SEALANTS AND PREVENTIVE RESIN RESTORATIONS
Dental caries should be diagnosed and managed as a dynamic disease of enamel and dentin. The disease process is initiated whenever a tooth surface is exposed to acids produced by the fermentation of carbohydrates in cariogenic bacteria.

In enamel, calcium and phosphate are lost from enamel crystals on the surface and sub-surface layers after the pH of oral fluids drops to less than 5.5.

If the loss continues, large microporous areas develop; “white spot” lesion.
The goal of examining a patient for the presence of dental caries is to detect the earliest signs of this disease in enamel and root surfaces.

If early signs of demineralization are detected; advise and provide preventative care to reverse the caries process.

Important to consider that dental caries is an infectious disease. “Drilling and filling” a tooth is not the only solution to the damage caused by the caries process and is not an effective method to treat the cariogenic infection (Gregory et al 1998).

A comprehensive preventative and treatment program is necessary to manage dental caries especially for patients with progressive or rampant caries.
A comprehensive preventative and treatment program is necessary to manage dental caries especially for patients with progressive or rampant caries.

In caries active patients an evaluation is carried out to identify factors such as dietary habits; use fluoride products; microbial infection in the mouth; salivary flow and buffering capacity and oral hygiene practices.

When examining patients, the goal is to predict the caries process as well as to diagnose the presence of dental caries.
The first step in assessing the caries status of a patient after all interview examinations are completed, is to inspect visually all tooth surfaces with a mirror, explorer and air syringe.

An explorer is useful in caries diagnosis as a tool to remove plaque and debris and check the surface characteristics of suspected carious lesions.

There is no need to apply too much pressure on an explorer because studies have found that this does not increase the accuracy of caries detection (Lussi 1991).

Gentle pressure is defined by the force just required to blanch a fingernail without causing pain or damage.
Following the principle that dental caries is a dynamic process, management should focus on identifying surfaces with questionable caries activity; tooth surfaces with early non-cavitated lesions and those lesions that should be cleaned and restored.

Each patient new or regular; should be assessed for caries activity. Primary preventive recommendations should be based on caries risk status.
PIT AND FISSURE CARIES

- Thought to form at base of fissure involving deeper aspects before the walls and cuspal inclines of the fissure

- Inclines are actually affected first

- 1st evidence of lesion formation is at orifice of the fissure

- Enamel at the base is affected to a greater extent and lesion progresses laterally and rapidly towards the DEJ

- Once cavitation begins the lesion is now clinically detectable
• ENAMEL SURFACES WITH PITS AND FISSURES RECEIVE MINIMAL CARIES PROTECTION FROM FLOURIDE (SYSTEMIC/TOPICAL)

• LITTLE DEPTH OF ENAMEL AT BASE OF FISSURE

• UNDERLYING DENTIN BECOMES INVOLVED RAPIDLY

• WHEN CARIES OCCURS ON SMOOTH SURFACES A CONSIDERABLE AMOUNT OF ENAMEL MUST BECOME INVOLVED BEFORE DENTIN IS REACHED (UP TO 3-4 YRS)
CURRENT PIT AND FISSURE TREATMENT ALTERNATIVES

- OBSERVATION ONLY
- SEALANT PLACEMENT
- PREVENTIVE RESIN RESTORATION
- RESTORATION
INDICATIONS FOR SEALANT PLACEMENT

- DEEP RETENTIVE FISSURES WHICH MAY CAUSE WEDGING OR CATCHING OF THE EXPLORER

- STAINED PITS AND FISSURES WITH MINIMAL DECALCIFICATION OR OPACIFICATION

- PIT AND FISSURE CARIES OR RESTORATIONS OF PITS AND FISSURES IN OTHER TEETH

- NO RADIOGRAPHIC OR CLINICAL EVIDENCE OF INTERPROXIMAL CARIES IN NEED OF RETORATION ON TEETH TO BE SEALED
INDICATIONS FOR SEALANT PLACEMENT

- USE OF OTHER PREVENTIVE TREATMENT SUCH AS SYSTEMIC OR TOPICAL FLOURIDE THERAPY TO INHIBIT INTERPROXIMAL CARIES FORMATION

- POSSIBILITY OF ADEQUATE ISOLATION FROM SALIVARY CONTAMINATION

- THE TOOTH CONSIDERED FOR SEALANT APPLICATION ERUPTED LESS THAN 4 YEARS AGO
CONTRAINDICATIONS FOR SEALANT PLACEMENT

- WELL COALESCED, SELF CLEANSING PITS AND FISSURES
- RADIOGRAPHIC OR CLINICAL EVIDENCE OF INTERPROXIMAL CARIES IN NEED OF RESTORATION
- PRESENCE OF MANY INTERPROXIMAL LESIONS OR RESTORATIONS AND NO PREVENTIVE TREATMENT TO INHIBIT INTERPROXIMAL CARIES FORMATION
- TOOTH PARTIALLY ERUPTED AND NO POSSIBILITY OF ADEQUATE ISOLATION FROM SALIVARY CONTAMINATION
- PIT AND FISSURE SURFACE THAT HAS REMAINED CARIES FREE 4YRS OR LONGER
PREVIOUS GUIDELINES FOR SEALANT PLACEMENT

- Caries risk assessment of the individual and the tooth are important as determinants to sealant need.

- Caries risk on surfaces with pits and fissures may continue into adulthood; therefore post-eruptive age alone should no longer be used as a major criterion for sealant decisions.

- Sealants should be used to prevent caries in at-risk teeth (preventive sealants).

- Sealants should be used to treat teeth with questionable caries confined to the enamel pits and fissures (therapeutic sealants).

- Sealed teeth need to be evaluated periodically for sealant integrity and retention.
CURRENT PHYLOSOPHY

- Sealant use must be based on personal, tooth, and surface at risk (may change at any time in life of pt).

- Current professional leadership had advocated that any fissure lesion judged to be limited to enamel is a candidate for sealant.

- It is speculated that sealing of pits and fissure could have an effect on the overall count of Streptococcus mutans in the oral cavity.
SOME HISTORY

1st paper published on the subject of pit and fissure sealants was by Cueto and Bounocore in 1965.

Bounocore introduced the 1st sealant material that utilized the acid etch technique.

Used cyanoacrylate.
IN 1982 RESIN BASED SEALANT MATERIALS WERE INTRODUCED

THESE HAD TWO DIFFERENT TYPES OF POLYMERIZATION

- AUTOPOLYMERIZATION
- PHOTOPOLYMERIZATION
BENEFITS OF LIGHT CURE VS CHEMICAL CURE

- MATERIAL SETS IN 10-20 SECONDS
- NO MIXING OF RESINS
- VISCOSITY REMAINS CONSISTENT DURING INFILTRATION OF THE ETCHED ENAMEL PORES
- SEALANT DOES NOT SET UNTIL ACTIVATED
DISADVANTAGES

- COST OF THE LIGHT CURING UNIT
- NEED FOR MULTIPLE UNITS
ADVANTAGES OF LASER CURING

- **FURTHER REDUCTION IN SETTING TIME**

- **CONTROL OVER SPECIFIC RADIATION ENERGY WAVELENGTH AND AREA OF EXPOSURE**

- **A DECREASED IN THE PERCENTAGE OF UNPOLYMERIZED RESIN COMPARED WITH VISIBLE LIGHT CURING**
DISADVANTAGES

- COST OF THE LASER UNIT
- NEED FOR ADEQUATELY TRAINED PERSONNEL
GLASS IONOMER SEALANTS

**ADVANTAGE**
- ABILITY TO RELEASE FLOURIDE

**DISADVANTAGE**
- POOR RETENTION
FILLED VS UNFILLED SEALANTS

- Penetration important in sealant application and retention; is inversely proportional to viscosity, therefore it can be reasoned that an unfilled resin will penetrate deeper into the fissure (ex Guardian Seal 30% filled).

- Unfilled sealant will abrade rapidly (24-48hrs) if it is left in occlusion with an opposing cusp tip.

- Filled sealant may require occlusal adjustment included as a routine part of the application procedure.
COLORED VS CLEAR SEALANTS

- OPAQUE IS EASIER TO DETECT AT RECALL
- LATEST TREND IS TO INCORPORATE COLOR CHANGE INTO POLYMERIZATION OR CURING PHASE
USE OF INTERMEDIATE BONDING LAYER

- Bonding agent under sealant on wet contamination yields bond strengths equivalent to the bond strength obtained when sealant is bonded directly to clean etched enamel.

- When saliva is air dried onto the surface there was no significant difference in bond strengths whether or not a bonding agent was used.

- Mixed studies.
FLOURIDE RELEASING SEALANTS

- Initial attempts to incorporate flouride into Bis-GMA sealants were disappointing.
- Incorporated flouride was trapped within the inert sealant material and unavailable for release.
- Ion exchanging resins were then developed; have relatively high flouride content and exchange flouride ions from the sealant material for hydroxyl and chloride ions in the oral environment.
- Mixed studies.
CLINICAL TECHNIQUE

- CLEANSE THE TOOTH SURFACE
  - FLUORIDE FREE PUMICE
  - AIR POLISHING DEVISE
  - ENAMELPLASTY

- ISOLATE TOOTH SURFACE FROM SALIVARY CONTAMINATION
  - RUBBER DAM
  - COTTON ROLL ISOLATION
- Acid-etch tooth surface with 37.5% PA gel etch (15-20 sec)

- Rinse and dry etched tooth surface
  - Rinse with air-water 10-20 sec
  - Dry 5-10 sec
DRIED ETCHED ENAMEL SHOULD HAVE A FROSTY WHITE APPEARANCE

APPLY SEALANT TO ETCHED TOOTH SURFACE
- ALLOW TO FLOW INTO PITS AND FISSURES
- MOVE SEALANT INTO SECONDARY AND SUPPLEMENTAL FISSURES
- APPLY VISIBLE LIGHT 10-20 SECONDS ACCORDING TO MANUFACTURER/ALLOW TO AUTOPOLYMERIZED
EXPLORE THE SEALED TOOTH SURFACE
  ○ CK ALL PITS AND FISSLURES
  ○ CK FOR VOIDS
  ○ APPLY ADDITIONAL MATERIAL AS NEEDED
  ○ UNISOLATE

PERIODICALLY REEVALUE AND REAPPLY SEALANTS AS NECESSARY
Areas of concern

- Retention rates on buccal pits and grooves of mandibular molars and distolingual grooves of maxillary molars
- Sealants need periodic maintenance
  - Moisture contamination secondary to incomplete eruption and difficulty in isolation - predicted 30% failure rate within 5 years in these areas.
  - Marginal integrity and wear.
PREVENTIVE RESIN RESTORATIONS

- Used for restoring isolated pits and fissures and simultaneously preventing caries in the remaining unaffected pits and fissures.

- Involves widening the pits and fissures and removing the enamel or dentin affected by caries.

- Depending on the extent of this removal, either an unfilled or a filled resin material is placed over the remaining intact pits and fissures as well as over the restored pits and fissures.
Preventive Resins Restorations

Indications

- Tooth can be isolated.
- No, or only minimal pit and fissure staining
- Minimal “catches” in the grooves, or areas with distinct incipient enamel caries.
- No evidence of radiographic caries.
Preventive Resin Restorations

- **Type A**
  - Caries is incipient and limited to enamel
  - No radiographic caries

- **Type B**
  - Caries extends minimally into dentin and is small and confined
  - No radiographic findings

Many clinical situations can not be classified according to type until the operator has completed the required exploratory preparation.
PRR “A” vs. PRR “B”

Type A

Type B
Preventive Resin

- Remove decalcified pits and fissures with a slow speed 1/4 or 1/2, or with a HS330FG

- Examine all margins for remaining caries.

- If caries remains, consider anesthetizing and placing conventional restoration; otherwise proceed in the following manner:
Preventive Resin “A”

- Etch surface for 15 seconds
- Wash for 10 seconds and dry
- For lesions which are completely within enamel, restore in the same manner as described for sealants.
- Air dry
- Place sealant
- Cure for 20 seconds
- Adjust occlusion if necessary
Preventive Resin “B”

- If caries extends to dentin:
  - Anesthesia?
  - Etch for 15 seconds
  - Rinse for 10 seconds and dry.
Preventive Resin “B”

- Apply bonding agent (lightly air dry if needed) and light cure for 10 seconds

Depending upon the extent of dentin involvement, DBA’s should be considered!
Preventive Resin “B”

- Place composite into prep, and cure
- Flowable compomer; flowable composite; composite or compomers may be used as needed
Preventive Resin “B”

- Examine margins for integrity
- Place sealant material, cure and adjust occlusion if necessary
THE END