Melting Tooth Syndrome

Recognizing, treating and preventing erosion and hypersensitivity

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Conversation starters!
oral health to general health

* Get the facts
* Develop positive energy
* Create a legitimate spin
* Focus on health benefits
* Discuss savings - money, time, comfort
* Offer reasonable alternatives
* Coaching not scolding

How complicated are our patients?

* Medically complex patients
* Challenged immune systems
* Significant chronic health issues
* Multiple life style challenges
* Dry mouth issues and self care challenges
* Compliance issues

Improving the patient’s outcome

Individual clinical expertise
Best external evidence

Patient values & expectations

Dental hypersensitivity

* Common condition
* Transient tooth pain
* Short, sharp sensations
* Caused by a variety of exogenous stimuli
  ✓ Thermal (cold)
  ✓ Tactile (touch)
  ✓ Osmotic (sweets or drying the surface)

Common reasons for gingival recession

* Inadequate attached gingivae
* Prominent roots
* Toothbrush abrasion
* Pocket reduction periodontal surgery
* Oral habits resulting in gingival laceration
  (traumatic tooth picking, eating hard foods)

Dentin exposure – Etiology

Loss of enamel covering crown

✓ Attrition
✓ Erosion
✓ Abrasion
✓ Abfraction
✓ Fracture

Gingival recession

✓ Root exposure
✓ Loss of cementum
✓ Periodontal disease
✓ Periodontal surgery
✓ Bruxism
✓ Habits

Patients report sensitivity to

* Thermal stimulus (cold) 75%
* Tactile stimulus 25%
* Osmotic stimulus (sweet) 16%
* Air blast 7%

www.wonderhowto.com/how-to-explore-atomic-structure-tooth-160130/
Common reasons for gingival recession

- Excessive oral hygiene
- Gingival loss secondary to specific diseases, i.e., NUG, periodontitis, herpetic gingivostomatitis
- Crown preparation
- Orthodontic treatment
- Oral piercings

Listening to our patients......
Verbal and non-verbal cues and clues

- Women and younger more anxious
- Tense bodies
- Foot on the floor
- "I'd rather be anywhere but here"
- Patient expectations
- Previous dental experiences

Rule out other conditions

- Occlusal trauma
- Cracked tooth syndrome
- Caries – new and recurrent
- Pulpal pathology
- Gingival sensitivity
- Layered sensitivities

Gingival recession

Teeth most commonly affected by recession and hypersensitivity

- Incisors 26%
- Cusps 25%
- Premolars 38%
- Molars 12%

A golden opportunity to create a great patient relationship

- Acknowledge their concern
- There can’t be that many hypochondriacs in the world
- Really believe in their discomfort
- Ask them to be a partner in the diagnosis

Dentinal hypersensitivity

Two conditions are necessary

- Exposed dentin via loss of enamel or periodontal tissues
- Open dentin tubules - patent to the pulp – loss of smear layer

Listening to our patients......

A golden opportunity to create a great patient relationship

- What is really bothering them
- Ask what elicits discomfort – temperature, air, galvanic, acidity
- Describe the feeling – sharp, dull, profound, achy, electric
- Can the procedure or recommendations be altered

Redheads

- High anxiety
- Fear of pain
- Avoid dental care
- More sensitive to cold
- Subcutaneous lidocaine significantly less effective

Jaccobson PL, Bruce G. Clinical dental hypersensitivity: understanding the causes and prescribing a treatment. J Contemp Dent Pract 2001;Winter; (2)1:8.

Incisors 26%
Cuspids 25%
Premolars 38%
Molars 12%


Root sensitivity following periodontal therapy

Fischer et al. (1991)
- 9% patients sensitive before treatment
- 55% patients sensitive 1 week after

Tammaro et al. (2000)
- 23% sensitive before treatment
- 54% sensitive 1 week after treatment

Hypersensitivity from bleaching

- History of sensitivity
- Length of exposure to the bleaching agent
- Concentration of the bleaching solution
- pH of the whitening solution

Hypersensitivity from bleaching

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- Concentration of the bleaching solution
- pH of the whitening solution

Structural differences between sensitive and non-sensitive

Non-sensitive
- No of open tubules
- Diameter of tubules
- Fluid Flow (Poisseuille’s law)

Sensitive
- 8 x
- 0.83
- 16 y

Sensitivity of dentin has

- Eight times more open tubules
- Twice the mean diameter of open tubules
- A greater propensity for tubular fluid flow with a given stimulus

Hypersensitivity from bleaching

- History of sensitivity
- Length of exposure to the bleaching agent
- Concentration of the bleaching solution
- pH of the whitening solution

Reasons for continued tubule

- Poor plaque control, i.e., acidic bacterial byproducts
- Excess oral acids, i.e., sodas, fruit juice, swimming pool chlorine, bulimia
- Cervical decay
- Toothbrush abrasion
- Tartar control toothpaste

Tooth wear – Attrition

Loss of tooth or restoration surface caused by tooth to tooth contact during mastication or parafunction (bruxism).

Attrition characteristics

- Tooth wear – sites of direct contact between teeth
- Associated with flattened cusp tips or incisal edges
- Localized facets on the occlusal or palatal
- Molars are most commonly affected

Tooth wear – Abrasion

Loss by wear of dental tissue caused by abrasion by foreign substance.
e.g., toothbrush, dentifrice, tooth pick, chew stick, pipe stem
Abrasion characteristics

- Typically side dependent
- Right handed – Left side abrasion
- Usually buccal cervical areas
- Cusps and premolars – most common
- Lesions tend to be angular and “V” shaped
- Accelerated by brushing after vomiting or consumption of acidic foods or beverages

Tooth wear – Abfraction

Loss of tooth surface at the cervical areas of teeth caused by tensile and compressive forces during tooth flexure.

Abfraction – Enamel prism fracturing due to stress effect of occlusal load

Tooth wear – erosion

- Progressive loss of hard dental tissue by chemical processes not involving bacterial action
- Most important factor in hypersensitivity
- Erosive lesions – most likely to be sensitive

Erosion vs. caries

- Surface-softening lesion
- Non-bacterial extrinsic and intrinsic acids
- Complicated by attrition and abrasion
- Resistant to remineralization
- Prevalence increases with age

Erosion – complicating medical conditions

GERD – gastric esophageal reflux
- 7% adults experience daily episodes
- 36% monthly
- Children also experience GERD

Anorexia
- 47% are in binge/purging subcategory
- refusal to maintain normal weight

Bulimia
- Typically normal weight
- Self induced vomiting after consuming food

Eating disorders – Common behaviors and findings

- Vomiting – affects palatal surfaces of maxillary teeth – termed perimyolysis
- Eroded surfaces are smooth and glossy
- Erosion – after two years of self-induced vomiting
- Active lesions - smooth and unstained
- Inactive lesions - stain over time
- May be the only oral manifestation of self-induced vomiting

Erosion – Intrinsic factors

Regurgitation
- reflux
- bulimia
- chemotherapy
- pregnancy
- alcoholism
- peptic ulcers
- gastritis
- drug side effects

OTC supplements
- medications
- chewable vitamin C
- cough drops
- fizzy liquid medications

When do teeth melt???

Critical pH – is a dynamic number
- Dependant on salivary calcium and phosphorus
- Average resting salivary pH 6.4 – 7.2

Root structure - pH 6
- Enamel - between pH 5 and 5.5
- Fluorapatite - pH 4.5

Mount GJ and Hume WJ. Preservation and restoration of tooth structure. Knowledge books and software. 2nd Edition. 2005

Dawes C. What is the critical pH and why does tooth dissolve in acid? J Can Dent Assoc 2003; 69(11):722–4

Stookey GK. The effect of saliva on dental caries. 2001


Photo - Courtesy of Richard Erlich, DDS - Ontario, Canada - elmtreedental.com

Eating disorders – Common behaviors and findings

* Consume large amounts of acidic beverages and fresh fruits
* Often treated with antidepressants and other drugs that cause dry mouth
* Binge/purge – high carbohydrate intake
* Anorexia - often poor oral hygiene

Oken treated with an antidepressants and other drugs that cause dry mouth.

Binge/purge – high carbohydrate intake

Anorexia; Oken poor oral hygiene


Erosion from GERD

Loss of occlusal anatomy

Rising amalgams

Erosion – Extrinsic factors

Diet

Drinks, fruits, candies, pickled foods

Environmental

Occupational (acid vapors from industrial electrolytic processes / wine tasting)

Recreational (swimming pool)*


The many looks of erosion

Loss of surface gloss and thin enamel

Loss of occlusal anatomy and rising sealant


The many looks of erosion

Early erosion

Advanced occlusal erosion

Bruxism plus erosion – two years of canned soft drinks

Erosion – Melting tooth syndrome

Dietary intake

Acidic foods – pickles, vinegar, citrus

Carbonated beverages

Sports and energy drinks

Flavored waters

Wine – particularly dry varieties

Beer

Erosion – Melting Tooth Syndrome

Other culprits

• Cough drops
• Chewable vitamin C (ascorbic acid)
• Chewable aspirin
• Chewable antacid tablets
• Fizzy liquid medications

Erosion – Dietary intake

• High carbohydrate foods
• Fruit juices
• Fruits, especially citrus
• Sour candies and powders
• Breath mints
• Sugar free candies containing citric acid

Erika Feltham’s paper erikafeltham@mac.com

Soda Pop!

1950s - 192 ml bottle

Today........

355 ml can is standard

592 ml bottle common

Missouri Dental Association
Brochure revised 2006
www.modental.org
USA – average annual consumption

Average US citizen drinks 379 liters per year – three bath tubs full!

Teen age boys drink 606 liters/year

One-quarter of all drinks consumed

450 different types of soda pop

2,500,000 vending machines in the USA

More thoughts on soda...........

Soda manufacturers are the largest single user of refined sugar in the United States

Most sodas include over 100 percent of the RDA for sugar

Soda linked to osteoporosis, obesity, tooth decay and heart disease

Teen female soda drinkers – five times higher fracture risk

Beverage consumption Fast Facts........

For children aged 6 - 11 from 1977 - 2001

Milk consumption dropped 39%

Soda consumption rose 137%

Fruit juice rose 54%

Fruit drink rose 69%

Sugar sweetened beverages - 11% total calories

The beverage of choice – kids and teens in the US

Consumption among children has almost doubled in the last ten years

Teenage boys drink 3 or more cans per day

10% of teen males drink 7 or more cans a day

Teenage girls average 2 cans per day

10% of teen females drink more than 5 cans a day

Teen age diets – Fast Facts.............

Drank one can or more sugared soda per day - 2011

M – 31.4%, F – 24.0%

Drank 3 or more glasses of milk per day - 2009

M – 19.8%, F – 8.7%

Trying to lose weight - 2009

M – 28.4%, F – 51.6%

One or more a day.........

Soda or fruit drinks

Studied 50,000 nurses

Today’s large bottles = 2-3 servings

Over 4 years = 10.3 lbs weight gain

83% increased risk for Type II diabetes

Appetite sensor may not recognize liquid calories

Purdue study – one can a day equals 19 pounds weight gain per year

http://apps.nccd.cdc.gov/yrbss          Accessed 7/7/2012  


What a brew!

- Carbonated water
  - High fructose corn syrup
  - Concentrated orange juice and other natural flavors
- Citric acid
  - Sodium benzoate (preserves freshness)
- Caffeine (55.2 mg/12 oz)

The scoop.....
powdered drinks

- Bottled water - pH 6.3
- Propel Fit Powder ‘vitamins’ - raspberry lemonade flavor - pH 3.2
- Kool-Aid Singles - cherry flavor - pH 2.8
- Country Time Lemonade ‘On the Go’ - pH 2.5 powder
- Crystal Light ‘On the Go’ - raspberry ice flavor - pH 2.6

Propel....now vitamin and calcium enhanced

- Water
- Sucrose syrup
- Flavors
- Citric acid
- Sodium citrate
- Potassium citrate
- Splenda (sucrolose)
- Acesulfame potassium
- Calcium disodium EDTA
- Vitamin B 5
- Vitamin B 6
- Vitamin B 3
- Vitamin B 12
- Vitamin D

Energy drinks contents and rebranding

- Caffeine
  - 80–300 mg per 16 oz
- Herbs
- Guarana
- Taurine
- Ginseng
- Ginkgo biloba
- Other various ingredients

2013 - Brand Market Share - Energy drinks

- Red Bull - $3.4 BILLION
- Monster - $3.1 BILLION

Energy Shots

- Specialized, concentrated energy drink
- Sold in smaller 50ml bottles
- Same total amount of caffeine, vitamins, functional ingredients
- Marketed as - low calorie, “instant energy”, one swallow

Marketing - 2013

Top Selling Energy Drink Mixes

- Midori
- Crystal Light Energy
- Private Label
- Propel Energy Drink Mix
- Ziffris
- Red Bull
- Ecostyle
- 7 Up
- Sains

Energy drinks risks

- Heart palpitations
- Increased blood pressure
- Nausea, stomach upsets
- Headaches
- Psychiatric disturbances
- Sleep disturbances
- Tooth erosion
- Weight gain
- Fatigue

*Tenfold increase from 2005 to 2009 in U.S. emergency department visits related to energy drink intake*


Energy drinks - Teens

- Adolescent consumption widespread - 30% daily use
- Energy drinks - strongly associated - alcohol, cigarette and illicit drugs
- Energy drink users - heightened risk for substance abuse
- Energy drink users - more physiologic and behavioral adverse effects


Energy drinks - Troops

- Monster brand - top selling beverage in Army and Air Force Exchange
- 44% deployed troops drink one per day
- 13% drink three or more a day / slept less than 4 hours a day
- Three a day - increase in sleep problems / stress / illness / day time sleepiness during guard duty or briefings


Industry growth analysis

<table>
<thead>
<tr>
<th>U.S. LIQUID REFRENSMENT BEVERAGE MARKET</th>
<th>CHANGE IN VOLUME BY SEGMENT</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2010-2011</td>
</tr>
<tr>
<td>Segment</td>
<td>% Change</td>
</tr>
<tr>
<td>Energy Drinks</td>
<td>+14.1%</td>
</tr>
<tr>
<td>RTDs (Tea)</td>
<td>-3.5%</td>
</tr>
<tr>
<td>Spirits (Vodka, Gin)</td>
<td>-1.2%</td>
</tr>
<tr>
<td>SODA (Coffee, Tea)</td>
<td>-1.6%</td>
</tr>
<tr>
<td>Commodity Soft Drink Products</td>
<td>-1.9%</td>
</tr>
<tr>
<td>Ready-to-Drink Beverages</td>
<td>-1.3%</td>
</tr>
<tr>
<td>SODA</td>
<td>+1.7%</td>
</tr>
<tr>
<td>TOTAL E89</td>
<td>+0.9%</td>
</tr>
</tbody>
</table>

Note: Beverage Marketing Corporation

Changing market shares 1997-2005

Markets Share, 1997

- Market Share 1997: Soda 35%, Energy Drinks 15%

Markets Share, 2005

- Market Share 2005: Soda 35%, Energy Drinks 22%

Marketing to children and teens

Are you sure you want to drink another soda??

2004 Landmark study

- Dissolution of enamel in soft drinks: [agd.org/library/2004/aug/mahl Phó.pdf]
Erosive potential of four soft drinks

**Study drinks**
- Red Bull
- Classic Coke
- Diet Coke
- Gatorade

**Measured**
- pH
- Titratable acidity

Listed all ingredients found in the beverage.

**Chemical erosion via soft drinks**
- Human molars – free of decay
- Imbedded in acrylic - Enamel exposed
- Half the surface – coated with nail polish
- Remaining surface exposed to beverages
- Beverages changed daily
- 14 days – compares to 14 years of exposure
- Microscopic and SEM evaluations

**Post immersion photos – 20x magnification**
- Classic Coke
- Diet Coke
- Red Bull – 250x SEM

**What's different about these non-carbonated drinks?**
- Multiple organic acids
- Added sucrose and glucose
- TA off the charts! Requires more titration
- Citric acid - binds (chelates) calcium - higher pH
- Net effect – accelerates calcium lost from tooth
- Maintains pH below 5.5, causing erosion

**Total acid content of beverages**

- **pH-Initial acidity**
  - Measures hydrogen ion concentration
- **TA-Titratable acidity**
  - Measures the total number of acid molecules / erosive potential
  - Higher TA = Longer time to reach neutral, safe pH value/salivary clearance

**More news on acidity**

<table>
<thead>
<tr>
<th></th>
<th>pH</th>
<th>TA</th>
</tr>
</thead>
<tbody>
<tr>
<td>LOW</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lager</td>
<td>5.3</td>
<td>0.1</td>
</tr>
<tr>
<td>Beer</td>
<td>4.4</td>
<td>0.5</td>
</tr>
<tr>
<td>MEDIUM</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Cola</td>
<td>3.9</td>
<td>0.6</td>
</tr>
<tr>
<td>HIGH</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Carbonated orange</td>
<td>2.9</td>
<td>2.0</td>
</tr>
<tr>
<td>White wine</td>
<td>2.5</td>
<td>2.2</td>
</tr>
<tr>
<td>Apple juice</td>
<td>3.3</td>
<td>4.5</td>
</tr>
<tr>
<td>Grapefruit juice</td>
<td>3.2</td>
<td>9.3</td>
</tr>
</tbody>
</table>

David Bartlett, BDS, PhD – Acids, sensitivity and teeth: A practical approach to management of erosion and tooth wear. ADA Meeting – October 17, 2008 – San Antonio, TX.

Elise Rose, PhD – Personal communication – August 4, 2009


Elise Rose, PhD – Personal communication – August 4, 2009

Carbonic Acid

Chelating - The acid dance – 6 PM

Chelating - the party's over.....

Elise Rose, PhD – Personal communication – August 4, 2009

Carbonic Acid

Chelating – The acid dance - 6 PM

Chelating – the party’s over......
Consumption...
patterns and habits
✓ Super sized drinks
✓ Frequency of between meal snacking
✓ Prolonged sipping
✓ Swishing, swilling
✓ Holding liquid in the mouth
✓ Baby bottles and sippy cups

Bottled water!!!
pH levels of 5.5 are common

Mouth Rinses!!!
pH levels 3.5 to 5

And it’s not just soft drinks!

Increasing the
risk for erosion
✓ 37X – Citrus twice daily
✓ 4X – Sports drinks weekly or soft drinks daily
✓ Vomiting once a week or more
✓ GERD
✓ Low unstimulated salivary flow rate

Diagnostic protocol for
dental erosion – historical data

Diagnostic protocol for dental erosion – physical evaluation

Fast Facts...........
Loosing tooth structure
✓ Pure abrasion 2,500 years to remove 1 mm
✓ Add toothpaste, 100 years
✓ Add acid and toothpaste - 2 years to remove 1 mm
✓ Active erosion will not be stained

Early erosion......one year

Increasing the risk for erosion

Slowing down erosion from acidic foods and beverages

- Drink with a straw
- Limit contact time – drink quickly
- Drink beverages during meals
- Add ice to drinks
- Avoid between meal snacks/drinks

• Eat chocolate, dairy or cheese after acidic intake
• Use xylitol gum, mints, lozenges or spray
• Chew gum to stimulate saliva
• Use bicarbonates - rinse, paste or lozenge
• Brush before morning juices, etc.
• Rinse with water
• Soft bristle brushes / low abrasion paste

Understanding labels

✓ "ose" words - sugar
✓ "ate" words - acid
✓ corn syrup
✓ ascorbic acid

Salivary dysfunction – etiology and contributing factors

- Dehydration
- Stress
- Smoking
- Systemic disease
- Recreational drugs
- Radiation treatment
- Chronic renal failure
- Autoimmune disorders
- Sleep apnea
- Salivary gland pathology
- Menopausal hormone imbalance
- Laxative/diuretic abuse
- Pharmaceutical and OTC medications (over 1,800 meds)

Saliva – The magic fluid

- Taste
- Speech
- Food preparation
- Digestion
- Lubrication
- Antibacterial properties
- Cleansing
- Buffering
- Mucosal integrity

Insufficient saliva – Oral Desert Storm

- Changes can be subtle
- Often unnoticed until 50% decrease
- Sets the stage for demineralization
- pH decreases

Insufficient saliva – Oral Desert Storm

- Acidogenic bacteria numbers increase
- Buffering capacity decreases
- Aciduric bacteria thrive
- Plaque biofilm becomes very sticky

Stimulated saliva

80% to 90% of daily salivary production
Stimulus that produces saliva

✓ Mechanical
✓ Gustatory
✓ Olfactory
✓ Pharmacological

Saliva – Fast facts…….

- Peak salivary flow - at the end of the afternoon
- Salivary flow near zero during sleep
- Acid substances increase salivary flow rates
- 80-90% of all saliva is stimulated
- Parotid gland secretions – 50% of stimulated saliva
Saliva testing measures six parameters:
- Salivary production
- Viscosity of unstimulated saliva
- pH of unstimulated saliva
- Stimulated flow
- pH of stimulated saliva
- Buffering capacity

How saliva buffers:
- Prevents colonization – pathogenic microbes
- Increases biofilm pH - sialin and urea
- Neutralizes acids
- Prevents enamel demineralization

Increasing salivary flow rate – benefits
- More bicarbonate ions
- pH rises towards neutral
- Buffering power of the saliva increases dramatically

Ecological plaque hypothesis
- Health - dental plaque in homeostasis
- Species in health differ from disease sites
- Imbalance in resident microflora
- Caries - shift dominates to acidogenic / aciduric
- Increase mutants streptococcus and lactobacillus
- Regular low pH - select for Ms and Lb

Ecological shifts in dental plaque

Checking out biofilm

CariScreen Caries Susceptibility Test
- Evaluates oral bacterial load
- Chair side
- Swab plaque
- Add reagents
- One minute meter test
- ATP Bioluminescence
- Measures patient risk

carifree.com

More news about caries biofilm
- S. Mutans is an early colonizer
- 30% rampant caries - do not test positive for S.Mutans
- “good” bacteria mutate / adapt
- Become acid producers to survive
- Can adapt in 30 minutes to survive acidic conditions
- Goals - change biofilm ecology
- Disrupt biofilm, reduce sugar, increase saliva and pH

Ecological plaque hypothesis - solutions
- Target putative pathogens (difficult)
- Stimulate saliva
- Limit sugar intake
- Use non-fermentable sweeteners
- Metabolic inhibitors - fluoride
- Anti-adhesion - xylitol

carinfree.com
Evidence based decision making

- Evaluate claims
- Important to understand research
- Try products – ask patient’s permission
- Split mouth designs
- Ask patients for real feedback
- Discuss outcomes with colleagues

Evidence based decision making

That’s not what I learned school!

- Personal observation / experience counts
- Trust what works well in your hands
- No one multipurpose product / technique
- Double blind, randomized clinical trials

Traditional therapeutic factors

- Fluoridated water
- OTC fluoridated toothpaste & rinses
- Prescription-level fluoride paste
- Topical fluoride treatments
- Sealants
- Dietary changes

But if this is working so well, why is sensitivity and decay on the increase??

Dentinal hypersensitivity treatment options

Consider something novel....
Therapeutic treatments that rebuild tooth structure or resist acid attacks

- Arginine bicarbonate
- ACP – Amorphous calcium phosphate
- CPP-ACP compounds – ACP + casein phosphopeptide
- Bioactive glass – NovaMin products
- Glass ionomer surface protection
- 5000 ppm fluoride pastes

Tubule occlusion

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Type of Product</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biocrowns, Fluorides</td>
<td>Toothpaste, Gel</td>
</tr>
<tr>
<td>High fluoride</td>
<td>Varnish, Gels</td>
</tr>
<tr>
<td>Precipitating salts</td>
<td>Calcium oxalate, Silicates</td>
</tr>
<tr>
<td>Restorative materials</td>
<td>Adhesive Resins</td>
</tr>
<tr>
<td>Lazer</td>
<td>Gel/cream</td>
</tr>
</tbody>
</table>

Colgate Sensitive Pro-Relief

- Based on salivary chemistry
- Arginine/bicarbonate/calcium carbonate complex occludes dentin tubules
- Bicarbonate buffers acids
- Arginine neutralizes - raises pH to 7

What is arginine?

- Natural amino acid
- Naturally found in saliva
- Bipolar molecule - both positively and negatively charged groups
- Net positive charge
Tooth surface is negatively charged
- Attracts arginine’s positive charge
- Arginine and calcium carbonate - CaCO$_3$ promotes precipitation of calcium and phosphate ions into tubules
- Arginine - raises pH to 7


NovaMin technology
- Calcium Sodium Phosphosilicate
- Reacts with saliva – Elevates pH to 8-8.5
- Calcium and phosphorus ions release
- Sodium and calcium cause bacterial cell lyses
- Demineralized lesions attract Ca$^{2+}$ and P$^{5+}$
- Build hydroxyapatite from bottom up

Efficacy after one application
- Paste like substance - adhesive properties
- Tubules remained sealed after 24-hour hydrochloric acid challenge


ACP – Amorphous calcium phosphate
- releases calcium and phosphorus
- highly soluble compound - prolonged substantivity?
- building block of apatite

CPP-ACP compounds
- contains casein phosphopeptide (Recaldent)
- adheres to soft tissue, plaque, teeth
- calcium and phosphate — released during acid challenge
- contraindicated with milk allergy

Applying desensitizing paste
New! Contra Elite Flex
- Use an anti-splatter prophy angle
- Run handpiece slowly
- Burnish the product into the tooth
- Does not need to be rinsed off
- Can apply with cotton tipped applicator or digitally

Therapeutic factors that reduce risk
- Professionally applied fluoride gels
- Professionally applied fluoride varnish
- Fluoride lozenges
- Prescription fluoride pastes
- Weekly chlorhexidine rinses
- Chlorhexidine/essential oil varnish
- Antibacterial tooth paste

Years ago we began with fluoride
Professional
Home

Fluoride treatment recommendations
- One minute foams / rinses not endorsed
- Gels – application should be four minutes.
- Varnish application – every six months
- Effective caries prevention
- Children, adolescent and adult dentition

Fluoride varnish recommendations
Varnish application
- two or more per year
- Effective caries prevention
- High risk populations

Application benefits
- Less time
- Less patient discomfort
- Greater patient acceptance than gels
- Ideal for preschool children

Evidence- Based Dental Hygiene: Evidence-Based Dental Hygiene Council on Scientific Affairs. American Dental Association. May, 2006


Colgate PreviDent Varnish

- 5% Sodium fluoride
- Treats hypersensitivity
- Transparent
- Contains xylitol
- Unit dose

3M ESPE Vanish Varnish with TCP

- Contains calcium and phosphate
- Saliva activates protected calcium
- Sweetened with xylitol
- Relieves hypersensitivity
- Calcium is released for 24 hours

Vanish XT – Extended contact varnish

- Durable protective coating
- Protects enamel or dentin
- Light cured glass ionomer
- Sustained fluoride and calcium release
- Recharges repeatedly with fluoride toothpaste
- Moisture tolerant material

Site-specific protective coating for at-risk surfaces

- Around orthodontic brackets
- Surfaces susceptible to acid erosion
- Exposed roots
- Non-cavitated lesions (white spots)
- Partially erupted molars
- Patients with limited dexterity, cognitive challenges, caregiver issues

Tri-calcium phosphate...

- Contains fluoride, calcium and phosphate
- Calcium ion – protective SLS coating
- Keeps ingredients from binding
- Contact with saliva or water dissolves SLS coating
- Fluoride, calcium and phosphate
- Available full strength at delivery site

Supportive therapy

- Power brushes
- Fluorescent disclosing
- Xylitol gum, mints, wipes
- Sustained release lozenges
- Compound lozenges – xylitol/essential oils

5000 PPM Fluoride

- Liquid gel formula
- Available full strength at delivery site
- Dry mouth formula - no SLS (sodium laurel sulfate)
- Sensitive formula - 5% potassium nitrate

Tri-calcium phosphate...

- Supports therapy

Effective home care – mechanical and chemical

- Goal is to reduce pathogenicity, disrupt biofilm, stimulate salivary flow and increase pH
- Brushing - power and manual
- Site specific activities – interdental devices, floss
- Irrigation
- Therapeutic rinses and paste
- Xylitol – gum, mints, wipes, spray

Supportive therapy

- Power brushes
- Fluorescent disclosing
- Xylitol gum, mints, wipes
- Sustained release lozenges
- Compound lozenges – xylitol/essential oils

Effective home care – mechanical and chemical

- Goal is to reduce pathogenicity, disrupt biofilm, stimulate salivary flow and increase pH
- Brushing - power and manual
- Site specific activities – interdental devices, floss
- Irrigation
- Therapeutic rinses and paste
- Xylitol – gum, mints, wipes, spray
The magic of xylitol

- Interferes with Strep Mutans metabolism
- Disrupts biofilm integrity
- Promotes neutral pH
- Stimulates saliva flow
- Shifts equilibrium to enhance remineralization
- Increases available calcium and phosphate

Can be fatal to dogs and ferrets
Avoid fructose for up to one hour after use

Using xylitol
- Must be one of first three ingredients
- One piece gum/candy - four times a day for 3-5 minutes
- 4 - 10 grams per day for dental benefits
- Xylitol tooth paste, wipes, pacifier or mouth rinse
- Excessive use – laxative effect

XyliMelts
- Bioadhesive disc
- 500 mg xylitol per dome
- Time release - 30 – 120 minutes
- 1.2 calories
- Can be used while sleeping
- Avoid fructose for up to one hour after use
- Contraindicated in age 5 years or younger - choking

Novel ways to apply xylitol
- Spiffies wipes
- Ice Chips candy
- CarliFree wipes

Novel ways to enjoy xylitol
- Ice Chips candy
- Xylitol gum
- Gum with Recaldent (CPP)/ACP
- Gum with xylitol and green tea extract

Comparing Xylitol

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<th>Sorbitol</th>
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<tr>
<td>Calorie</td>
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<td>Acute, not chronic</td>
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<tr>
<td>Oral symptoms</td>
<td>None</td>
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</table>
| Chewing gum!             | Ice Chips candy

- Stimulates saliva - bicarbonates neutralize acids
- Xylitol gum
- Gum with Recaldent (CPP)/ACP
- Gum with xylitol and green tea extract

Theodent
New toothpaste!

- Rennou® technology
- Theobromine - found in cacao (chocolate) plus minerals
- Stimulates growth of larger hydroxyapatite crystals (4X larger)
- Complete dentinal tubule occlusion - 7 days
- FDA GRAS (generally regarded as safe) status
- Does not contain fluoride

Increase in surface micro hardness in 7 days!

What do we owe our patients?
- We can improve their lives
- Current, in-depth health history
- Assess a patient’s total needs
- Current scientific information
- Understand technology
- Tell the truth
- Provide all options
- Patients must make the final choice

What’s the take home message?
Investigate and understand

- Dietary intake and patterns
- Saliva composition and bacterial risk
- Intervention and remineralization strategies
- Every patient is unique
# Product Resources - 2014

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<tr>
<th>Magnification &amp; Illumination</th>
<th>800-863-9943</th>
<th><a href="mailto:info@ortek1nc.com">info@ortek1nc.com</a></th>
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<td>Gregg Brown</td>
<td></td>
<td><a href="mailto:Gregg.brown@sybron.com">Gregg.brown@sybron.com</a></td>
<td>412-302-6739</td>
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<td>Loupes / headlights / saddles</td>
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