
  - Various accessories

**The product**

**Step-by-step**

**Unique Conditions of the Maxillo-Facial Patient**

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Dr. J. A. Holloway.
Emergency and Long Term Solutions

GC Fuji TRIAGE™
GLASS IONOMER SEALANT & SURFACE PROTECTION MATERIAL
 Comes in eight shades and an assorted pack: A1, A2, A3, A3.5, B1, B2, B3, C4

Indications

EQUIA is a complete system that is an ideal solution for posterior restorations:
- Class I, II and V posterior restorations
- Compomer replacement
- Amalgam replacement
- High caries risk patients
- Pediatric patients
- Geriatric patients
- Special needs patients

EQUIA is a system that combines Fuji IX GP Extra and G COAT Plus

- Self Adhesive
- Higher Translucency
- High Fluoride release
- Self Curing
- Reduce risk of secondary caries
- Bulk Filling
- Finishing and Polishing in 2 ½ minutes
  - Increases flexural strength of Fuji IX GP Extra restoration by 29%. (IADR #0487)
  - Provides a high gloss and smooth surface
  - Contains nano-fillers that disperse evenly leading to high wear resistance
  - Reduces post-operative sensitivity to water
  - Light Curing
  - Self Adhesive

G-Coat Plus Bonding interface (SEM)

G-Coat Plus can bond to restorative material and to tooth structure (enamel & dentin) simultaneously

Application Time and Translucency

EQUIA - System

Fuji IX GP EXTRA
Polished by using silicon carbide paper (600)

100µm
Some voids are observed.

After coating
100µm
A smooth surface is obtained.

G-COAT PLUS fills-in surface porosities of Fuji IX GP EXTRA.
EQUIA - Procedure

Optional Step

Prepare the cavity.

Prior to bulk fill, apply GC Cavity Conditioner, then rinse and dry. (Do not desiccated.)

Bulk fill GC Fuji IX GP EXTRA, condense and carve to shape.

Final finishing using a superfine diamond. Rinse and dry.

Apply G-COAT PLUS and light cure - 20 seconds.

Final restoration.

Prevention/Treatment Approaches for Maxillo-Facial Patients

- **Existing healthy teeth**
  - Protect: CHX + FL + CaPO₄

- **Demineralization started**
  - Remineralize and Protect: CaPO₄ + CHX + FL

- **Cavitation started**
  - Restore: Resin or GI based restorative + G Coat