

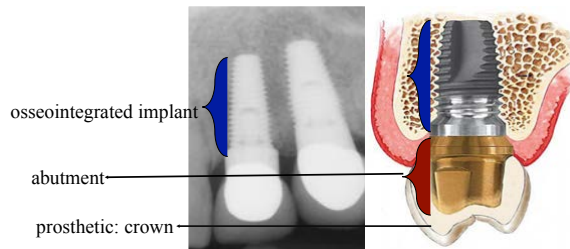
## Peri-Implant Support for the Dental Hygienist

Penny Hatzimanolakis MSc. RDH  
Clinical Associate Professor, UBC  
November 14, 2016

### Objectives:

- Assess: Describe peri-implant disease.
- Diagnosis: Identify a healthy, failing, and ailing implant.
- Planning: Treatment plan for the healthy and compromised implants.
- Implementation: Describe the various materials used to debride healthy and diseased implants.
- Evaluation: Describe the complications, referral and recall intervals for the healthy and compromised implants.

### Implant components



### Process of Care Module- ADPIE

- Assess
- Diagnosis
- Plan
- Implement
- Evaluate



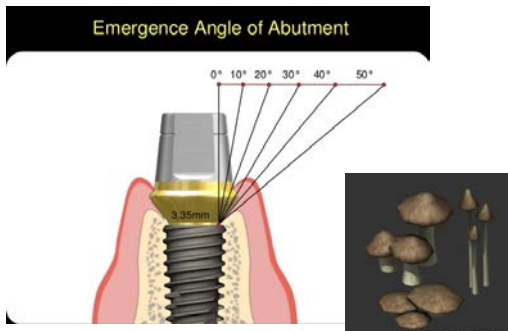
### Aligned with terms



### Abutment diversity



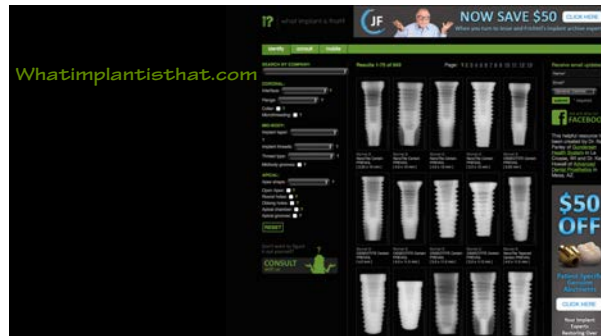
BioHorizons



## Implant neck or collar

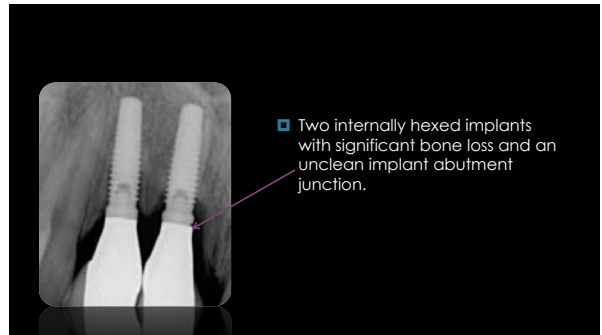


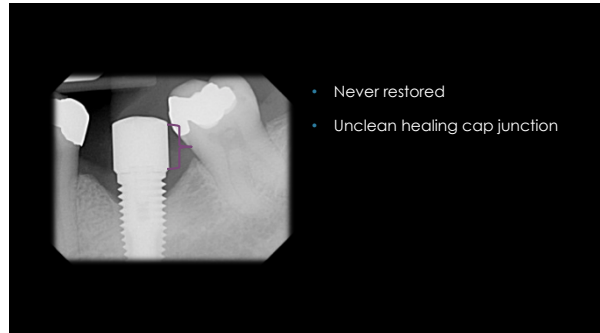
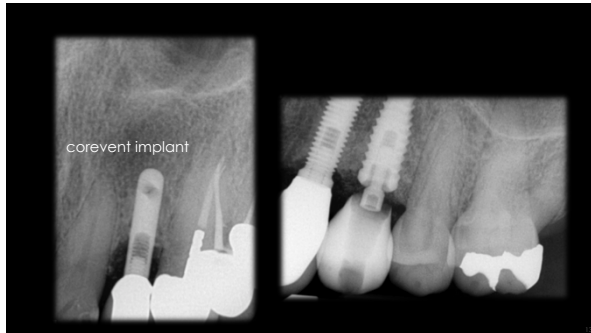
BioHorizons



### Why...

- What and where is our focus?
- At what level is the disease?





## Transmucosal Region

- Transmucosal region:**
1. The prosthetic
  2. The abutment
  3. Implant neck or collar



## Implant collar/neck

- At the marginal part of the neck (collar).
- Can have a polished finished averaging about 0.5 - 1mm wide for the connection with the abutment.
- Newer/Most now have a roughened microstructure to aid with soft tissue attachment and a homogenous transition with the neck.



## Our goal for the Transmucosal...

- Effectively debride surfaces [soft and hard]
- Minimal surface [abutment/neck/implant] damage
- Minimal affect to the soft tissue-implant interface
- Overall maintenance of perimucosal tissue

Louropoulou et al., 2014 Schmage et al., 2014

## ADPIE

- ▣ Assess
  - ▣ What is happening?
- ▣ Diagnosis
- ▣ Plan
- ▣ Implement
- ▣ Evaluation



## Prevalence (widespread) of implant disease

- Derks and Tomasi (J Clin) 2015
  - Meta-analyses estimated weighted mean prevalence
    - ▣ peri-implant mucositis of 43% (CI: 32-54%)
    - ▣ peri-implantitis 22% (CI: 14-30%)

## Incidence (risk) of peri-implantitis

- Failures are an issue.
- DaSilva 2014, 1 out 5 failing.
  - Explanation:
    - Very high success rates reality?
    - Protocols changed, technology changed
    - Practitioner have "changed"
    - Poor plan
  - We might have high "stated" success rate but not a treatment rate... this is a problem.

## clinical parameters of assessment

- ✓ Medical/Dental History
- ✓ Pain
- ✓ Mobility
- ✓ Bleeding (BOP) and/or Exudate digital palpation
- ✓ Probing (less than .20N)
- ✓ Radiograph
- ✓ Keratinized Tissue/Recession
- ✓ Biotype: thick or thin
- ✓ Occlusion: what is happening?
- ✓ Soft-tissue evaluation
- ✓ Contacts- if applicable

## What is baseline measurement?

- ▣ When does it "mean" something?
  - ▣ At prosthetic placement
  - ▣ New client

## Do you ever hear this from your clients, "It doesn't bleed when I brush or floss!"

Why is that?

**Primarily Aerobic Bacteria**

- 1-2 mm pocket and/or surface of tooth:
- Acid loving
- Cariogenic (Cavity causing)

1-2 mm Transitional area

- Aerobic to Anaerobic Bacteria

**Primarily Anaerobic Bacteria**

- 3 or greater mm pocket:
- Alkaline loving
- Periogenic
- (Periodontal disease or gingivitis)

## Bleeding... (peri-implant mucosa)

- Gingival bleeding is the **main risk factor** for the onset of inflammation.
- Absence of BOP-
  - high negative predictive value = indicator for stable peri-implant condition.
- Prognostic value of BOP:
  - **any site** bleeding more than half of recall visits over a 2-year period had disease progression.

Tonetti et al., 2015

- ▣ Place the probe **parallel** to the long axis of the buccal/lingual surface of the implant.
- ▣ There are only 2 fiber groups, circular and parallel
- ▣ 0.15-20N

## Soft Tissue Adhesion

pocketdentistry.com

Larjava et al., 2011

<http://www.breadentalimplant.com>

## Hu-Friedy Novatech CP-NT2 right-angled probe



Easier to align with the vertical axis. This is a PH observation: no literature...yet

## Summary and be mindful...

- No predictable peri-mucosal seal
- Penetrate the seal
- Closer to the proximal bone
- Difficult in achieving parallelism
- Correlate pocket depth to bone level
- The mucosal thickness and the implant position can create a deep sulcus
- Metal probes can be more accurate but less comfortable

## Mobility assessment

DenScope

UBC Research

Diagnostic device that precisely gauges the health of dental implants.

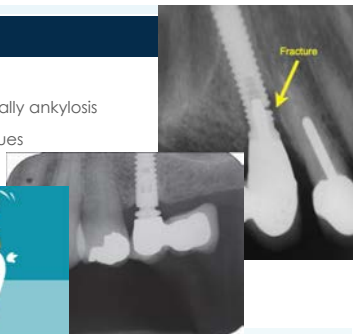
Implant stability quotient (ISQ)



denscope.com

## Mobility

- Implant is Functionally ankylosis
- Other technical issues
  - Tiny Bubbles...



## Radiographs

- Ideally vertical bitewings to determine bone levels.
- But at times we do need to see the apex of the implants, especially if there are many concerns.
- Panoramic- systems? Multiple implants?

## Radiographs

- Threads need to be clear/sharp and horizontally positioned.

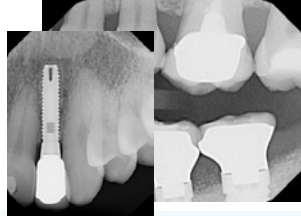


## Radiographs

- Try to use the same technique/holders
- **Angulation** of the beam to the long axis of the implant should not exceed **15 degrees**
- Calibration is key for prognostic value
- Use the same radiograph used at baseline for measurement reliability and prognostic value.

### Suggested Guidelines...

- Base line- Periapical- new patient?
- Maintenance- VBWs
- Radiographs should be taken
  - The time of implant placement,
  - Osteointegration check,
  - After placement of restoration and 1-year recall if stable/healthy



### Fibrous encapsulation



- ❑ Lack of stability when the implant is first placed can result in implant micro-motion above 100 microns, and loss of the implant due to fibrous tissue bonding to the implant surface instead of bone

### Keratinized Tissue (KT)



- ✓ Ideal- 2mm
- ✓ Good interdental papillae
- ✓ Resistant to abrasion
- ✓ Less discomfort for client
- ✓ More Hemidesmosomes
- ✓ Collagen fibers perpendicular

Chiu et al., 2015; Brito et al., 2014; Mortila, 2013; Lin et al., 2013.

luisquesta.com

### Lack of KT



- No tissue cuff
- Increase risk of disease/complications
- Can have greater PD
- Plaque retention (simulate exudate)
- Collagen fibers only parallel
- Can increase sensitivity
- Tx plan: Case dependent -CTG prior to implant placement!

forum.dentalxp.com

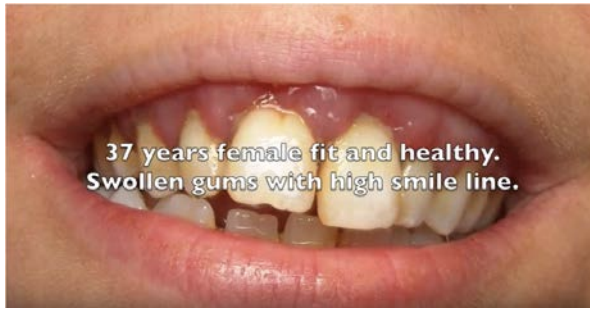
Chiu et al., 2015



### Gingival biotype- implants

- 2mm tissue needed to not see the bone loss
- 2.5mm protective of crestal bone (Le & Nielsen, 2015)





### Increase the Risk for failures

- Improper oral hygiene: high level of evidence
- History of periodontitis: high level of evidence
- Previous/current smokers: high level of evidence
- Medical: moderate level of evidence (no causation)
- Inadequate treatment planning: multifactorial
  - Failure to associate- Improper client selection
  - Improper control of immediate stress or load force
  - Inadequate healing/manufacture/design
  - Implantitis/surgical complications (previous bone)

### Process of Care

- ADPIE
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### Diagnosis

**Table 1. Diagnostic criteria for peri-implant mucositis**

Author (reference)	Mucositis definition
Hetz-Mayfield et al. (14)	Bleeding on probing and no bone loss
Thone-Muhling et al. (62)	Bleeding on probing and/or gingival index $\geq 1$ on at least one site and no bone loss in the previous 2 years
Ramberg et al. (29)	Bleeding on probing
Perras et al. (28)	Plaque, probing depth $\leq 5$ mm and evidence of inflammation by modified bleeding index
Feki et al. (10)	Bleeding on probing, modified gingival index $> 1.5$ , modified plaque index $> 1.5$ and probing depth $\geq 3$ mm
Ciancio et al. (8)	Bleeding on probing, modified gingival index $> 1.5$ and modified plaque index $> 1.7$

Table from Figuero et al 2014

**Table 2. Diagnostic criteria for peri-implantitis**

Author (reference)	Peri-implant disease definition
Schar et al. (16)	Probing depth $\geq 4$ mm, bleeding on probing at one or more sites and radiographic bone loss of 0.5-2 mm
Rezzetti et al. (33)	Probing depth $\geq 5$ mm, bleeding on probing/suppuration and radiographic bone loss $> 3$ mm
Rezzetti et al. (37)	Probing depth $\geq 4$ mm, bleeding on probing/suppuration and radiographic bone loss $> 2.5$ mm
Rezzetti et al. (25)	Probing depth $\geq 4$ mm, bleeding on probing/suppuration, bone loss $> 1.5$ mm (three threads) and the presence of Porphyromonas gingivalis, Prevotella intermedia, Fusobacterium nucleatum, Tannerella forsythia, Aggregatibacter actinomycetemcomitans and Treponema denticola
Rezzetti et al. (30, 32)	Probing depth $\geq 4$ mm, bleeding on probing/suppuration, bone loss lower than three threads and the presence of Porphyromonas gingivalis, Prevotella intermedia, Fusobacterium nucleatum, Tannerella forsythia, Aggregatibacter actinomycetemcomitans and Treponema denticola
Schwartz et al. (47, 56)	Moderate ( $> 4$ mm) to advanced ( $> 7$ mm) probing depth, bone loss, bleeding on probing/suppuration, plaque index $\geq 1$ and bacterial incense
Karring et al. (13)	Probing depth $\geq 5$ mm, bleeding on probing, radiographic bone loss $> 1.5$ mm and exposed implant threads
Aghvashadi et al. (1)	Probing depth $\geq 3$ mm, bleeding on probing/suppuration, radiographic bone loss $\geq 2$ mm and angular peri-implant bone defects $\geq 3$ mm
Schwartz et al. (53)	Probing depth $\geq 6$ mm and radiographic bone loss $> 3$ mm
Rose-Jacobs et al. (14)	Bleeding on probing/suppuration and bone loss more than three threads
Chappet et al. (9)	Probing depth $\geq 4$ mm or bleeding on probing, vertical bone loss
Schwartz et al. (48, 52, 55)	Probing depth $\geq 6$ mm and radiographic bone loss $> 3$ mm
Battino et al. (26, 38)	Probing depth $\geq 4$ mm, bleeding on probing/suppuration and peri-implant radiolucency

Table from Figuero et al., 2014

### Etiology of implant(periodontal) disease?

Is it the same in all disease sites?



## peri-implant microbiome

- The peri-implant microbiome differs significantly from the periodontal community in both health and disease.
- Peri-implantitis is a microbial heterogeneous infection with predominantly gram-negative species, and is less complex than periodontitis.
- What about fungal or viral in the biofilm?

Kumar et al., 2012

## Peri-implant crevicular fluid

- Salivary biomarkers
  - Identify a differences between peri-implant health.
  - *Might* help discriminate peri-implant health from disease.

Zani et al., 2016 J Clin Perio

## Pathology

- Rough surface facilitates biofilm accumulation
- Circumferential lesions typical
- Progresses often faster than chronic periodontitis lesions
- Biofilm in direct contact with inflammatory cells (not separated by the pocket epithelium)
- More acute phase inflammatory cells (PMN, macrophages)

(Dabdoub et al., 2013) Larjava

## Derks et al., 2016 J clin perio

### CONCLUSION:

- It is suggested that peri-implantitis accelerates in a non-linear pattern and that, for the majority of cases, the onset occurs within 3 years of function (when the prosthetic place).

## Diagnosis

- To successfully treat the peri-implant lesion, the diagnosis must be based on
  - the etiologic cause of the disease.

## Peri-Implant Disease Classification

### Peri-Implant Mucositis

- Describes an inflammatory lesion that resides in the mucosa.
- The reversible inflammatory reaction in the soft tissues surrounding a functioning implant (Albrektsson 1994)
- It can be defined as a chronic plaque induced infection of the marginal peri-implant soft tissues without appreciable bone loss (Esposito 1999)

## Peri-Implant Disease Classification

### Peri-Implantitis

- The mucosal lesion is often associated with suppuration and deepened pockets, but always accompanied by loss of supporting marginal bone

(Linche & Meyle 2008)

Early	PD ≥ 4 mm (bleeding and/or suppuration on probing*) Bone loss < 25% of the implant length†	Ailing
Moderate	PD ≥ 6 mm (bleeding and/or suppuration on probing*) Bone loss 25% to 50% of the implant length†	Failing
Advanced	PD > 8 mm (bleeding and/or suppuration on probing*) Bone loss > 50% of the implant length†	Failed

\*Noted on two or more aspects of the implant.  
†Measured on radiographs from time of definitive prosthesis loading to current radiograph. If not available, the earliest available radiograph following loading should be used.

From Froum and Rosen, Int J Restorative Dent, 2012

## Process of Care

- ADPIE
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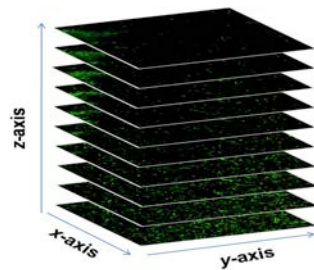
## Plan

- Every practicing dental hygienist knows how unequivocally critical plaque biofilm removal is in order to establish and maintain periodontal health...
- The greater the pocket depths, the more challenging that becomes.

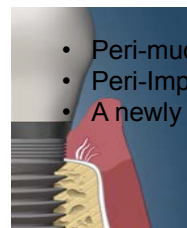
## Confocal Images of biofilm

- What is the most effective method to dismantle subgingival biofilm in order to achieve biological compatibility?

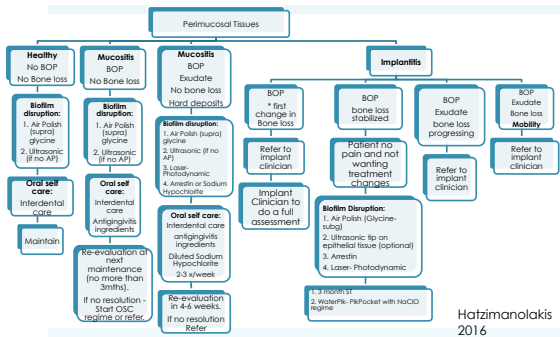
- Laser?
- Air polish?
- Surgical?
- Local/systemic antimicrobial?



## Treatment plan:



- Peri-mucositis?
- Peri-Implantitis?
- A newly placed implant?



**Process of Care**

- ADPIE
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**What is our goal?**

- Effectively debride surfaces,
- Minimal or no surface damage,
- Maintain perimucosal tissue,
- Minimal affect to the soft tissue-implant interface, and
- Prevent or arrest the progression of inflammation.

**Biofilm**

**LM Flexplorer 1 1/2**



### Subgingival Air Biofilm Management

- For removal of biofilm from subgingival root surfaces and implants
- As effective as ultrasonic or hand instrumentation of biofilm but faster and more comfortable for patients
- Used in Europe for more than ten years on over 3 million patients.
- Different powder – Glycine crystal powder, finer, less abrasive. Amino acid
- Newest powder is Erythritol. Will be coming to Canada.
- Ems HuFriedy and Acteon Satelec since 2010 in North America.

### Quintessence International 2013

- ▣ To effectively remove subgingival biofilm, the ultrasonic tip must be moved in an overlapping fashion to touch the entire surface while the air polisher spray easily reaches a broader area.
- ▣ Research resulted with air polishing (subgingival glycine) is more effective as the spray reaches much further than the localized effect of an ultrasonic scaler.

Wennstrom JL, Dahlen G, Ramberg P. Subgingival debridement of periodontal pockets by air polishing in comparison with ultrasonic instrumentation during maintenance therapy. *J Clin Periodontol*. 2011; 38

### Implant Care and Peri-Implantitis

- ▣ Subgingival glycine powder air-polishing has been shown to be clinically effective in treatment of peri-implantitis as well as adjunctive local delivery of antibiotics and Er:YAG laser treatments, with greater reduction in bleeding on probing with (glycine powder) air polishing compared to subgingival debridement using curettes with adjunctive chlorhexidine.

Muthukuru M, Zainvi A, Esplugues EO, Flemmig TF. Non-surgical therapy for the management of peri-implantitis: a systematic review. *Clin Oral Implants Res*. 2012; 23(suppl):677-83.  
Renvert S, Lindahl C, Roos-Jansaker AM, Persson GR. Treatment of peri-implantitis using an Er:YAG laser or an air-abrasive device: a randomized clinical trial. *J Clin Periodontol*. 2011; 38:65-73.

### ACTEON Implant Protect tip kit

- ▣ Piezo inserts



### Oral self-care

- ▣ Biofilm control
- High level suggesting high correlation failures
- Single-tufted brush, rubber tips, wooden cleaners, coated wire nylon interdental brush, ETB, manual TB, water pik with the pik pocket insert
- What's missing?



### To floss or not to floss is now the new question?

- 10 cases with non responding peri-implantitis
- In all ten cases, remnants of dental floss were found around the neck and coronal part of a dental implant.
- After careful removal of these floss remnants and implant cleansing, a significant improvement in the peri-implant conditions in nine of ten cases was noted.

van Velzen et al. 2015



Controversy with flossing especially with peri-implantitis

vanVelzen et al.,2015

**What to use?**

- Nylon
- interproximal brushes-Nylon
- thicker filament

## Chlorhexidine

- Underutilized with peri-implant diseases.
- Application of CHX gel was noted to reduce bacterial counts in internal implant cavity ( Ghannad et al.,2015).
- Not subgingival irrigation.



## New implant

Healing abutment

- No probing (PD)
- Only supra debridement to remove biofilm/ plaque
- Polishing: air(glycine)
- Oral-self promotion-Sonicare?



## Hard deposits

## Debridement

Nonmetallic materials:

- Plastic (unfilled resin), graphite (filled resin), Teflon, titanium, nylon, gold-plated.
- Plastic or nylon sleeves (PEEK) placed over ultrasonic tips.
- PEEK and unfilled resin are one time/disposable



## Materials

- Unfilled resin (plastic) does not have any fillers for reinforcement of shape or stiffness.
- Filled resin uses fillers(graphite) for shape and stiffness.

## Different materials

■ Graphite



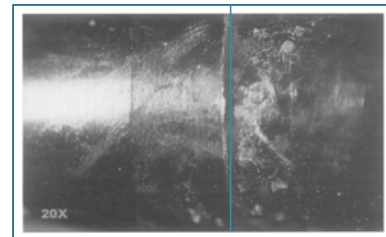
■ Titanium



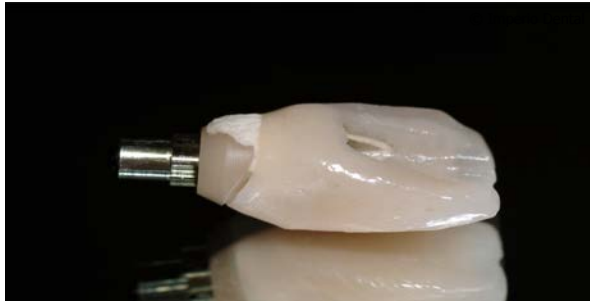
LM- mini universal

## Research

- Dr. Driver (PhD)
- Plastic- left residual material on surface
- Stainless steel- increased the most surface damage
- PEEK- overheated and left material on surfaces
- Titanium \*\* was best in removing and acceptable surface changes.



© Imperio Dental




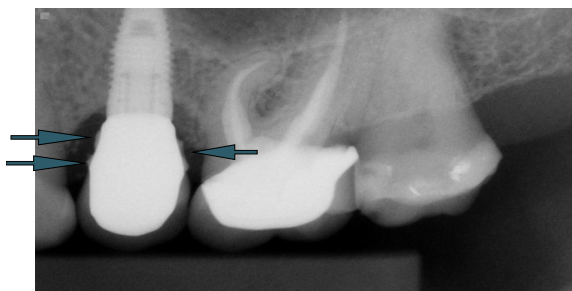
### Cement...Etiology ?

- Systematic review by de Brandao et al., 2013:
- No evidence to support differences in the marginal bone loss between cement and screw-retained restorations.
- 4 reviews from 2013-2015- 4% FR 5yrs; 8% FR 10yrs.
  - No difference from screw or cemented implants.
  - Is the issue cement or rather the residual of it...much like calculus?
- Are we comparing apples to oranges?

<b>Cement types:</b>	<b>Ease:</b>
Resin	Hard
Zinc phosphate	Easier
Glass ionomer	moderate
Resin-based	hard

- Use radiopaque resins so you can see on radiograph
- Titanium scalars:
  - ex: Wingrove (PDT) or LM (LM Dental)
- Explorer- LM Flexporer



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### Process of Care

- ADPIE
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### Evolution of Implants in the Last Decade

- |  |   |
|--|---|
| <ul style="list-style-type: none"> <li>■ 2000                     <ul style="list-style-type: none"> <li>• Polished surface</li> <li>• External Hex</li> <li>• Straight wall design</li> <li>• Regular platform</li> <li>• 2-stage protocol</li> <li>• Delayed protocol</li> </ul> </li> </ul> | <ul style="list-style-type: none"> <li>■ 2010                     <ul style="list-style-type: none"> <li>• Rough surface (2003)</li> <li>• Internal connection</li> <li>• Tapered design</li> <li>• Platform-switching (2005)</li> <li>• Single-stage protocol</li> <li>• Immediate load</li> </ul> </li> </ul> |
|--|---|

Lee 2016

### Risk for failures

- Factors altering host response (diabetes, stress, bisphosphonates etc)
- Local factors: cement, poor prosthetic design (emergence profile etc), poor inter-implant/tooth implant distance, exposure of rough surface, lack of KT
- Previous bone grafting
  - load force?
  - Inadequate healing/manufacture/design?
  - Implantitis/surgical complications (previous bone)?

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### Prevention Rather than Repair

- An appropriate periodontal diagnosis alongside assessment of patient-level factors (risk factors and attitudes) should determine the selection of the most appropriate type of professional preventive/therapy care.



## Referral

- The goal is to stop inflammation- clinically that translate to no bleeding.
- Challenging and we can't afford to "wait and see" mentality. Act sooner than later.
- Practice Evidence INFORMED Methodology.



[pennyhat@dentistry.ubc.ca](mailto:pennyhat@dentistry.ubc.ca)

