

## The Tooth

- Dentin and the Pulp are living tissues sealed by enamel and cementum
- Over one's life, secondary dentin is secreted at a low rate decreasing the pulpal volume
- Injurious activities cause the dentin/pulp complex to secrete tertiary dentin



## The Tooth (continued)

- Hebling (1999) along with others have shown that with deeper lesions, resin bonding agents placed on the cavity floor, may diffuse across dentin and reach the pulp, triggering local inflammatory reactions or enhance existing inflammation
- Remaining Dentinal Thickness (RDT) has been shown to be a major determinant of the severity of damages caused in the pulp after restorative procedures with adhesive systems (Gwinnett and Tay, 1998 and Costa 2000) *This is one specific reason why I believe in basing out most restorations*

## The Tooth (continued)

- About's in vivo study (2001) showed the RDT was the most important feature in final pulpal outcomes.
- Jo Camp's study (2000) showed the bacterial remaining in the cavity to be the primary issue followed by RDT
- Treatment near pulpal exposures should thus avoid resin based treatments and incorporate bases that have antibacterial properties

## Kakehashi's Studies

- Bacterial exposure lead to partial necrosis of exposed pulpal tissue in conventional rats after 8 days and total necrosis by 14 days.
- This is not seen in germ-free animals with pulpal exposures. Up to 32 days after pulpal exposure in germ-free rats, intact dentinal bridge developed.
- Bacterial infection of dental pulp constitutes a dominant etiologic factor for pulpal necrosis.

## Direct Pulp Capping studies

- Successful completion of pulp capping was found on non-humans with resin materials (Cox:1998, Costa:2000) showed signs of a lack of chronic inflammation and bridge formation
- Human studies by (Hebling, Gwinnett, Tay and others) showed persistent chronic inflammation in association with giant-cell foreign body reaction with resin materials.



## Essential features to Successful Pulp Capping

- Self healing capacity of the pulp
- Absence of bacteria
- Proper hemorrhage control



## ProRoot<sub>tm</sub> MTA

Dentsply  
TulsaDental  
1-800-662-1202

## Ingredients



- Tricalcium oxide
- Silicate Oxide
- Bismute Oxide
- Tricalcium silicate
- Tricalcium aluminate

## Key Features

- Hydrophilic: Thus will set in presence of moisture, key in all applications!
- pH is initially 10 and sets at 12.5
- Biocompatible
- Somewhat anti-microbial
- Marginal adaptation and sealing properties

## Research Overview

On Sealability:  
MTA provides a better apical seal  
as root-end filling material than  
amalgam, IRM, and Super EBA

Fisher, E. et al. JOE Vol 24, Num.3  
March 1998, pp176-179

## Research Overview

On Biocompatibility: Absence of  
cytotoxicity when MTA came into  
contact with fibroblasts and osteoblasts  
and formation of dentin bridges when  
used in pulp capping.

Koh et al and Pitt Ford j Biomed Material Res. 1997, 37:432

## Research Overview

Demonstration of growth of  
cementum, periodontal ligament  
and bone adjacent to MTA

Torabinejad et al J Endo. 1997; 23:225

## ProRoot™ MTA Benefits

- Allows normal healing response
- Allows formation of new cementum
- Allows formation of new dentin
- Least leakage

Coupled with Laser therapy that has been shown to promote fibroblastic attachment...

## ProRoot™ MTA uses

- Pulp Capping
- Pulpotomy
- Furcation Perforation
- Extra-Radicular perforation repair
- Apexification
- Surgical root repair
- Internal resorption repair

## Size of Exposure

- The size of the exposure can be .5 (the tip size of a perio probe)-4mm with the same success.
- Pin point exposures may not be exposed to enough material to create tertiary dentin.

## Usage Notes (before laser use)

1. I utilize Superoxyl (not to wet) to stop any hemorrhage for 1 minute
2. Thoroughly disinfect the area
3. I utilize NaHypoChlorite x 1 minute (not to wet)
  - I actually open up minor exposures so I can pack in the material with a 1/4 round bur
  - Using the CO2 laser, the exposure is both sterilized and carbonized and no need for the above solutions

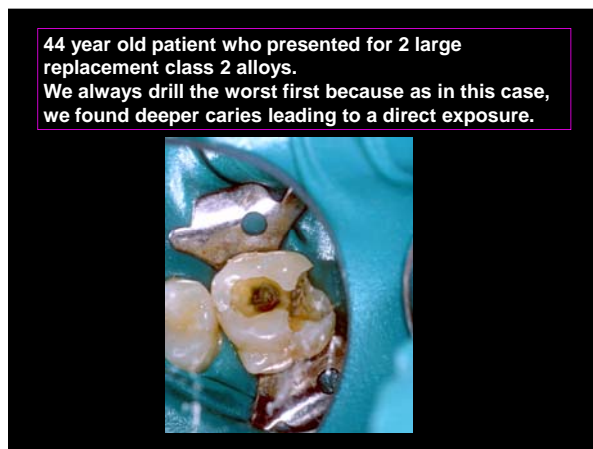
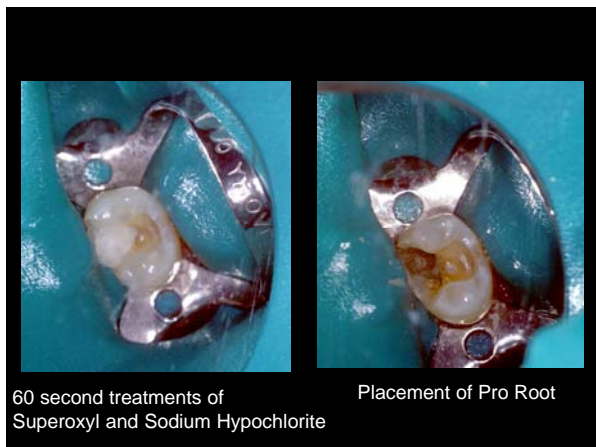
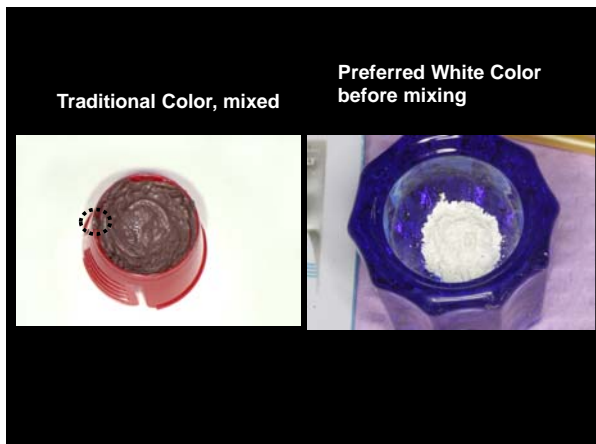


## How it works in Pulp Capping!

- Initially may cause necrotic layer in the superficial bridge layer
- This occurs via necrosis by coagulum while in contact with pulpal tissue
- Probably due to the high pH
- Then: Calcite crystals in contact with MTA attract fibronectin which causes cellular adhesion and differentiation, similar to CaOH, but with a superior seal against bacteria

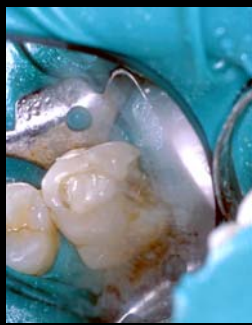
## Mixing

- Open a single full pouch
- Mix with the water ampule (sterile water) provided and get to a creamy consistency
- I place with a smooth instrument with a small ball tip and condense with a condenser. I use a micro-brush to remove excess moisture
- Approximately 5-15 minute work time and 4-6 hour SET time.





10 minutes of wait time, then do an indirect pulp cap



Vitrebond