

# Preclinical dentistry I.

## Temporary filling materials



# Fillings – classification acc.to consistency

- Plastic (soft) fillings:

Are placed into the cavity in soft consistency, in the cavity the setting takes place

- Rigid fillings (inlays, onlays)

Are made in the dental laboratory, are luted into the cavity using luting materials



# Classification of fillings and filling materials

- Temporary filling materials

Are placed into the cavity for the limited time – days, weeks.

- Permanent filling materials

Are placed into the cavity for unlimited time.



# Temporary filling materials

- For temporary closure
  - for period of fabrication of rigid filling
  - in case of inflammation of gingiva (premanent filling can not be fabricated due to the bleeding)
  - for expectation
  - for separation of ingrowth gingiva
  - for lack of the time
  - for closure of the cavity in case of medicaments



# Temporary filling materials

- Zinkoxid sulphate cement
- Guttapercha
- Zinkoxid eugenol paste and cement
- Zinkoxid phosphate cement
- Zinkoxid polyacrylate cement
- One component materials based on gypsum and organic pastes
- One component resin materials



# Zincoxid sulphate cement (Fletcher)

- Powder: Zinc oxide, zinc sulphate.
- Liquid: distilled water.
- Principle of setting: Hydratation of components of a powder.
- Properties: Non toxic material, good retention in the cavity
- Purpose: Temporary filling material (1 – 2 weeks)  
Nowadays this cement has been replaced with one component temporary filling materials ready to use. These material usually consist of gypsum and resin and water accelerate their setting.



# One component materials based on gypsum and resin

- Provimat HV (Spofadental, ČR)
- Cavit (Espe, Německo)
- Litark (LASCOD, Itálie)
- Proviso (M+W Dental, Německo)





Cavit™ for fillings with occlusal loading, increased hardness  
Cavit™ W for postendo treatment, lower hardness, enhanced adhesivity  
Cavit™ G temporary for the period of the fabrication of inlays, can be removed without any bur





# Zincoxid eugenol paste

Powder: Zinc oxide

Liquid: clove oil or eugenol or mixture



# Zinkoxid eugenol cement

- Powder

- Zinc oxide (69,3%)
- Colophony (29,3%)
- Zinc stearate(1,0%)
- Zinc acetate (0,7%)

- Liquid:

- Eugenol 85%, olive oil 15%



# Zinkoxid eugenol cement

- Modification
- Powder:
  - Zincoxid (80%) or 70% zincoxid and 10% alumina
  - Methylmetacrylate resin (20%)
  - Zinc stearate (1,0%)
  - Zinc acetate (0,7%)
- Liquid:
  - Eugenol or eugenol (37,5) plus 62,5 EBA (etoxybenzoic acid)



# Zinkoxid eugenol based sealers – root canal fillings

## Powder:

- Zinc oxide (41%), silver, colophony, thymol

## • Liquid:

- Eugenol



# Zinkoxid eugenol cement



Powder

70% Zinc oxide

10-15% natural and artificial resins

1% accelerators (Zinc acetate, zinc stearate)

5-10% anorganic filler –  
Glass or quartz))

Liquid

85 %Eugenol, olive oil



# Zinkoxid eugenol cement - properties

- Biocompatibility
- Antiseptic
- Small volume changes during the setting
- Good thermal isolation
  
- Difficult mixing
- Inhibition the curing of the composite materials and adhesives

*Pressure resistancy max 35 MPa*



# Zinkoxideugenol cement

## Principle of the setting

- Zinc eugenolate is a result of the reaction between eugenol and zinc oxide.
- EBA also reacts with zinc oxide.
- A chelation reaction in which amorphous, zinc eugenolate is formed.
- The setting is accelerated with water and higher temperature



# Zinkoxid eugenol cement

## Mixing

During mixing is important to bring as much as possible powder into the liquid. The consistency is like dough, not sticky.

- Application:

With the dry spatula to the dry cavity  
Moisture accelerates setting





# Zinkoxid eugenol cement

## Indication

- Expectative filling, often in combination with calcium hydroxide
- Root canal filling in primary teeth (resorption)
- Sealers in endodontics can contain ZOE cement
- Surgical dressing in periodontology
- Temporary luting material
- Root canal filling material in apical surgery



# Non eugenol cements – oil cements

- Powder
- Zinc oxide
- Liquid:
- Aromatic oil, olive oil, white vaseline, oil acid and bee wax.



# Zincoxid phosphate cement, zinc phosphate cement

- Powder:

Zinc oxide (90%) magnesium oxide(8,2 -10%)

Admixture of silicium dioxide, bismuthum trioxide, baryum oxide, calcium oxide, baryumsulphate

## Liquid:

- Ortho phosphoric acid aqueous solution –(50% - 60%)

Orthophosphoric acid is buffered by adding aluminium and sometimes zinc), water (usually 1/3 of water).



# Zincoxid phosphate cement

- Principle of the setting

When the powder is brought into contact with the liquid the surface of alkaline powder is dissolved by the acid liquid, resulting in an exothermic reaction. The set zinc phosphate cement is a hydrated amorphous network of zinc phosphate that surrounds incompletely dissolved particles of zinc oxide.

- Properties

- Mechanical resistance odolnost (strength up to 100 MPa)
- Acidity – decreases during the setting
- Setting is exothermic reaction
- Solubility in saliva
- Good adhesion to the dry walls of the cavity
- Shrinkage during setting



# Zincoxid phosphate cement - indications

- Temporary filling, that is not next to dental pulp (pH)

Initial acidity during setting may cause a pulpal response when there is only thin layer of dentin between the cement and the pulp. Therefore zinc phosphate cement is not recommended in deep cavities.

- Base (thermal isolation)
- Luting material
- Root canal filling before apical surgery (obsolete)

## Products

- Adhesor Normal, Adhesor Rapid (Spofadental, ČR)
- Harvard phosphate cement (Harvard, Germany)



# Zincoxid phosphate cement -mixing

- On the rough side of the glass mixing block. Stainless steel spatula must be use, the powder is being admixed gradually. The consistency must be homogenous.
- Setting 2 – 4 min or 4 – 6 min. (rapid, normal)



# Zincoxid phosphate cement can be mixed to two consistencies

Putty: temporary filling, base

Cream: root canal filling, luting material (for crowns and bridges)



# Zinc polyacrylate cement (zinc polycarboxylate, zinkoxid polycarboxylate)

Powder:

Identical with the powder of zincoxid phosphate cement, finer grained

Liquid:

Polyacrylic acid





# Zinc polyacrylate cement (zinc polycarboxylate, zinkoxid polacarboxylate)

## Setting:

Zinc polyacrylate is formed

Higher temperature accelerates the setting, lower temperature decelerates the setting.



# Zinc polyacrylate cement (zinc polycarboxylate, zinkoxid polacarboxylate) - mixing

- On the smooth side of the glass mixing block with the stainless steel spatula.



# Zinc polyacrylate cement (zinc polycarboxylate, zinkoxid polacarboxylate)

Comparison with the zinc oxide phosphate cement

Setting 7-9 min

The thickness of the film is bigger

Resistance in the pressure is lower

- The acidity is lower – more friendly to dental pulp
- No exothermic reaction
- Bonding to enamel and dentine
- Lower permeability



# Zinc polyacrylate cement (zinc polycarboxylate, zinkoxid polycarboxylate) - indication

- Base
- Luting
- Root canal filling – rarely
  
- Products:  
Adhesor Carboxy  
Adhesor Carbofine (Both Spofadenta, CZ)



# Guttapercha

- Guttapercha

Dried juice from the tree *Isonandra gutta* (percha).

Chemically similar to caoutchouc

Crystalline structure, thermoplastic



# Guttapercha

- Beta phase – room temperature
- Semisolid consistency
  
- Alpha phase 42° – 49° C
- Plastic
- Gamma phase 56° – 62° (amorphous)

Expansion by heating, contraction by cooling

- Slow cooling (0,5°/min) – remain in the alfa phase also by room temperature
- Faster cooling – beta phase again



# Guttapercha as a temporary filling

Is mixed with zinc oxide (4 – 7:1)

- Small sticks –for heating, application with dry condensor. The closure is not hermetic, filling can be removed in one piece with the probe. Good solution for the period when inlay is being made.



# Guttapercha for endodontics

Guttapercha 19% – 22%

Zinc oxide 59 - 79%

Heavy metal salts 1% - 7%

Wax or resine 1% - 4%

- Material for root canal filling in combination with the sealer. It is available as guttapercha cones or in cartridges.





# Light curing temporary materials

- These resin based materials are cured by light curing unit, they have semisolid consistency and the same indication as guttapercha for the temporary filling (not for the root canal treatment). They do not close the cavity hermetically and can be removed in one piece.

