Dental Caries

- Etiology
- Pathogenesis
- Prevention
- Remineralization

Dental Caries - Etiology

- Susceptible Host – **TOOTH**
- Microflora with cariogenic potential – **PLAQUE**
- Suitable Substrate – Dietary **Carbohydrate**

Caries - Questions

- Streptococcus mutans is considered to be a principal agent of caries because it produces organic acids and it?
  a) Forms a gelatinous matrix
  b) Metabolizes substrate from saliva
  c) Derives energy from enamel constituents
  d) Lives symbiotically with Lactobaccilus acidophilus

Dental Caries - Pathogenesis

- **Zones of Carious Dentin:**
  - Zone 1: Normal Dentin
  - Zone 2: Sub-transparent Dentin: zone of Demineralization created by the acid from caries. No bacteria found. Capable of remineralization.
**Dental Caries – Prevention and Remineralization**

- OHI
- Sealants
- Flouride

**Amalgam Composition**

- Historically Amalgam alloy powder:
  - 65% – Silver
  - 29% – Tin
  - 6% – Copper

- High Copper Alloys: 6% – 30%: Hardens and strengthens the alloy.

- Zinc: Not exceeding 1% wt.: Alloys with more zinc are more brittle.
  Function of zinc is as a deoxidiser

**Amalgam**

- Admixed: Spherical silver – copper eutectic alloy particles (71.9 wt% Ag and 28.1 wt% Cu) added to lathe-cut low copper amalgam alloy particles.

**Amalgam - Questions**

- Which metal is added to amalgam alloy powder to prevent expansion?
  - Zinc

- You would use large condenser and lateral condensation in which alloy?
  a) Lathe cut
  b) Admixed
  c) Spherical
  d) High copper
  e) Low copper

- Over-trituration of High Copper Amalgam has what effect?
  - Decreased working time

**Amalgam - Questions**

- Due to mesial concavity of the maxillary first premolar, prior to condensation of the amalgam, the tooth is best prepared with?
  a) Wedge only
  b) Matrix only
  c) No wedge nor matrix needed
  d) Custom made wedge and matrix

- Restoration of a cusp using dental amalgam requires that?
  a) All the enamel be removed from the cusp to provide bulk of amalgam
  b) Only the enamel be removed to conserve tooth structure
  c) At least 2 mm of the cusp be removed to provide retention form
  d) At least 2 mm of the cusp be removed to provide resistance form
  e) A reverse bevel be provided on the cusp to provide retention form
Composite

- **Matrix**: a resin material that binds fillers particles
- **Fillers**: Reinforcing particles dispersed in matrix
- **Coupling agent (Silane)**: Bonding agent that promotes adhesion between filler and resin matrix

**Composite Composition**

- **Resin Matrix**: Bis-GMA, TEGDMA, UDMA

**Composite Composition**

- **Fillers**: Produced by grinding or milling quartz or glass

**Advantages**:
- Increased hardness, strength and decreased wear
- Reduction in polymerization shrinkage
- Reduction in thermal expansion and contraction
- Increased workability by increased viscosity
- Reduction in water sorption, softening and staining
- Increased radiopacity

**Classification of Composites**

<table>
<thead>
<tr>
<th>Composites Group</th>
<th>Particle Size</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traditional hybrid</td>
<td>1-20 microns glass</td>
<td>High-stress areas requiring increased hardness and strength</td>
</tr>
<tr>
<td>Hybrid large particle</td>
<td>0.3-10 microns glass</td>
<td>High-stress areas requiring increased hardness and strength</td>
</tr>
<tr>
<td>Hybrid: quartz</td>
<td>0.3-10 microns glass</td>
<td>High-stress areas requiring increased hardness and strength</td>
</tr>
<tr>
<td>Hybrid: nonsilica</td>
<td>0.3-6 microns glass</td>
<td>Moderate-stress areas requiring increased hardness and strength</td>
</tr>
<tr>
<td>Hybrid: glass</td>
<td>0.1-2 microns glass</td>
<td>Moderate-stress areas requiring increased hardness and strength</td>
</tr>
<tr>
<td>Flowable hybrid</td>
<td>0.04 microns silica</td>
<td>Situations in which improved flowability is required</td>
</tr>
<tr>
<td>High-stress hybrid</td>
<td>0.1-20 microns glass</td>
<td>Situations in which increased flowability and lower shrinkage are required</td>
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**Composites – Questions**

- The component common to most composite resins, sealants, bonding and glazing agents, and resin cements for orthodontic bands is?
  - a) Inorganic filler
  - b) Benzoyl methyl ether
  - c) Poly methylmethacrylate
  - d) Bisphenol A – glycidylmethacrylate

- Each of the following determines the outline form for a Class 3 composite restoration. Except one:
  - a) Convenience for access
  - b) Extension for prevention
  - c) Size, shape and location of caries

- Classification of Composites

- **Composite Composition**

- **Coupling Agents**
  - a) Titanates
  - b) Zirconates
  - c) Organosilanes like methacryloxypropyl trimethoxysilane
**Dental Cements**

<table>
<thead>
<tr>
<th>Material</th>
<th>Formulation</th>
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</thead>
<tbody>
<tr>
<td>Zinc Phosphate</td>
<td>Powder: Zinc phosphate &amp; magnesium oxide</td>
</tr>
<tr>
<td></td>
<td>Liquid: Phosphoric acid</td>
</tr>
<tr>
<td>Zinc oxide-eugenol</td>
<td>Powder: Zinc oxide</td>
</tr>
<tr>
<td></td>
<td>Liquid: Eugenol</td>
</tr>
<tr>
<td>Zinc oxide – eugenol (EBA modified)</td>
<td>Powder: Zinc oxide</td>
</tr>
<tr>
<td></td>
<td>Liquid: Eugenol &amp; ethoxybenzoic acid</td>
</tr>
<tr>
<td>Zinc polycarboxylate</td>
<td>Powder: Zinc oxide &amp; magnesium oxide</td>
</tr>
<tr>
<td></td>
<td>Liquid: Polycrylic acid</td>
</tr>
<tr>
<td>Glass Ionomer</td>
<td>Powder: Fluoride aluminum silicate glass</td>
</tr>
<tr>
<td></td>
<td>Liquid: Polycrylic acid, polybasic carboxylic acid, water</td>
</tr>
</tbody>
</table>

**When do you clean zinc phosphate cement from crown margins?**

a) Immediately 

b) 4 hours after the cement has set 

c) After the cement has set completely 

d) The next day

**You can decrease the strength of ZOE by adding?**

a) Ethoxybenzoic acid 

b) Acrylic 

c) Petroleum 

d) Cotton fiber

**ZOE is a good temporary restoration because?**

a) Less irritant 

b) Increased strength 

c) Good seal 

d) Antibacterial

**Which of the following is not recommended under a composite restoration?**

a) Zinc phosphate 

b) Glass Ionomer 

c) ZOE 

d) Calcium hydroxide

**Which of the following is not an advantage of resin based GIC over water based GIC?**

a) Better fluoride release 

b) Better bonding 

c) Better esthetics 

d) Easier for manipulation

**Rubber Dam**

**Best method to isolate the operating field**

**Standard of care in performing endodontics**

**Punch holes at appropriate distance:**

- Punching holes too far apart would result in wrinkling of rubber dam 

- Punching holes too close may damage gingival papilla

**Which Rubber Dam provides most retraction of soft tissue?**

a) Woodbury 

b) Young 

c) Both are the same 

**To remain stable, a rubber dam clamp must contact the anchor tooth gingival to the height of contour. Which other criterion must the clamp satisfy?**

a) All four points must be sharp 

b) All four points must contact the tooth 

c) The bow must be directed to the distal side of the tooth
Mechanical Properties of Dental Materials

- **Elastic Modulus**: Modulus of Elasticity or Young’s modulus; Relative stiffness of a material.
- **Proportional limit**: Maximum stress at which stress is proportional to strain and above which plastic deformation occurs.
- **Yield strength**: The stress at which a test specimen exhibits a specific amount of plastic strain.

**Mechanical properties**

- A restorative material that has high proportional limit, compared with one with lower proportional limit, invariably has:
  a) Greater ductility
  b) Greater toughness
  c) A higher modulus of elasticity
  d) **More resistance to permanent deformation**

**Instruments**

- **Four-numbered instrument**:
  1. # - width of blade in tenths of mm
  2. # - angle of cutting edge of blade with long axis of handle
  3. # - length of the blade in whole mm
  4. # - angle that blade forms with long axis of the handle

**Instruments**

- Which of the following instruments should be used to plane the facio-proximal cavosurface margin of a standard Class 2 preparation on a mandibular molar?
  a) Straight chisel
  b) Bin-angle chisel
  c) **Enamel hatchet**
  d) Bibeveled hatchet

**Instruments**

- Chisels are primarily used to cut
  - **Enamel**

**Instruments**

- Difference between gingival marginal trimmer and hatchet?
  - **Angulation of blade**

**Miscellaneous**

- The best and most effective way to remove stained mottled enamel?
  a) Home bleaching
  b) **Microabrasion technique**
  c) Office bleaching
  d) Walking bleach

- Why should the wax pattern be washed by soap water before it is inserted?
  - **Increase surface wetting ability**
Which of the following deciduous teeth has the highest incidence of caries?

a) Distal of canine
b) Mesial of first molar
c) Distal of first molar
d) Mesial of second molar
e) Distal of second molar