

*Preventive & Restorative Dentistry*  
for the best, most predictable outcomes

**PAMELA MARAGLIANO-MUNIZ, BSDH, DMD**  
PROSTHODONTIST  
TUFTS UNIVERSITY SCHOOL OF DENTAL MEDICINE, BOSTON, MA  
PRIVATE PRACTICE: SALEM DENTAL ARTS, SALEM, MA  
EDITORIAL DIRECTOR, PEARLS FOR YOUR PRACTICE, DENTISTRYIQ.COM  
2010 ADA ADULT PREVENTIVE CARE PRACTICE OF THE YEAR

## *Course Objectives*

- \* Caries management programs do not have to be complicated and time consuming
- \* Understand the role of risk factors & strategies for risk management
- \* Appreciate clinical results and profit potential
- \* Identify restorative materials and techniques that promote favorable long-term outcomes
- \* Implant treatment planning can for long term outcomes
- \* Learn some tips that you can use Monday!

## *Prostodontics & Prevention*

Older patient population  
Complex MH, Medications  
Caries risk assessment  
Diagnosis and treatment planning  
Many restorative procedures increase caries risk  
Favorable and predictable outcomes

## CARIES

Caries is the most prevalent disease in the world

Surgeon General: dental caries is the single most common chronic disease of childhood

Starting at age 60, tooth decay rates are equal to or greater than adolescent decay rates who grew up with no fluoride in the water

91% of adults are affected by caries in their lifetime

World Health Organization 2010  
Health Report 2010, Surgeon General Report  
Ettinger R. Oral health and the aging population. J Am Dent Assoc 2003; 134(5): 55-62  
Bellizzi-Kaplan ED, Barker LC, Cantor MT, et al. Centers for Disease Control and Prevention. Surveillance for dental caries, dental sealants, tooth retention, edentulism and enamel fluorosis - United States, 1988-94 and 1999-2002.  
MMWR Surveill Summ 2005;54(3): 1-13

## COMMON CARIES MISCONCEPTIONS

- Children and adolescents are at the highest risk for developing caries and caries risk reduces with age.  
*Just the opposite!*
- If you brush and floss your teeth, you will not be as susceptible to caries.  
*False!*
- High amounts of topical fluoride will minimize risk.  
*Sometimes!*
- If incipient caries are detected, the least invasive thing to do is to watch it.  
*NEVER!*

## THE DISEASE: *Dental Caries*

Bacteria    pH    Inadequate exchange of minerals

*Not a hole in a tooth!*

## Bacteria

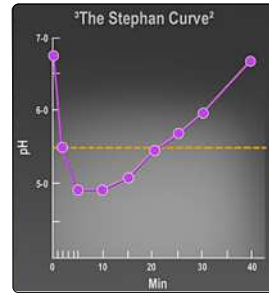
- S. mutans
- S. sobrinus
- Lactobacillus
- other bacteria



- Sticks to tooth
- Converts sucrose to glucan
- Lactic acid byproduct

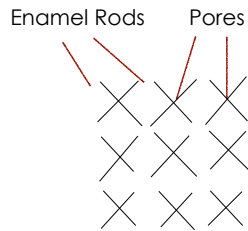
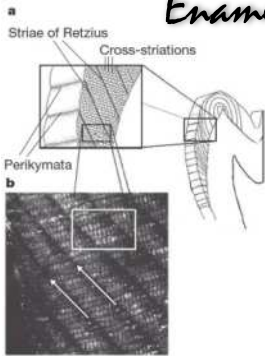
*Acidogenic, Aciduric, Cariogenic*

pH



below 5.5 enamel caries can develop

## Enamel



Cross Section View

## Demineralization

- Constant cycle of acids formed by bacteria on teeth
- Acids remove minerals from teeth faster than the saliva can restore the minerals
- Without chemotherapeutics and risk management, demineralization will lead to caries

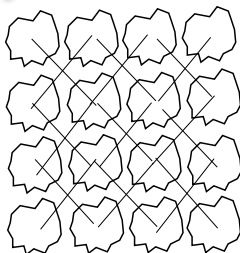
## Demineralized Enamel

Enamel rods become ragged

Widening of inter-rod space

Fluid Diffusion Occurs

- Plaque acids
- Bacteria
- Calcium
- Phosphate
- Fluoride
- Buffering agents



## DENTAL CARIES

*Impact on a Patient's Quality of Life*

- ✓ Diminished comfort, function, aesthetics and perception of oral health
- ✓ Increased anxiety
- ✓ Increased cost
- ✓ Direct link to systemic conditions

## DENTAL CARIES

*Impact on a Clinician's Quality of Life*

- ✓ Increased anxiety
- ✓ Delivering "bad news"
- ✓ Lack of control of disease process
- ✓ Reduced lifespan of restorations

So, we can't see the disease, but  
we need to identify it before it  
destroys teeth?!



## CAMBRA Caries Management by Risk Assessment



Evidence Based  
Caries can be  
prevented and cured  
Risk Assessment  
Risk Management  
ADA adopted  
protocols



### CAMBRA

(CARIES MANAGEMENT BY RISK ASSESSMENT)  
Journal of the California Dental Association, Oct & Nov 2007

Why would I consider a  
Caries Management  
Program for my Practice?

*Trends in Dentistry  
Legal Implications*

## Trends in Dentistry

Shift towards Prevention

Studied insurance claims from 1992-2007

The number of restorative, endodontic,  
surgical procedures declined

Composites are replacing amalgams

**Conclusion:**  
Practitioners might need to adjust the  
number of patients they treat and the  
services they provide



Eklund, JADA 2010



## CDT CODES

**Caries risk assessment & documentation with a finding of:**

D0601: low risk

D0602: moderate risk

D0603: high risk

D0604: extreme risk

D0999: unspecified diagnostic procedure, by report

[www.carifree.com/dentists/blog/education/winning](http://www.carifree.com/dentists/blog/education/winning)

"Although we have reached a relatively high degree of excellence in restoring teeth, placing high-quality restorations in teeth that should not have been surgically cut and restored represents the lowest overall standard of care."

Ismail, S. Dental Caries in the Second Millennium. *J Dent Ed.* Oct 2011

Why *else* would I consider  
a Caries Management  
Program for my Practice?

*Clinical Benefits*  
*Financial Rewards*

## RECORD REVIEW

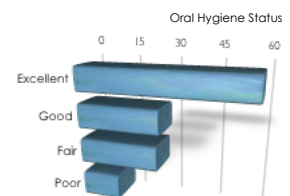


132 Patients  
Demographic Information  
# of new carious lesions  
# of reversal of incipient lesions  
Oral Hygiene Status  
Risk Category

Maragliono-Muniz, PM., Roberts, DR., Chapman, R.J. Trends in Dental Hygiene: Clinical Results and Profitability of a Caries-Management Program in Private Practice. *RDH Magazine*, Dec. 2012.

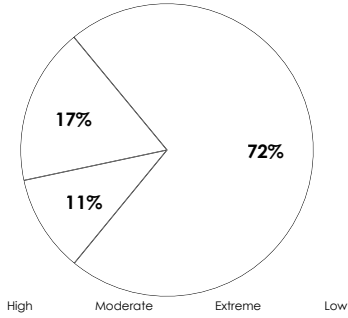
## RESULTS

- n=132 (62 Male, 70 Female)
- Mean age: 63 years old
- 254 new carious lesions (49 people)
- 215 lesions reversed
- 102 accepted CAMBRA

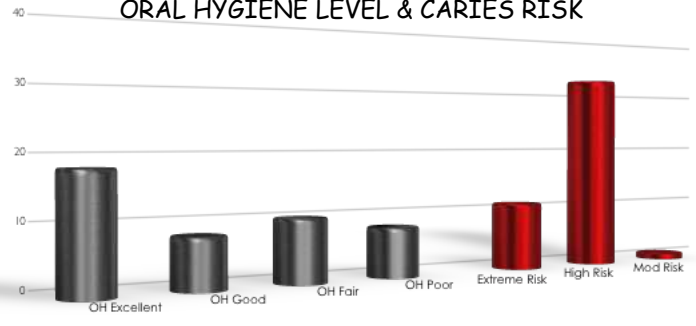


**93.87%** Patients with new carious lesions accepted CAMBRA protocols

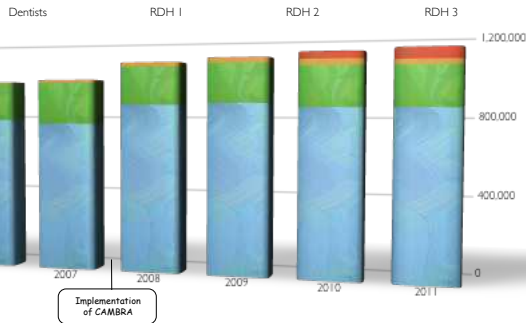
## CARIES RISK CLASSIFICATIONS



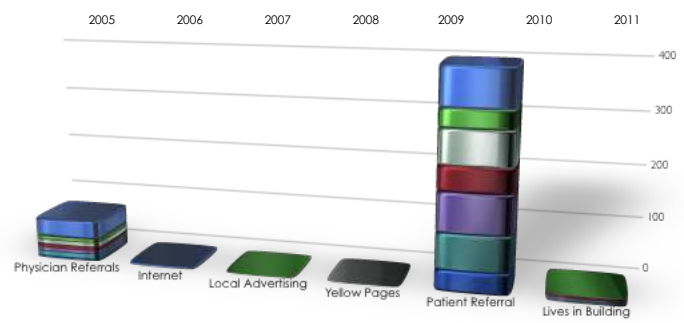
## DISTRIBUTION OF PATIENTS WITH INCIPIENT CARIES REVERSALS (N=44) ORAL HYGIENE LEVEL & CARIES RISK



## OFFICE PRODUCTION



## PATIENT REFERRALS



## ADDITIONAL FINDINGS



*Improved Periodontal Condition*

Less Bleeding  
Less Inflammation



## ADDITIONAL FINDINGS

*Decrease in Calculus & Stain*

- Improved patient satisfaction and comfort
- Increased time for communication and clinical evaluations
- Decrease in scaling time
- Decrease in scaling-related fatigue

## ADDITIONAL FINDINGS

*Smooth, Shiny, Glass-like Root Surfaces*



Maragliano-Muniz, Jan 2012



## Classification System for Root Surface Quality

Root surfaces are at risk for: abrasion, abfraction, continued recession and caries

Difficult to monitor for changes

Classification system for root surface remineralization & demineralization introduced

Criteria:

Surface hardness, texture, color, consistency, cavitation

Inside Dentistry, Jan 2012, p34-42.  
Maragliano-Muniz PM, Roberts DR, Chapman R.J.

## Summary of Classification System

CLASSIFICATION	HARDNESS CHANGE	TEXTURE CHANGE	COLOR CHANGE	CONSISTENCY CHANGE	CAVITATION	NEED FOR RESTORATION
NO CHANGE (NC)	N/A	N/A	N/A	N/A	NO	NO
D1	DECREASED	ROUGH	DARK YELLOW	DULL	NO	NO
D2	DECREASED	STICKY	DARK YELLOW TO LIGHT BROWN	DULL	NO	NO UNLESS PATIENT REQUESTS
D3	DECREASED	STICKY	LIGHT BROWN TO BLACK	DULL	YES	YES
R1	INCREASED	SMOOTH	YELLOW TO DARK YELLOW	SHINY	NO	NO
R2	INCREASED	SMOOTH	DARK YELLOW TO BROWN	SHINY	NO	NO UNLESS PATIENT REQUESTS
R3	INCREASED	SMOOTH	LIGHT BROWN TO BLACK	SHINY	YES	POSSIBLY AFTER REMINERALIZATION
R4	INCREASED	HARD PERIPHERY SOFT CENTER	DARK YELLOW TO BLACK	SHINY WITH A DULL CENTER	YES	YES

Maragliano-Muniz PM, Roberts DR, Chapman R.J. Classification System for Root Surface Quality. Inside Dentistry, Jan 2012, p 40.

## CLASSIFICATION SYSTEM FOR ROOT SURFACE QUALITY

### NO CHANGE



No change:  
Hardness  
Texture  
Color  
Consistency



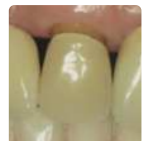
No cavitation  
No need for restoration



## CLASSIFICATION SYSTEM FOR ROOT SURFACE QUALITY

### D1

Hardness: Decreased  
Texture: Rough  
Color: Yellow to dark yellow  
Consistency: Dull  
No Cavitation  
No need for restoration



## CLASSIFICATION SYSTEM FOR ROOT SURFACE QUALITY

### D2

Hardness: Decreased  
Texture: Sticky  
Color: Dark yellow to light brown  
Consistency: Dull  
No Cavitation  
No need for restoration, unless patient requests





CLASSIFICATION SYSTEM FOR ROOT SURFACE QUALITY

**D3**



- Hardness: Decreased
- Texture: Sticky
- Color: Light brown to black
- Consistency: Dull
- Cavitation present
- Possible restoration after remineralization

CLASSIFICATION SYSTEM FOR ROOT SURFACE QUALITY

**R1**



- Hardness: Increased
- Texture: Smooth
- Color: Yellow to dark yellow
- Consistency: Shiny
- No Cavitation
- No need for restoration



CLASSIFICATION SYSTEM FOR ROOT SURFACE QUALITY

**R2**

- Hardness: Increased
- Texture: Smooth
- Color: Dark yellow to light brown
- Consistency: Shiny
- No Cavitation
- No need for restoration, unless patient requests



CLASSIFICATION SYSTEM FOR ROOT SURFACE QUALITY

**R3**

- Hardness: Increased
- Texture: Smooth
- Color: Light brown to black
- Consistency: Shiny
- Cavitation
- Possible need for restoration, after remineralization therapy



CLASSIFICATION SYSTEM FOR ROOT SURFACE QUALITY

**R4**

- Hardness: Increased
- Texture: Hard periphery, soft center
- Color: Dark yellow to black
- Consistency: Shiny, with a dull center
- Cavitation
- Restoration indicated



**ADDITIONAL FINDINGS**

*Tooth & Root Sensitivity Minimized*

A better alternative to sensitivity protection dental products?

Future research:

- Comparison of products
- Caries prevention/sensitivity reduction after perio surgery
- Effects of CAMBRA products on biofilm

# Assessing Caries Risk & Understanding Risk Factors

## A BALANCED MOUTH IS A HEALTHY MOUTH

- Oral bacteria
- Neutral pH
- Adequate mineral exchange



## AN UNBALANCED MOUTH = DISEASE

Presence of risk factors contribute to disease

- Bacterial imbalance
- Acidic oral environment
- Reduced calcium & phosphate concentrations

## Featherstone et al. 2007 Caries Risk Assessment- The Caries Imbalance

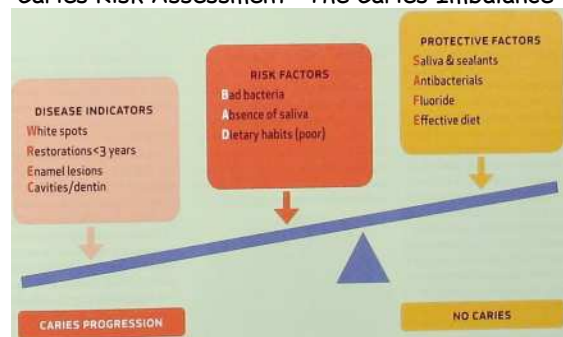


TABLE 1  
Caries Management by Risk Assessment (CAMBRA)  
Clinical Guidelines for Patients 6 years and Older

Risk Level	Frequency of Radiographs	Frequency of Caries Recount Exams	Saliva Test (Saliva Flow & Bacteriological)	Antibacterials	Fluoride	pH Control	Calcium Phosphate Supplements	Resin Sealants (Resin-based or Glass Ionomer)
Low Risk	Biennial radiographs every 24-36 months	Every 9-12 months to monitor caries risk	May be done as a baseline reference for new patients or those with a history of high bacterial load and/or low salivary flow	For active caries or DMG (Dental Management of Geriatric Patients) 1-3	OTC fluoride containing toothpaste and toothbrush. For active caries, fluoride varnish, fluoride toothpaste, fluoride mouthwash, fluoride supplements	Not required	Optional for prevention of secondary caries	Optional for prevention of secondary caries (Table 2)
Moderate Risk	Biennial radiographs every 18-24 months	Every 6-9 months to monitor caries risk	May be done as a baseline reference for new patients or those with a history of high bacterial load and/or low salivary flow	For active caries or DMG (Dental Management of Geriatric Patients) 1-3	OTC fluoride containing toothpaste and toothbrush. For active caries, fluoride varnish, fluoride toothpaste, fluoride mouthwash, fluoride supplements	Not required	Optional for prevention of secondary caries	Optional for prevention of secondary caries (Table 2)
High Risk	Biennial radiographs every 12-18 months	Every 3-6 months to monitor caries risk	Saliva flow test and bacterial culture may be done as a baseline reference for new patients or those with a history of high bacterial load and/or low salivary flow	For active caries or DMG (Dental Management of Geriatric Patients) 1-3	OTC fluoride containing toothpaste and toothbrush. For active caries, fluoride varnish, fluoride toothpaste, fluoride mouthwash, fluoride supplements	Not required	Optional for prevention of secondary caries	Optional for prevention of secondary caries (Table 2)
Extreme Risk	Biennial radiographs every 6-12 months or as needed	Every 3 months to monitor caries risk	Saliva flow test and bacterial culture may be done as a baseline reference for new patients or those with a history of high bacterial load and/or low salivary flow	For active caries or DMG (Dental Management of Geriatric Patients) 1-3	OTC fluoride containing toothpaste and toothbrush. For active caries, fluoride varnish, fluoride toothpaste, fluoride mouthwash, fluoride supplements	Not required	Optional for prevention of secondary caries	Optional for prevention of secondary caries (Table 2)

## CARIES RISK FACTORS



- Gingival Recession
- Deep Pits & Fissures
- Diet High in Sugar/Carbs/Acids
- Poor Oral Hygiene
- Growing up without access to fluoride
- 60+ years of age

Compendium, Oct 2013

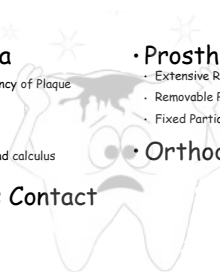
These risk factors contribute to caries risk, but are not high risk factors



## CARIES HIGH RISK FACTORS

### Bacterial Influence

- Xerostomia
  - Changes in consistency of Plaque
- Smoking
  - Increased plaque and calculus
- Infectious Contact
- Prosthodontics
  - Extensive Restorations
  - Removable Partial Dentures
  - Fixed Partial Dentures
- Orthodontics



## CARIES HIGH RISK FACTORS

### pH Influence

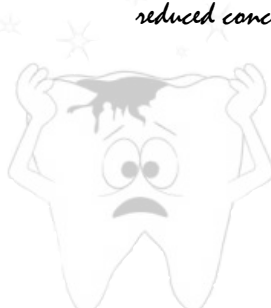
- Xerostomia
  - Longer rebound to neutral pH after eating
- Recreational Drug Use
  - Methamphetamines
  - Marijuana
- Smoking



## CARIES HIGH RISK FACTORS

### reduced concentration of minerals

- Xerostomia
  - Lack of Calcium, Phosphate and Fluoride
- Caries within 3 years
  - High likelihood of recurrence
  - Best predictor for future disease
- Incipient Caries/ Demineralization
  - Tooth structure has loss of minerals

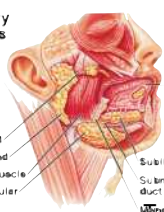


## Saliva

how it works and why we need it

## SALIVARY GLANDS

- Salivary Glands**
- Parotid Gland**
- Serous
  - Contains Electrolytes
  - Sodium Bicarbonate
  - Amylase
- Submandibular Gland**
- Mixed
  - Provides most unstimulated saliva
- Minor Salivary Glands**
- Palatal, lingual, buccal, labial
  - Mucous
  - Improves mastication, swallowing
  - Contribute fluoride
- Other Labels:** Parotid duct, Parotid gland, Masseter muscle, Submandibular gland, Sublingual Gland, Mucous, Sublingual gland, Submandibular duct, Tongue



## Saliva

- Important for homeostasis
- 5 Protective Functions:
  1. Lubrication
  2. Flushing/Rinsing
  3. Chemical
  4. Antimicrobial
  5. Maintenance of supersaturation of calcium & phosphate ions
- Varies throughout day
  - Time of day
  - Postural

## Components of Saliva

1. Mucins/ Glycoproteins
2. Phosphoproteins
3. Immunoglobulins
4. Amylase and other enzymes

## Enzymes

### PEROXIDASE

- Reacts with saliva- forms  
**HYPOTHIOCYANATE**- inhibits the ability of bacteria to fully use glucose

### LACTOPEROXIDASE

- Component of acquired pellicle  
 - Adheres to hydroxyapatite  
 - Influences qualitative and quantitative characteristics of bacteria within dental plaque

## Proteins

### HISTADINE & STATHERIN

- ✓ Control the status of Calcium & Phosphate
- ✓ Maintain levels of supersaturation of calcium & phosphate in relation to hydroxyapatite
- ✓ Prevent a rapid drop in pH, aid in quicker pH recovery
- ✓ Bacteriostatic

## The lack of saliva effects:

**Mastication & Deglutition**  
**Digestion**  
**Immunity**  
**Oral Homeostasis**  
**Buffering Capacity (control of oral pH)**  
**Oral Microflora**  
**Concentration of Calcium & Phosphate**

## XEROSTOMIA

Over 400 Medications

Antihypertensives  
 Antidepressants  
 Anxiety  
 Antihistamines  
 Decongestants  
 Acid Reflux  
 Sedatives  
 Pain Meds  
 ADHD  
 Chemotherapy



## XEROSTOMIA

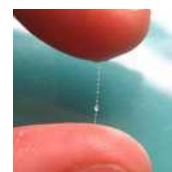
### Systemic Conditions

- SYSTEMIC LUPUS
- RHEUMATOID ARTHRITIS
- HYPERTENSION
- ENDOCRINE DISORDERS
- BELLS PALSY
- SARCOIDOSIS
- DIABETES
- SCLERODERMA
- HIV
- SJOGREN'S SYNDROME
- DEHYDRATION
- ANXIETY

## CLINICAL SIGNS OF XEROSTOMIA



Thick Plaque

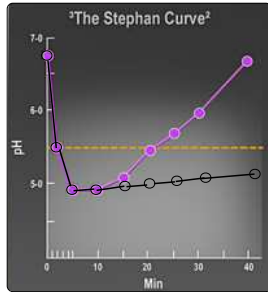


Stringy Saliva



Bubbly or Frothy Saliva

## ROLE OF PH



Healthy  
Salivary  
Flow

Reduced  
Salivary  
Flow

## SMOKING *Contributing to Caries Risk*

## Smoking...

- ↳ a vasoconstrictor
- ↳ will dry the oral mucosa
- ↳ promotes the proliferation of cariogenic bacteria
- ↳ suppression of serum ascorbic acid levels (Heng 2006, Strass 2001, Vuorinen 1994)
- ↳ positive correlation of pack years and DMFT (Heng 2006, Hirsch 1991)

So, what about those of us who  
sometimes drool...  
I mean, have adequate  
quantities of saliva?

**Does quantity = quality?**

## XEROSTOMIA

*Reduced Concentration of Salivary Minerals*

- Calcium
- Phosphate
- Fluoride
- Buffering Agents
- Immunoglobulins
- Digestive Enzymes



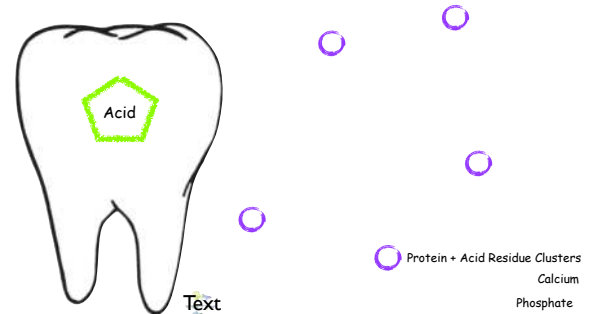
## Salivary Testing

- pH Testing
  - Saliva Check Buffer- GC America
  - CRT Buffer- Ivoclar
- Bacterial Testing
  - Saliva Check Mutans- GC America
  - CRT Bacteria- Ivoclar
  - Cari-cult- Oral Biotech
  - Dentocult SM- Orion Diagnostics
- ATPase Testing
  - Cariscreen- Carifree

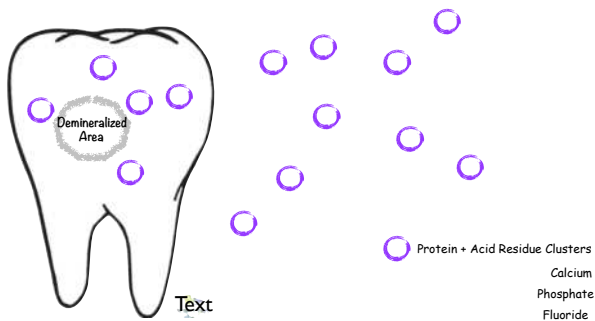
## CHEMISTRY OF MINERAL UPTAKE

- Diffusion
- Teeth made of hydroxyapatite, fluorapatite, calcium, phosphate
- Constant cycle of demin-remin
- If minerals out = minerals in: no net change to tooth
- Rate limiting factor is the **available calcium & phosphate**

## DEMINERALIZATION



## REMINERALIZATION



CARIES WITHIN 3 YEARS  
&  
INCIPIENT CARIES  
*"Are we watching or waiting?"*

## "WATCH" AREAS



What are we watching?  
How are we watching this?  
What are we waiting for?

## FIXED ORTHODONTICS

- Difficult to clean
- Demineralization common around brackets/bands
- White spot lesion prevalence 2-97%



## "INVISIBLE BRACES"



Bonding of attachments

Oral hygiene must be optimal

Can impede natural passage of minerals

Plaque accumulates on internal surface of aligners

Decalcification of cusp tips, incisal edges common

Moshiri et al. Consequences of Poor Oral Hygiene During Clear Aligner Therapy. August 2013.

## Fixed Partial Dentures

- Avg. lifespan: 7-10 years, 87% at 10 years, 66% at 15 years  
Scuria, 1998

- The greater the span, the greater the risk of failure

- Dental Caries: most common mode of failure  
Goodacre, 2004, Tan 2004



## Extensively Restored Teeth *10+ Restored Surfaces*

- How did we get here?
- Lifespan of restorations: 7-15 years
- Common mode of failure:  
secondary caries around margins



Labwork: Mr. Jungo Endo, MDT

## Removable Partial Dentures

- Surgeon General: By age 50, Americans have lost an average of 12.1 teeth
- Avg. lifespan: 74% success rate at 5 years
- Dental Caries: Most common mode of failure



Kapur, 1989

## INFECTIOUS CONTACT *Contributing to Caries Risk*

**Significant others**

**Parent to child**

**Primary caregiver to child**

**Child to child**

## RECREATIONAL DRUGS *Contributing to Caries Risk*

## Methamphetamines

"Meth Mouth": severe decay, tooth loss, fracture, erosion

Causes  
drug-induced  
xerostomia  
bruxism  
poor nutrition  
poor oral hygiene

Most severe when injected

Hussein, 2012



## Marijuana

Active ingredient: 9-tetrahydrocannabinol (THC)

Therapeutic Uses:

Appetite stimulant, Pain relief, Relief of glaucoma and neurological illnesses (epilepsy, migraines, bipolar disorder)

Affects cardiovascular, respiratory, immune systems

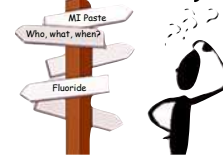
Directly affects cell activity by suppressing:  
macrophages, natural killer cells, T & B lymphocytes

Oral Side Effects:

Reduced resistance to bacterial and viral infections  
Chronic Inflammation of oral mucosa  
Xerostomia  
Leukoedema  
Gingival changes: gingivitis, hyperplasia  
Uvulitis  
Carcinoma of the tongue  
Increased risk for periodontal disease  
Increased risk for caries

Versteeg et al. 2008

## How do I implement Caries Management in my practice?



## KEYS FOR SUCCESSFUL IMPLEMENTATION

- ✓ Easy
- ✓ Efficient
- ✓ Economical
- ✓ Effective

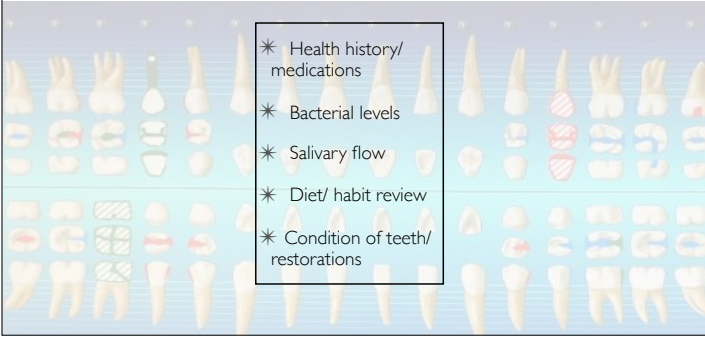
## WHY THE HYGIENIST?

- Regularly scheduled appointments
- Direct patient contact
- 45-60 minute appointments
- Establishes rapport & trust
- Provides clinical assessments
- Provides risk management instructions



## CARIES RISK ASSESSMENT

- \* Health history/ medications
- \* Bacterial levels
- \* Salivary flow
- \* Diet/ habit review
- \* Condition of teeth/ restorations



## Documentation

## Additional Considerations

- Oral Health Related Quality of Life
- Caries Management

### ORAL HEALTH RELATED QUALITY OF LIFE

**COMFORT** "Is everything comfortable in your mouth?"

**FUNCTION** "Are you chewing, speaking, swallowing properly?  
Have you noticed any changes in how your mouth works?"

**AESTHETICS** "Are you happy with how your mouth looks?"

**PERCEPTION OF HEALTH** "Do you think your mouth is healthy?"

### OH/QUAL. OF LIFE:

**ESTHETICS** "My teeth are yellower than they used to be"

**COMFORT** "My teeth are sensitive to cold"

**FUNCTION** "I never used to bite my cheek when I chew, but now I do..."

**PERCEPTION** "I have soft teeth and I always get cavities"

## Paper vs. Electronic Health Record

PATIENT		DATE		EXAMINER		OFFICE	
NAME		DATE		EXAMINER		OFFICE	
PATIENT INFORMATION		DATE		EXAMINER		OFFICE	
NAME		DATE		EXAMINER		OFFICE	
ADDRESS		DATE		EXAMINER		OFFICE	
CITY		DATE		EXAMINER		OFFICE	
STATE		DATE		EXAMINER		OFFICE	
ZIP		DATE		EXAMINER		OFFICE	
PHONE		DATE		EXAMINER		OFFICE	
FAX		DATE		EXAMINER		OFFICE	
EMAIL		DATE		EXAMINER		OFFICE	
WEBSITE		DATE		EXAMINER		OFFICE	
SOCIAL MEDIA		DATE		EXAMINER		OFFICE	
OTHER		DATE		EXAMINER		OFFICE	
REMARKS		DATE		EXAMINER		OFFICE	
TREATMENT PLAN		DATE		EXAMINER		OFFICE	
PROGNOSIS		DATE		EXAMINER		OFFICE	
REFERENCES		DATE		EXAMINER		OFFICE	
SIGNATURE		DATE		EXAMINER		OFFICE	
TITLE		DATE		EXAMINER		OFFICE	

## DOCUMENTATION SIMPLE & EFFICIENT

NAME: Jane Doe      SEX: F      AGE: 3mos.      DATE: 9-24-2010  
 MEDICATIONS: Lipitor, Zoloft      ALLERGIES: Appendectomy 7-30-10      PROBLEMS: None

# 118/64 R      WNL

**TI PROGNOSTIC PLAN:**  
 Full Mouth Remineral, selective patch, Resin. Patient happy with stain removal, but interested in whitening. OH reviewed. Dispersed Clingro. Gave High Risk Handout. #20 occ. Stain, re-evaluate in 4wks.

## DOCUMENTATION



## CARIES RISK CATEGORIES

Low  
 Moderate  
 High  
 Extreme High

## CARIES RISK REDUCTION *3 Principles for Caries Risk Reduction*

1. Reduce bacterial levels/ disrupt bacterial colonies
2. Neutralize pH
3. Facilitate mineral exchange

## *Low Risk Patient*

Absence of all high risk factors  
 No to few restorations  
 Shallow occlusal anatomy  
 No gingival recession  
 Favorable diet



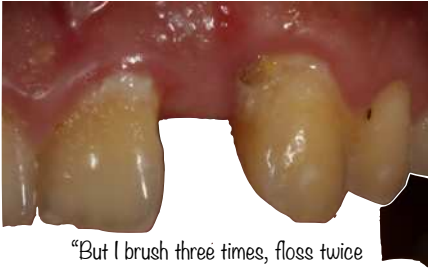
## *Risk Management for the Low Caries Risk Patient*



Patient handouts  
 Oral hygiene instructions  
 Diet assessment  
 Fluoride varnish  
 Xylitol  
 6 month recall



What is your patient doing at home?



"But I brush three times, floss twice  
AND use those little brushes you gave me..."

## SMART TOOTHBRUSHES



[www.beamtoothbrush.com](http://www.beamtoothbrush.com)

Insurance Company, NOT a toothbrush company

Increased reimbursement or reduced rates for compliant groups



Kolibree TOOTHBRUSH APP MEET THE TEAM GET IN TOUCH PRESS BLOG

SIGN UP



BRING INTELLIGENCE TO YOUR SMILE

With the World's First Connected Electric Toothbrush

Be the first to get the latest  
Kolibree News

SIGN UP

[www.kolibree.com](http://www.kolibree.com)

## ORAL-B BLUETOOTH CONNECTED TOOTHBRUSH



<http://www.engadget.com/2014/02/25/oral-b-bluetoothbrush-smartseries-7000-hands-on/>

[www.connectedtoothbrush.com](http://www.connectedtoothbrush.com)

## Oral-B Genius



**New Genius Technology**  
Position detection  
Coaching technology



## ORAL HYGIENE INSTRUCTIONS PATIENT MOTIVATOR

Dark Purple: 48+ hours old

Pink: <48 hours old

Light Blue: Acidogenic Plaque





**GC TRI PLAQUE ID GEL**  
Directions for Use



## DIET REVIEW



Some caries-inducing diets are obvious to recognize, some are not so obvious

## Recommended Foods

Foods high in **ARGININE**:

Spinach  
Seafood  
Nuts  
Soy

Snacks: Cheese, Sunflower seeds  
Drinks: Water, Milk

ten Cate, JM. J Clin Dent. 2013

### Acidity (pH) of Common Drinks

The lower the pH, the stronger the acid



### PH LEVELS OF POPULAR BRANDS OF BOTTLED WATER



Propel Zero: pH 3.5 Arrowhead: pH 6.8 Fiji: pH 7.3 SmartWater: pH 7.6 Evian: pH 7.9 Icelandi: pH 8.4 Alkalife TEN: pH 10.0  
AquaFina: pH 5.5 Poland Spring: pH 7.2 Volvic: pH 7.5 Deer Park: pH 7.8 Real Water: pH 8.0 Evamoe: pH 8.8  
Dasani: pH 5.6 Nestle Pure Life: pH 7.3 VOSS: pH 7.6 Penta: pH 7.8 Eternal: pH 8.1 Essentia: pH 9.4

pH values based on lab results. Manufacturers claims may vary.

www.AlkalifeTEN.com



www.alkalifeTEN.com

## NATURAL ALTERNATIVES

Licorice root extract- bactericidal (*s.mutans*, *lactobacillus*, *s.sobrinus*)

Cranberry extract- inhibits plaque formation

Grapefruit seed extract- antimicrobial, anti-inflammatory

Grape seed extract- inhibits growth of *s. mutans* and *p. gingivalis*

www.homesteadmarket.com

www.nutribiotic.com

www.aunatureline.com

www.loloz.com



## Oil Pulling

Sesame Oil, Partially-Digested Coconut Oil, Sunflower Oil, Tea Tree Oil

### Detoxifying- Ama in Ayurvedic Medicine



- Creates surface layer that prevent bacterial adhesion
- Reduces plaque bacteria
- Increases salivary flow
- Prolonged, forceful rinsing dislodges food particles
- Moisturizes gums

## Oil Pulling

### Oil Pulling drawbacks\*

There have been reports in the mainstream media on "oil pulling" and its benefits for dental and general health. The claims state that oil pulling—swishing oil in the mouth—whitens teeth, and improves dental health and

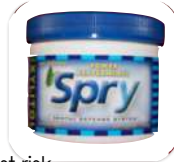


1. This is NOT a substitute for your dentist
2. It takes longer than conventional rinsing
3. There is one case of inhalation of oil
4. Coconut oil could trigger contact dermatitis
5. Coconut oil: spit into the garbage

\*according to medical professionals  
<http://www.ada.org/en/Home-MouthHealth/oz-topics/o/oil-pulling>

## 100% XYLITOL

Bacteriostatic  
 Interferes with adherence & metabolism of s. mutans



6-10g for highest risk  
 >14g Potential Side Effect GI Upset

Does Spry make Doggie Treats?



Harmful to Pets Especially Dogs



## OTC XYLITOL ALTERNATIVES

Therapeutic Use:  
 Chew for 3-5 Minutes



Morgan, J Dent Res 2006



## WHAT IS FLUORIDE VARNISH?

- Highly concentrated form of fluoride which is applied to the tooth's surface by a dental professional as a form of topical fluoride therapy
- Due to its adherent nature, stays on the surface of the tooth for several hours
- Can be applied to the enamel, dentin or cementum
- Its been used in Western Europe, Canada and the Scandinavian countries since the 1980's for tooth decay prevention
- Many studies report it's efficacy for the prevention of tooth decay or remineralization of early carious lesions
- In the USA, it is widely used as an *anti-hypersensitivity* agent

...but, I thought fluoride varnish was used for preventing caries?

FOOD AND DRUG ASSOCIATION

Fluoride varnish is considered an FDA-approved *device* to occlude tubules and therefore aid in anti-hypersensitivity

For a varnish to be considered to be listed as an anti-carries material, it would have to be approved by the FDA as a *drug*

## FLUORIDE VARNISH VS. TRAYS

- Delivers fluoride, calcium and phosphate
- Varnishes up to 25-75% reduction in caries risk
- Increased patient comfort & compliance
  - According to the ADA Council of Scientific Affairs
- Safer to patient than gels/foams
- Acidulated phosphate fluoride treatments potentially damaging to dental restorations/sealants

There are so many varnishes on the market... How do I pick one?

## PATIENT COMPLIANCE

KEYS TO IMPROVING PATIENT COMPLIANCE

QUICK APPLICATION  
EFFECTIVE MATERIALS  
AESTHETIC OUTCOME  
EXCELLENT TASTE

## MI VARNISH

FLUORIDE + CALCIUM + PHOSPHATE + CASEIN PROTEIN  
(ACP-APP)



## MI VARNISH APPLICATION



Do not brush/floss for 4 hours  
Avoid hot, sticky foods  
Avoid alcohol (beverages/ rinses)  
Refrain from fluoride until the next day  
Discontinue fluoride tablets for 2-3 days

Instruct patients to expectorate-  
DO NOT SUCTION AFTER VARNISH APPLICATION

## Fluoride Varnish



**Fluoride varnish application**  
**01 206.....high risk patient**  
**01 208.....desensitizing agent**

\*\*\* Coverage varies among insurance companies\*\*\*

## SILVER DIAMINE FLUORIDE



Elevate Oral Care

38% Silver Diamine Fluoride

FDA Approved for Dentinal Hypersensitivity by blocking dentinal tubules

Hardens dentin

Strong bactericidal and MMP reduction= Anti-Caries!

<http://www.dentistryiq.com/articles/2016/07/the-dos-and-don-ts-of-silver-diamine-fluoride.html>



## SILVER DIAMINE FLUORIDE



## SILVER DIAMINE FLUORIDE



*Caries Management*

## Silver Diamine Fluoride



*During Restorative Tx*

## Risk Assessment

Xerostomia	Orthodontics
Caries within 3 years	Prosthetic treatment
Incipient caries/demin	Extensive restorations
Gingival recession	60+ years old
Recreational drug use	Smoking
? Diet high in sugar/carbs/acid	Infectious contact
Poor plaque control	Deep pits/fissures
Growing up without F <sub>2</sub>	Acidic environment

## MODERATE CARIES RISK



- Good oral hygiene
- Favorable diet
- Shallow to deep occlusal anatomy
- Few restorations
- Gingival recession
- No high risk factors

## Risk Reduction Moderate Risk

- Patient handouts
- Oral hygiene instructions
- Diet assessment
- Fluoride varnish
- Xylitol
- 6 month recalls

Considerations  
Anti-hypersensitivity  
Sealants

## IN-OFFICE ANTIHYPERSENSITIVITY



GOAL: OCCLUDE DENTINAL TUBULES

## TAKE HOME ANTI-HYPERSENSITIVITY



## MI PASTE



ACP-CPP (Recaldent)  
Casein: Milk-based Protein  
MI Paste Plus 900ppm NaF  
Safe with Lactose Intolerance,  
Pregnant Patients, Children  
Contraindicated with Milk Allergy  
Caution:  
Kidney Dialysis  
Kidney Stones



## MILK ALLERGY

- ✓ Most common food allergy in early childhood
- ✓ 2-3% of infants and young children
- ✓ 85-90% of these children lose clinical reactivity to milk by age 3
- ✓ Prevalence in adults is 0.1-0.5%

1. [www.ncbi.nlm.nih.gov/pubmed/14864444](http://www.ncbi.nlm.nih.gov/pubmed/14864444)  
2. Han A, Deaver 2003. Frequency of cow's milk allergy in childhood. *Ann. Allergy Asthma Immunol.* 91:6 Suppl: 53-5  
3. Orskov, R. G., Sorens, L. E. (2005) 'Cow's milk allergy: A complex disorder'. *Journal of the American College of Nutrition* 24: 46 Suppl: 50C5-50C  
4. The Dairy Council. [www.dairy.com](http://www.dairy.com)



## MI PASTE APPLICATION



White Spot Removal  
[www.dimaragiano.com](http://www.dimaragiano.com)

## RESIN VS. GLASS IONOMER SEALANTS

### GLASS IONOMER SEALANTS

- ✓ Similar retention rates as resin-based sealants
- ✓ Fewer caries
- ✓ Better marginal integrity
- ✓ Improved ability to reach the depth of fissure

## FUJI TRIAGE SEALANTS

- Glass ionomer
- Works in a moist field
- No isolation required
- No bonding agent required
- Self bonding (chemical bond) with its high fluoride release
- Safe to seal over immature enamel or non-cavitated lesions

## FUJI TRIAGE SEALANTS

- Glass ionomer sealant allows Fluoride, Calcium and Phosphate to pass through the sealant to help mature the newly erupted tooth
- Resin sealants create a barrier and Fluoride, Calcium and Phosphate cannot penetrate through the sealant
- Contains 1400ppm Fluoride- releases over 400 days
- "rechargeable" with fluoride tx
- 1 capsule seals one arch

## Moderate Caries Risk

### Risk Reduction Recommendations

1. Oral hygiene instructions
  - moderate risk handout, brushing, flossing, infectious contact
2. Nutritional counseling
  - snacking
3. MI Paste Plus, MI Varnish, Sensi-stop strips, SDF for hypersensitivity
4. Recall: 6 months

## HIGH CARIES RISK

Incipient caries  
Demineralization  
Xerostomia  
60+ years old  
Orthodontics  
Recreational drug use



Smoking  
Infectious contact

## WHO ELSE IS AT HIGH RISK?



Active Caries



Fixed Partial Dentures



RPD



Extensive Restorative History

## “WATCH” AREAS



We no longer watch caries get larger, we can now predictably reverse or stop the process!

## Intra-oral Camera

- ★ Documentation
- ★ Patient education
- ★ Treatment acceptance
- ★ Informed consent
- ★ Before & Afters
- ★ All teeth to be “monitored”



## CLINICAL CARIES RE-EVAL APPOINTMENT

- Provide remineralization therapy (high risk protocols)
- Schedule re-eval with doctor who originally diagnosed in one month
- Continue remineralization therapy or schedule appointment for restorative if needed
- Avoid “the poke”

## EXPLORER

Don't depend on a “stick” to find caries

17-40% accurate (Lussi 1991, Panning 1992, Pereira 2001)

Transfer of bacteria

Potential for damage of in tact surfaces

### Occlusal Protocol\*\*\*

ICDAS code	0	1	2	3	4	5	6	
<b>Definition</b>	Sound tooth surface, no caries change after air-drying, or loss of luster, or weak, erosive and other noncaries phenomena	First visual change in enamel, seen when air-drying, or color change that limited to the cervical area of the pit and fissure area	Distinct visual change in enamel, seen when wet, white or colored “chalk” than the following Pits/Fissures	Localized enamel breakdown with no visible dentin or underlying discoloration of surface	Underlying dentin visible, dentin with or without localized enamel breakdown	Distinct cavity with visible dentin, frank caries extending less than half of a tooth surface	Extensive distinct cavity with dentin, cavity is deep and wide involving more than half of the tooth	Extensive distinct cavity with dentin, cavity is deep and wide involving more than half of the tooth
<b>Lesion depth</b>		Lesion depth in IFF was 20% in the outer enamel with only 10% into dentin	Lesion depth in IFF was 50% into enamel and 50% into the outer 1/2 dentin	Lesion depth in IFF was 75% in dentin	Lesion depth in IFF with 100% into dentin	Lesion depth in IFF with 100% in dentin	Lesion depth in IFF with 100% in dentin	Lesion depth in IFF with 100% in dentin
<b>Sealant/restoration Recommendation for Low Risk</b>	Sealant optional, CDM/CDC may be helpful	Sealant optional, CDM/CDC may be helpful	Sealant optional, CDM/CDC may be helpful	Sealant or restorative, CDM/CDC may be helpful	Physically restore, restorative	Physically restore, restorative	Physically restore, restorative	Physically restore, restorative
<b>Sealant/restoration Recommendation for Moderate Risk</b>	Sealant optional, CDM/CDC may be helpful	Sealant recommended, CDM/CDC may be helpful	Sealant recommended, CDM/CDC may be helpful	Sealant or restorative, CDM/CDC may be helpful	Physically restore, restorative	Physically restore, restorative	Physically restore, restorative	Physically restore, restorative
<b>Sealant/restoration Recommendation for High Risk**</b>	Sealant recommended, CDM/CDC may be helpful	Sealant recommended, CDM/CDC may be helpful	Sealant recommended, CDM/CDC may be helpful	Sealant or restorative, CDM/CDC may be helpful	Physically restore, restorative	Physically restore, restorative	Physically restore, restorative	Physically restore, restorative
<b>Sealant/restoration Recommendation for Extreme Risk**</b>	Sealant recommended, CDM/CDC may be helpful	Sealant recommended, CDM/CDC may be helpful	Sealant recommended, CDM/CDC may be helpful	Sealant or restorative, CDM/CDC may be helpful	Physically restore, restorative	Physically restore, restorative	Physically restore, restorative	Physically restore, restorative

\*\* Patients with one or more (several) lesions are high-risk patients. \*\*\* Patients with one or more (several) lesions and extensive or extensive risk patients. \*\*\*\* All sealants and restorations to be done with extremely sensitive philosophy in mind. Sealants are defined as confined to enamel. Restoration is defined as in dentin. A free surface restoration is defined as a preparation that has as part of the preparation to dentin and the enamel also extends to a second surface. In this second surface does not have to be in dentin. A sealant can be either non-bonded glass ionomer. Dentin based sealants should have the most conservative preparation for proper bonding. Glass ionomer should be considered when the enamel is fractured, or where fluoride preparation to rest dentin, another option demineralized is not possible. Patients should be given a choice in material selection.

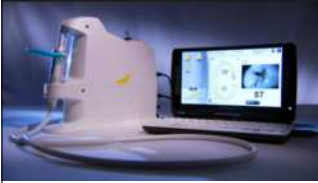
## CARIES DETECTION TECHNOLOGY

- Transillumination
  - CariVu (Dexis)
- Laser Caries Detection Systems
  - DIAGNOdent (KaVo USA), SoproCARE/ SoproLIFE (Acteon), Spectra (Air Tech), Kodak, Midwest Caries ID
- Crystallinity Measurements
  - The Canary System (Quantum Dental Technologies)
- Optical Coherence Tomography
  - Lanis Laser



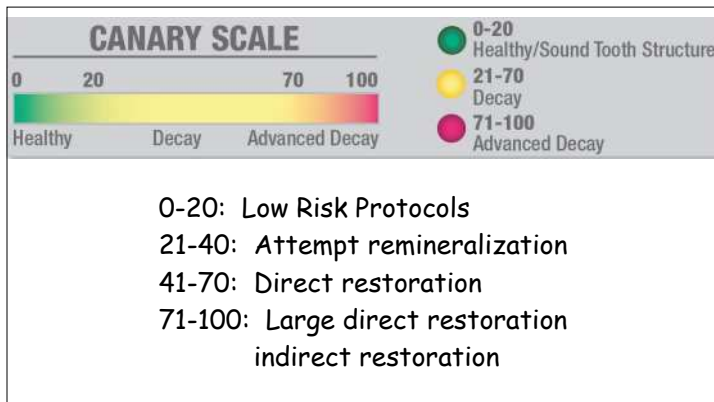
## Caries Detection Technology

The Canary System  
Quantum Dental Technology



Useful for:

- Demineralization
- White Spots
- Around direct restorations
- Sealants
- Crown margins
- Tooth Fractures
- Root surfaces



## Yes, but does it work?

43 year old patient  
Initial visit: 45  
Follow up: 15



Tooth Number (IHS)	Surface	May 11, 2015
18	Buccal	18

Recommendations: MI Paste Plus

0-20: Healthy/Sound Tooth Structure  
21-70: Early Decay  
71-100: Advanced Decay

<http://www.dentistryiq.com/articles/2015/05/implementing-cambra-in-the-private-practice-a-clinical-report.html>

## RADIOGRAPHIC CARIES RE-EVAL APPOINTMENT

- Provide remineralization therapy
- Bitewing x-ray 3-6 months
- Evaluate for reversal, stability or progression
- Evaluated by doctor who originally diagnosed

## RISK REDUCTION HIGH RISK

- Patient handouts
- Oral hygiene instructions
- Diet assessment
- MI Paste Plus
- Xylitol (6-10g/day)
- 3-4 month recall
- Fluoride varnish -OR- Chlorhexidine Varnish



MI Paste Plus





## Alternative to Chlorhexidine Rinses



## The Oral Ecosystem

400-700 microorganisms in the oral cavity

Many are considered "good bacteria".

Many have not been named or classified and their role in health or disease has yet to be determined.

Consider probiotics!



## Crest Pro-Health [HD]

**Step 1: Mechanical Plaque Removal**  
Anti-plaque/ gingivitis

**Step 2: Whitening Agent**  
Hydrogen peroxide



## High Caries Risk

Risk Reduction Recommendations

1. Oral hygiene instructions
  - high risk handout, individualized OHI
2. Restorative treatment plan
  - glass ionomer for small restorations
  - glass ionomer cements for indirect
3. Nutritional counseling
  - sugar, sipping coffee
4. MI Paste Plus, CHx Varnish then MI Varnish
5. Recall: 4 months initially, then 6 if caries is under control



## EXTREME HIGH CARIES RISK



**Severe xerostomia**  
Multiple medications  
Systemic conditions



**Multiple high risk factors/acidic oral environment**

**Planning/undergoing chemotherapy or radiation**

**Special needs patients**



**Uncontrolled GI disorders**  
Acid reflux, H. pylori, rumination

**High caries incidence**  
Unknown cause  
Recreational drug use

## RISK MANAGEMENT EXTREME RISK

Patient handouts

Oral hygiene instructions

Diet assessment

Fluoride varnish

Xylitol (6-10g/day)

3 month recalls

**MI Paste Plus**  
+  
**pH Increasing Strategies**

## BAKING SODA TOOTHBRUSHING RAISES PH

**Baking soda has an abrasion index of 7**

The Relative Dentin Abrasion (RDA) Index  
adopted by the American Dental Association

**RDA:** ability to remove stain,  
**NOT** a measure of safety

No additional benefit over 250

<250: Safe for a lifetime of use

<http://www.ada.org/en/member-center/oral-health-topics/toothpastes>



## CTX2 SPRAY



**pH 9**

*Glycerine  
Xylitol  
Natural Flavoring*



## Self Monitoring



**App for iPhone / iPad & Android!**

Our iPhone & Android app is designed to capture the pH value for a patient. The app can manually set the pH value, or you can take a picture of a test strip and auto-calculate the value. Once set the app will allow you to save the data and track improvements to oral pH over time.

To download the app from the Apple App Store [click here](#).



**PH<sub>2</sub>OH**

[www.ph2oh.com](http://www.ph2oh.com)

## Extreme Caries Risk

Risk Reduction Recommendations

1. Oral hygiene instructions  
- extreme risk handout, individualized OHI
2. Physician referral
3. Restorative treatment plan  
- consider glass ionomer luting agents
4. MI Paste Plus, Fluoride varnish
5. pH increasing strategies
6. Recall: 3-4 months

## RISK REDUCTION HIGH/EXTREME RISK

Patient handouts

Oral hygiene instructions

Diet assessment

Fluoride varnish

MI Paste Plus

Xylitol (6-10g/day)

3-4 month recall

Restorative Choices  
Treatment Planning



## Restorative Considerations

## Amalgam

- Alloy of mercury and other metals
- In use for more than 150 years
- Higher longevity than composite
- More cost effective than composite
- Lifespan approx. 11 years

Antony, K. et al, 2008

## Composite

- Many shades, translucency
- Aesthetic
- Bonds best to enamel surfaces
- Anterior, posterior, class V
- Marginal breakdown, stain
- Secondary caries
- Lifespan approx. 5-7 years

RESTORATION Longevity

Should resin-based composite dominate restorative dentistry today?

**P**atient longevity is a key factor in the selection of restorative materials. The purpose of this review is to evaluate the clinical service longevity of neither amalgam or composite is impressive. Neither type of restoration is reported to serve for a long time... To improve longevity, use a resin-modified glass ionomer liner on either deep preparations or on all dentin surfaces...

Christensen, G., JADA 2011

...the clinical service longevity of neither amalgam or composite is impressive.

Neither type of restoration is reported to serve for a long time...

To improve longevity, use a resin-modified glass ionomer liner on either deep preparations or on all dentin surfaces...

ALTERNATIVE TO AMALGAM & COMPOSITE RESTORATIONS?

## Glass Ionomers

## Acid-base Reaction

FLUOROALUMINOSILICATE GLASS + POLYACRYLIC ACID = GLASS IONOMER

1. Glass is attacked by H<sup>+</sup>, releasing Al, Ca, F, Na ions
2. pH increases, further ionization of polyacrylic acid
3. Al and Ca migrates into the aqueous phase
4. Ionization of polyacrylic acid leads to unwinding of polymer chain. Viscosity of material increases.
5. Cations condense on the polymer chain.
6. Formation of an insoluble salt

www.mi.gceurope.com

## Glass Ionomers advantages

- Self-adhesive to tooth structure
- Strong chemical adhesion
- Excellent marginal seal
- Hydrophilic
- High fluoride release
- Biocompatible

## Glass Ionomers

1. Do glass ionomers have adequate retention and wear resistance?
2. Is the fluoride release clinically significant?
3. Do they really halt the caries process?
4. Isn't GI too weak to be a permanent restoration?

1. Do glass ionomers have adequate retention and wear resistance?

## Glass Ionomers vs. Composite

"All 3 glass-ionomer restorative materials exhibited statistically significantly greater retention than did (the composite restoration). Glass ionomer materials are the restorative material of choice for abrasion/erosion lesions because of their long-term retention values" Matis et al. Quintessence Int., 1996

"Glass ionomers most effectively and durably bond to tooth structure..."

Peumans, M., Dent Mat., 2005

"Average lifespan of composite was 6 years, glass ionomer was 11 years..."

Sunnegårdh-Gronberg, K., J Dent., 2009

"Glass ionomer restorations can mechanically in strength and wear but also in esthetics compete with posterior composites"

Van Duinen, RN, 2011, Millward, PJ, 2011

2. Is fluoride release clinically significant?

3. Does GI really halt the caries process?

- Evaluated non-restorable 1st molars
- Removed caries enough to obtain clean margins
- Restored teeth with GI, extracted teeth at 1-3 months, sectioned and observed with electron probe micro analysis
- Conclusion: both fluorine and strontium ions had penetrated deep into underlying demineralized dentin. The pattern was consistent with remineralization. The only source of these ions was the glass ionomer restoration.

Ngo et al, 2006



## Fluoride Release & Caries Inhibition

Hicks, 2010: Resistance against caries has been shown in both in vitro and in vivo studies

Zilberman, 2009: Continuous ion exchange both in vitro and in vivo. Strontium, alumina and fluoride provide antibacterial and anticariogenic properties. Calcium provides remineralization and promotes longer lifespan of the restoration

Shahid, 2014: Fluoride release is enhanced when some of the calcium in glass ionomers is replaced with strontium

Paiva, 2014: GI proven effective in white spot prevention around restorations

*GI was able to greatly increase fluoride release at an acidic, cariogenic pH when these ions are most needed to inhibit caries...*  
Moreau JL, 2010

Glass-ionomers, both conventional or resin-modified, are more effective at protecting the tooth against further decay than either compomers or fluoride-releasing composites, with the best protection of all being provided by conventional glass-ionomers.

Gjorgievska, E., et al., 2009



430 matched contralateral pairs of permanent molars

Evaluated secondary caries six years later

**2% GI had caries**  
**10% Amalgam had caries**

Mandari, Caries Res, 2009

Courtesy of Dr. Brian Neay

4. Isn't GI too weak to be a permanent restoration?

## EQUIA

Easy bulk placement

Quick fillings (under 3.5 minutes)

Unique features

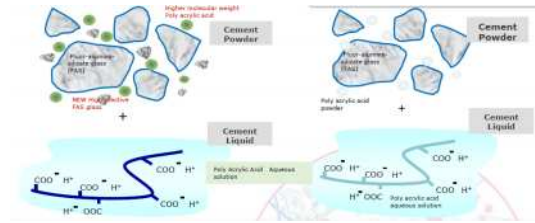
Intelligent synergy effect with coating

Aesthetic, yet economical

## EQUIA Forte

- ★ New generation of GI
- ★ Improved physical properties
- ★ Suitable for stress bearing Class II restorations
- ★ Higher translucency for improved aesthetics
- ★ No polymerization shrinkage
- ★ Hydrophilic
- ★ CTE same as dentin

Higher molecular weight polyacrylic acid: Cement matrix made stronger and more chemically stable. Leads to higher flexural strength.



Highly reactive Fluoro-alumino-silicate fillers (<4µm): Helps to release more metal ions which improves the cross-linking of polyacrylic acid, to improve physical properties.

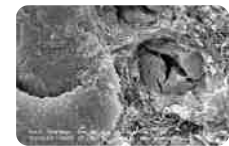
## What's Unique about EQUIA Forte?

- It has the benefits of glass ionomer
  - Chemically bonds to dentin
  - Kinder to tooth structure than composite
  - Fluoride release and recharge
- Physical properties improve over time

## Gentle Tooth Conditioning



SEM picture of etched dentin Composite Bonding Technique 7000x



SEM Picture of conditioned dentin (Glass Ionomer Bonding technique) 10000x

Dentinal tubules not exposed & minerals are not washed away = **No Post Op Sensitivity**

## EQUIA Forte is a System



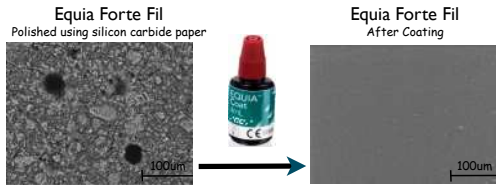
EQUIA Forte + EQUIA Forte Coat

## EQUIA Forte Coat

Unique Technology

- **unique filler particles** uniformly dispersed
- film thickness as low as **35-40 µm**
- penetrates no less than **30-50 µm** in the EQUIA Fil
- **NO delamination layer** between GI and Coating
- **stronger final restoration**

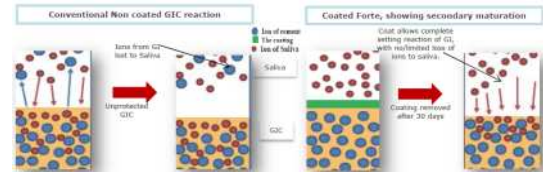
## What does EQUIA Forte Coat do? *fills porosities to offer a smoother surface*



EQUIA coat takes about **6 months (or more)** to wear off!

Source: GCC 880

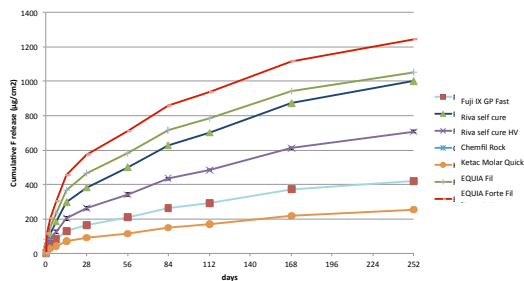
## EQUIA Forte undergoes a unique maturation process initiated by the saliva



The restoration is harder  
Long term wear similar to that of composite  
Fluoride release is never blocked

Shimada, Tsuboi, Hoshi, Tanaka, et al. Poster #0024 Evaluation of hardness increase of GIC restorative surface in saliva. London, UK, May 2015.

## Fluoride Release



**Gurgan, 2014:** Compared GI vs. Composite. Both clinically acceptable at 6 years

**Kanic, 2011:** Compared 2 GI systems, EQUIA forte excellent even in large class II restorations

**Viem, 2014:** 3% fractures of EQUIA Forte at 4y.

**Basso, 2014:** ...reliable material in load bearing premolars and molars

## Glass Ionomers

- Do glass ionomers have adequate retention and wear resistance?
- Is fluoride release clinically significant?
- Does GI really halt the caries process?
- Isn't GI too weak to be a permanent restoration?

**EQUIA FORTE**

TECHNIQUE GUIDE

**'GCI'**



<http://www.gcamerica.com/products/operator/EQUIAForte/videos.php>



**EQUIA FORTE** CLASS II CAVITY PREPARATION GUIDE **'GC'**

Basso, 2015: Rounded cavity preparation, sectional matrix

**One little click for man,  
one giant click for luting-kind**

Courtesy of Dr. Brian Novy

**Cementation Selection**

There are more than 100 permanent cement brands available on the market...  
...it's confusing

ivoclar vivadent

**Primary Methods of Cementation**

**Conventional Cementation**

Filling space to create "retention" via luting forces

**Bonding**

Using dental adhesives and restorative primers to create "Adhesion" via chemical bonding

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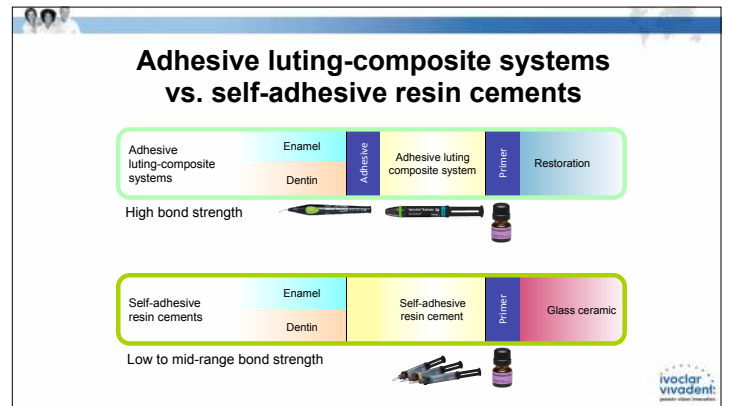
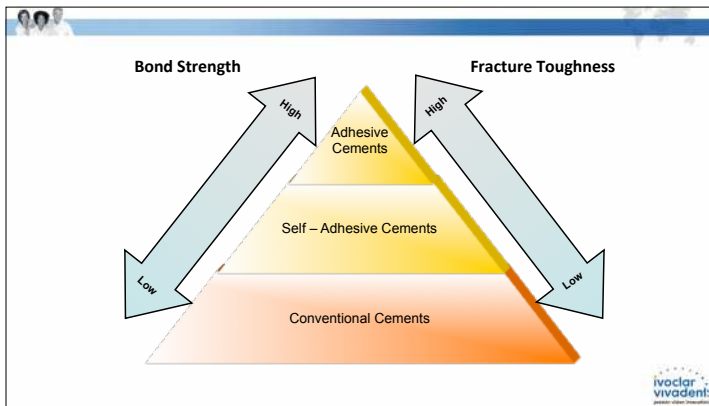
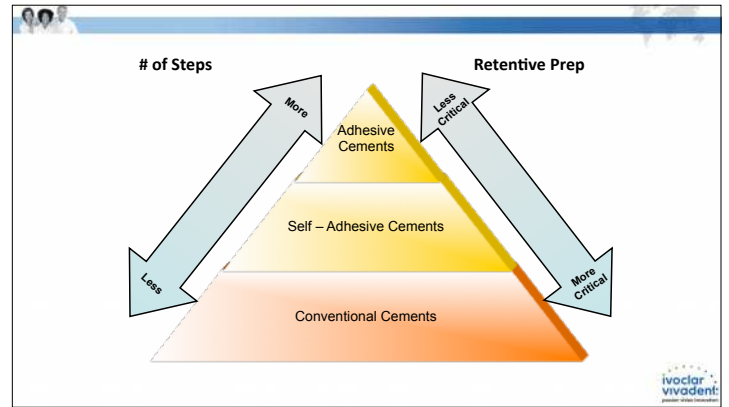
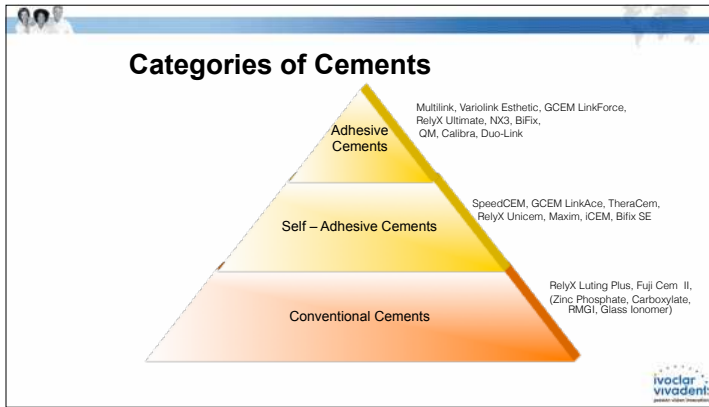
**Important questions to consider when determining the type of cement to use**

<p>What type of restoration will be placed?</p>	<p>What restorative material was used to create the restoration?</p> <p><b>Glass ceramic</b> (Lithium disilicate, Feldspathic, Leucite)</p> <p><b>Oxide ceramic</b> (Zirconia, Alumina)</p> <p><b>Metal</b></p>	<p>What is the condition of the preparation(s)?</p>
---	---	---

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**Categories of Cements**

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Home » Products » Are you treating or mistreating your all-ceramic restorations?

## Are you treating or mistreating your all-ceramic restorations?

February 22, 2016  
By Maryanne Salcetti, DDS

[http://www.dentistryiq.com/articles/2016/02/are-you-treating-or-mistreating-your-all-ceramic-restorations.html?cmpid=Enl\\_DIQ\\_Navigator\\_Feb-24-2016&sponsored=topic1](http://www.dentistryiq.com/articles/2016/02/are-you-treating-or-mistreating-your-all-ceramic-restorations.html?cmpid=Enl_DIQ_Navigator_Feb-24-2016&sponsored=topic1)

## GLASS IONOMER AS A LUTING AGENT

- Metal-ceramic crowns
- Cast gold inlays
- Cast gold onlays
- Zirconia (Cetic, 2016)

## What do I charge?

	Cost to Office	Cost to Patient
MI Paste/MI Paste Plus	\$15.75	\$25
White spot removal	\$15.75 + chair time	\$300/3 sessions (30 minute sessions)
Fluoride Varnish	\$1.75	\$35 <small>(coverage \$35-50)</small>
Sealants	\$195/50 capsules	\$51 per tooth

## POTENTIAL PROFITS

5 days a week/ 48 weeks a year

### Before Implementation

RDH: 8 Patients/day

\$140 x 8 = \$1,120/ day

= \$5,600/week

= \$268,800\*/year

### After Implementation

RDH: 8 Patients/day

8 Pro+8 Flz + 7 MI Paste/ day  
\$1120 + \$280 + \$175/day

= \$1575/day

= \$7875/week

= \$378,000\*/year

**Almost a 30% Increase!**

\* Does not include radiographs, sealants, white spot removal, tooth whitening

## Getting Started (behind the scenes)

- Office meeting
  - Decide products
  - Cost
  - Insurance coverage
  - Office protocols (who does what)
- Make documentation templates
  - Oral health related quality of life
  - CAMBRA
- Handouts

## The hygiene visit with Caries Management

- Seat your patient
  - OHRQOL
  - Med hx review
- Clinical and Risk Assessment
  - Clinical findings
  - Risk factors
  - Diet and habit review
- Risk Management: "We have a new approach to prevent disease in your mouth so that we can treat you more conservatively."
- Patient Education
  - Handouts
  - OHI
- Periodic Exam with Dentist
  - Confirm recommendations
- Fluoride Varnish Application
- Recall based on risk

## IMMEDIATE REWARDS

- Enhanced production within your hygiene department
- Improved communication
  - Patients
  - Office staff
- Practice at the highest standard of care
- Legal protection

## LONG-TERM REWARDS

- Improved patient retention & new patient referrals
- Increased production for elective dental procedures
- Improved experience
  - Patients
  - Office

## MAINTENANCE

*What are the next steps?*

## HERE'S WHAT THEY SAY...

If a patient is caries free for 3 years, the practitioner may consider classifying the patient in a *lower caries risk category*.

J California Dental Assoc. Oct/Nov 2007

## CARIES

Caries is the most prevalent disease in the world

Surgeon General: dental caries is the single most common chronic disease of childhood

Starting at age 60, tooth decay rates are equal to or greater than adolescent decay rates who grew up with no fluoride in the water

91% of adults are affected by caries in their lifetime

World Health Organization 2010  
Healthy People 2010, Surgeon General Report  
Ettinger R. Oral health and the aging population. J Am Dent Assoc 2007; 138(9): 55-65  
Bethan-Agulari, ED, Barker LC, Corbo MI, et al. Centers for Disease Control and Prevention. Surveillance for dental caries, dental sealants, tooth retention, edentulism and enamel fluorosis - United States, 1988-94 and 1995-2002. MMWR Surveill Summ 2005;54(13): 1-43

“If the disease is controlled with medicaments and risk management AND the risk factors are still present, the patient will be treated at the existing risk category for life. I will consider reducing the caries risk classification only in cases where the disease is controlled AND the risk factors are eliminated.”

- Pamela Maragliano-Muniz

## Dental Implants for Long term Solutions

## Dental Implants for Long term Solutions

- 🗣️ Treatment planning with predictability
- 🗣️ Management of implants in the aesthetic zone
- 🗣️ Multiple-unit impressions

## RISK REDUCTION HIGH/EXTREME RISK

Patient handouts  
Oral hygiene instructions  
Diet assessment  
Fluoride varnish  
Treatment planning  
MI Paste Plus  
Xylitol (6-10g/day)  
3-4 month recall



MI Paste Plus

## Fixed Partial Dentures

• Avg. lifespan: 7-10 years, 87% at 10 years, 66% at 15 years  
Scuria, 1998

• The greater the span, the greater the risk of failure

• Dental Caries: most common mode of failure Goodacre, 2004, Tan 2004



## Removable Partial Dentures

• Surgeon General: By age 50, Americans have lost an average of 12.1 teeth

• Avg. lifespan: 74% success rate at 5 years

• Dental Caries: Most common mode of failure



Kapur, 1989

## Staff Role in Implant Tx Planning (Having the conversation with patients)

1. Longevity: Bridges do not last as long as implants
  - Implants may require maintenance
  - Porcelain failure, screw loosening
2. Replacement: If a problem occurs on an abutment, the entire bridge needs replacement. Implants prevent this from occurring.
3. Cost: The cost is usually comparable

## Staff Role in Implant Tx Planning (Tooth needs extraction)

1. Tooth Extraction: 3-4 months healing
  - Possible socket augmentation/ bone graft
  - In some cases, immediate implant placement possible
2. Implant Placement
  - 3-4 month healing
3. Implant Restoration
  - Approximately 2-4 weeks for 1 crown
  - Approximately 4+ weeks for multiple crowns

## Staff Role in Implant Tx Planning (Tooth already missing)

1. Possible Bone Augmentation
  - Sinus augmentation/ bone graft
2. Implant Placement
  - 3-4 month healing
3. Implant Restoration
  - Approximately 2-4 weeks for 1 crown
  - Approximately 4+ weeks for multiple crowns

*How do we get from "I need a partial"*

*to*

*"ok, go ahead and rehab my mouth"?*

- 📷 Photography
- 📷 Treatment Planning Presentations

### Intraoral Photography: *Full Face*

Smile

Profile at Rest



F Stop: 8-10  
Facial Symmetry  
Facial Proportions

F Stop: 8-10  
Profile convexity, concavity  
Lip Support  
Maxillary-mandibular relationship

### Intraoral Photography: *Smile and At Rest*



**Close up Smile**  
F Stop: 22  
Focus on lateral incisor  
Occlusal plane  
Vertical overlap  
Gingival display



**At rest position**  
F Stop: 22  
Focus on central incisor  
Incisal edge position

### Intraoral Photography: *Frontal Retracted*



**Retracted Views**  
F Stop: 22

Focus on lateral/canine  
Anterior teeth:  
size, symmetry



Occlusal plane  
Vertical overlap  
Gingival display/  
architecture

### Intraoral Photography: *Occlusal Views*

**Occlusal Views**  
F Stop: 22  
Focus on premolars  
Rotations, arch shape  
Occlusal conditions  
Spacing



### Intraoral Photography: *Lateral Views*

**Lateral Views**  
F Stop: 22  
Use mirror  
Focus on first bicuspid  
Occlusal plane  
Gingival architecture  
If additional views are taken, can view occlusal interferences





## Intraoral Photography: *Getting Started*

Dental Conferences

Ask your colleagues!

<http://www.dentistryiq.com/articles/2016/01/digital-photography-in-dentistry-the-tools-and-techniques-you-need-to-help-your-patients-and-improve-your-practice.html>

[www.photomed.com](http://www.photomed.com)

Textbook: Photography in the Dental Practice

Facebook Groups



## *Dental Implants for Long term Solutions*

- 👤 Treatment planning with predictability
- 👤 Management of implants in the aesthetic zone
  - 👤 Treatment planning in the aesthetic zone
- 👤 Managing tissue: provisionalization and final impressions
- 👤 Multiple-unit impressions

## *Treatment Planning Anterior Implants*

Must understand relationship between tissue and bone



## *Possible Presentations*

Scenario 1: Needing extractions, favorable bone and soft tissue



## *Possible Presentations*

Scenario 2: Needing extractions, inadequate bone and soft tissue



## *Possible Presentations*

Scenario 3: Missing teeth with a favorable ridge



## Possible Presentations

Scenario 4: Missing teeth with a deficient ridge



## Replacement Options

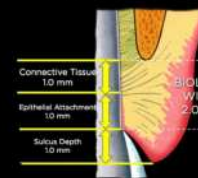
- Tooth supported fixed partial denture
- Implant supported fixed partial denture
- Tooth supported removable prosthesis
- Implant supported removable prosthesis

## Adjunctive Therapies to Consider

- Bone augmentation
- Soft tissue augmentation
- Orthodontics
- Prosthetic tissue replacement

*Teeth are not implants and implants are not teeth.*

Classic illustration of the average human attachment apparatus as described by Gargiulo, Wentz, and Orban in 1961



The Connective tissue attachment and epithelial attachment form the "Biologic Width" averaging 2mm in most patients

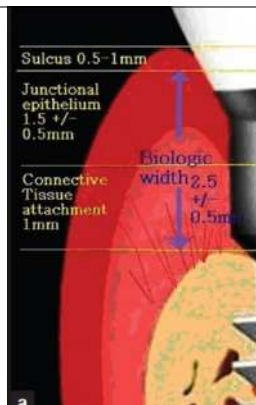
*Teeth are not implants and implants are not teeth.*

Longer junctional epithelial attachment  
(Abrahamsson 2001, Berglundh 1991)

- Treatment planning
- Treatment

Keratinized gingival band around implant affects the overall success of the implant/soft tissue health. (Rapley, 1992)

Prasad et. al. J Interdisciplinary Dent., 2011



*So what does this mean clinically?*



For single unit implants, the bone on the **proximal of the adjacent teeth** will determine the papilla height.

Tamow (1992), Grunder (2000), Choquet (2001)

## Salama et al., 2003

Chart 1: Predictably achievable interproximal soft tissue dimensions measured from the most coronal IHB. (note: measurements rounded to nearest half millimeter for clinical relevance and utilization)

Class	Restorative Environment	Proximity Limitations	Vertical Soft tissue imitations
1	Tooth-Tooth	1	5.0 mm
2	Tooth-Pontic	N/A	6.5 mm
3	Pontic-Pontic	N/A	6.0 mm
4	Tooth-Implant	1.5 mm	4.5 mm
6	Implant-Pontic	N/A	5.5 mm
6	Implant-Implant	3 mm	3.5 mm

## Immediate Provisionalization



## Immediate Provisionalization



## Immediate Provisionalization



## Immediate Provisionalization



Fill and recontour with composite

## Immediate Provisionalization



### Other considerations: Custom Staining



<http://www.dentistryiq.com/articles/2016/01/so-easy-a-prosthodontist-can-do-it-a-simple-and-cost-effective-method-for-characterizing-acrylic-teeth-and-denture-bases.html> (Dr. Miles Cone)

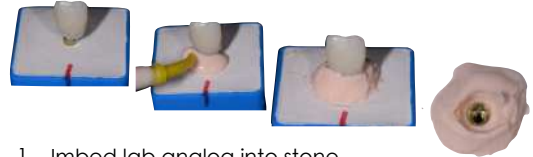
### Other considerations: Gum Shades



### Time for Impressions

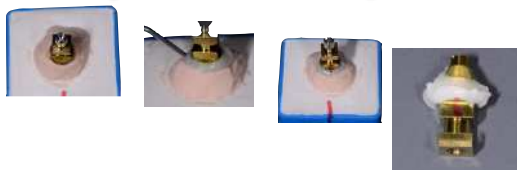


### Customize Impression Coping



1. Imbed lab analog into stone
2. Place provisional on lab analog
3. Apply silicone around apical 1/3 of provisional
4. The contour of the silicone has the exact shape of the provisional

### Customize Impression Coping



5. Place impression coping
6. Inject composite or acrylic around impression coping
7. Allow to set

### Customize Impression Coping



## Before and After

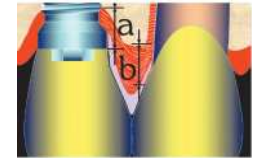
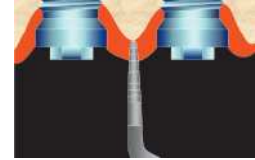


## Tarnow, 2003

136 interimplant papillary heights on 33 patients

Measured distance between crest of bone to height of interdental papilla

**Conclusion:** In most cases, only 2, 3 or 4mm (range was 1-7mm) of tissue can be expected. The average was 3.4mm. The tissue support is different for implants than teeth



*J Periodont.* Dec 2003; 74(2)

## PMMA Maryland FPD

Tarnow, 2000

Radiographic evaluation of 36 patients with 2 adjacent implants

### Findings:

- 1> There is a lateral component to bone loss
- 2> Implants greater than 3mm apart: 0.45mm bone loss
- 3> Implants less than 3mm apart: 1.04mm bone loss

### Clinical Significance:

- 1> This will impact the presence/absence of a papilla
- 2> May consider smaller implants if you need space

## Extractions and Grafting

### Factors to Consider

- ☞ **Horizontal:** at least 2mm of bone buccal to the proposed implant position
- ☞ **Vertical:** Crestal bone height 3mm apical to proposed facial gingival margin and 3.5mm from interdental papilla
- ☞ **Interproximal:** Implants 3mm apart from each other, central incisor implants 4.5mm, implant-adjacent tooth 2mm
- ☞ Soft tissue augmentation occurs after bone augmentation

Saadoun, 2004, Ishikawa, 2010

## Dental Implants for Long term Solutions

- ☞ Treatment planning with predictability
- ☞ Management of implants in the aesthetic zone
- ☞ Multiple-unit impressions

## Multiple Implant Impressions

### Challenges

1. Passively fit frameworks/restorations
2. Multiple implant angulations
3. Dental materials
4. Screw or cement-retained

Maragliano-Muniz, *Dental Economics*, April 2016



## Multiple Implant Impressions- Facts

1. Single implants: open vs. closed tray have similar accuracy (Brewer, 2015)
2. Full arch impressions: open tray has greater accuracy (Lee, 2008)
3. Inaccuracies can occur with free-standing impression copings (Kim, 2015)
4. Rigid connection suggested (Papaspyridakos, 2011)

## Multi-implant Impression Technique

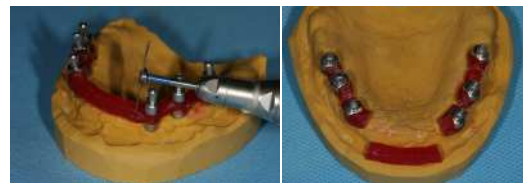
1. Remove healing abutments
2. Place transfer impression copings
3. Make preliminary impression
4. Place lab analogs and pour a cast

## Multi-implant Impression Technique



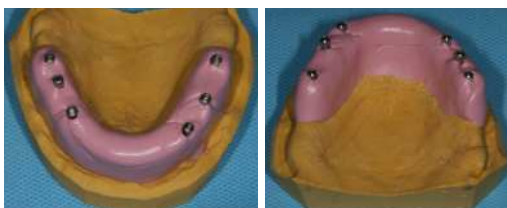
5. Place open tray impression copings
6. Attach copings with GC Pattern Resin
7. Let set completely

## Multi-implant Impression Technique



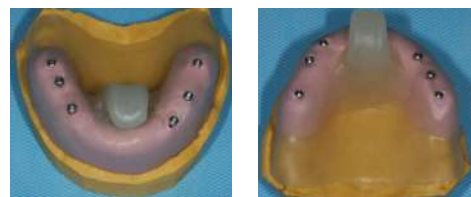
8. Section GC Pattern Resin  
Thickness of a business card or 0.3mm

## Multi-implant Impression Technique



8. Block out

## Multi-implant Impression Technique



9. Fabricate custom impression tray



## Multi-implant Impression Technique



10. Place impression copings, take X-ray
11. Reattach with GC Pattern Resin
12. Make an accurate impression



## Summary

- CAMBRA is beneficial to all patient populations/practice types
- CAMBRA can be successfully implemented in the private practice
- Dental hygienists hold the key for successful implementation and prevention is profitable
- Dentists may consider making different choices in restorative materials based on caries risk
- Utilize dental photography for education and case presentations
- Dental implants may reduce caries risk and provide better long term outcomes
- Understanding the biologic parameters will aid in successful planning of aesthetic restorations
- Modern implant impression techniques can improve outcomes

THANK YOU  
*for your kind attention*



THANK YOU  
*for your kind attention*

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