Cavity preparation basic rules

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Preparation of dental caries
(cavity preparation)

- Instrumental treatment that removes dental caries
- The rest of the tooth must be restorable with filling materials
- The rest of the tooth as well as the filling must be resistant against occlusal forces
- The risk of secondary caries must be minimized

Basic rules

Acces to the cavity

Preparation of cavosurface margin and

Extention for prevention

Retention of the filling

Resistance of the restored tooth

Excavation of carious dentin

Finishing of the walls

Final control (light, mirir, magnification)

Basic rules

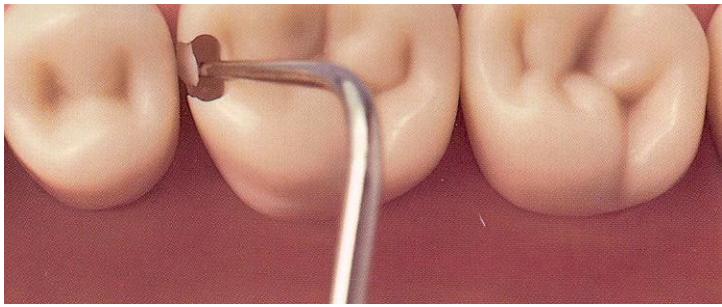
Acces to the cavity

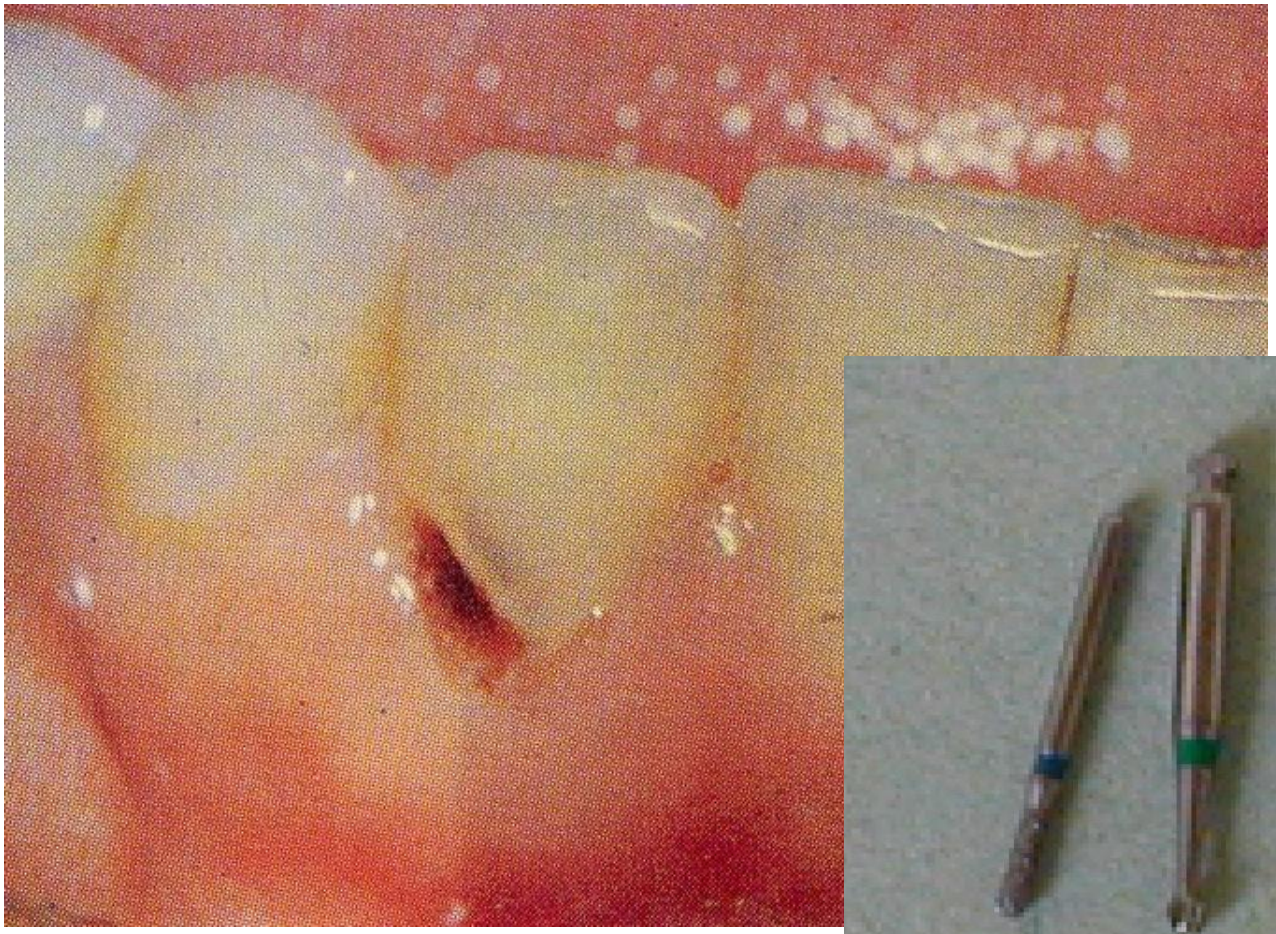
Preparation through the hard dental tissues

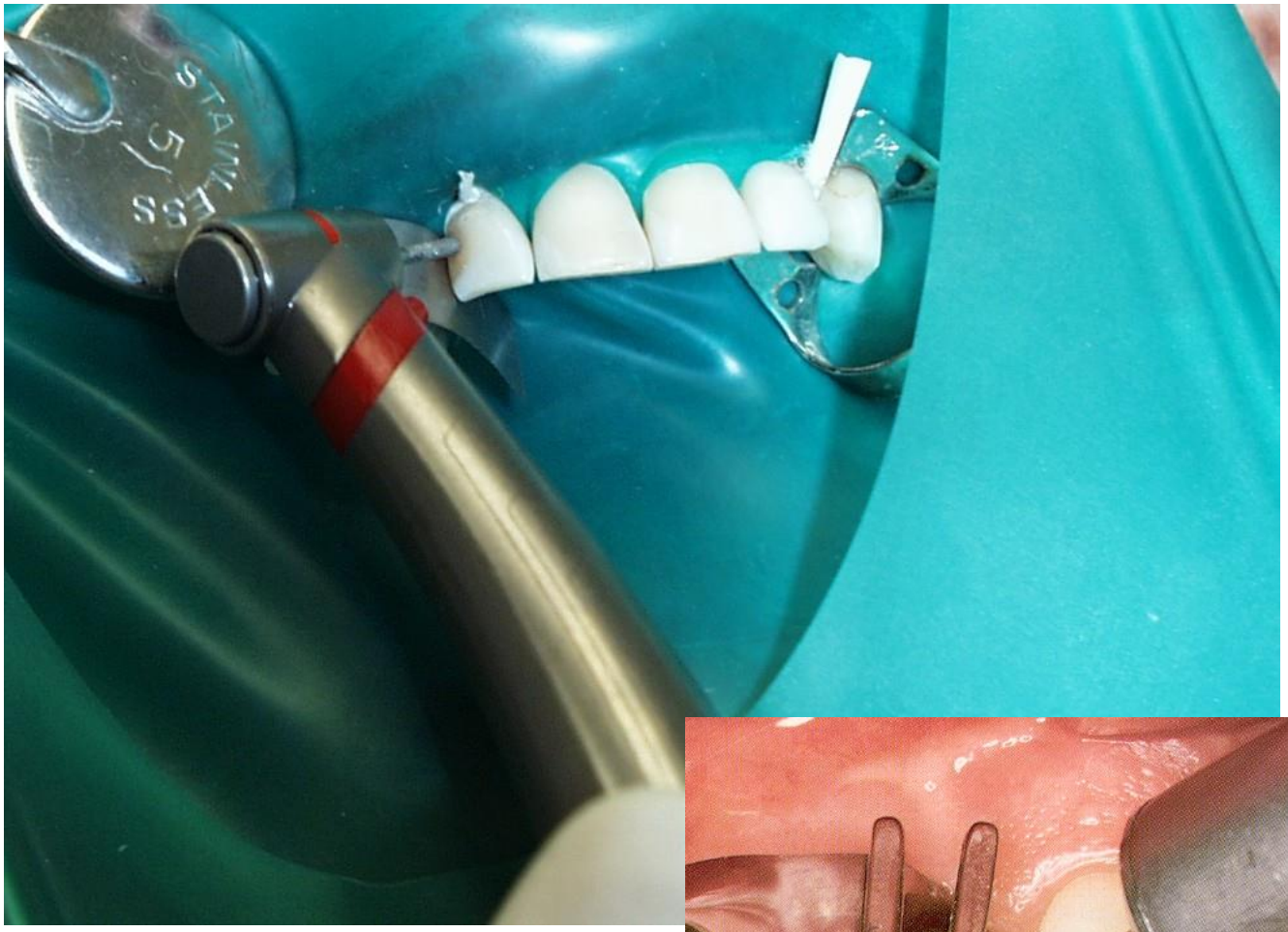
Removal the undermined enamel

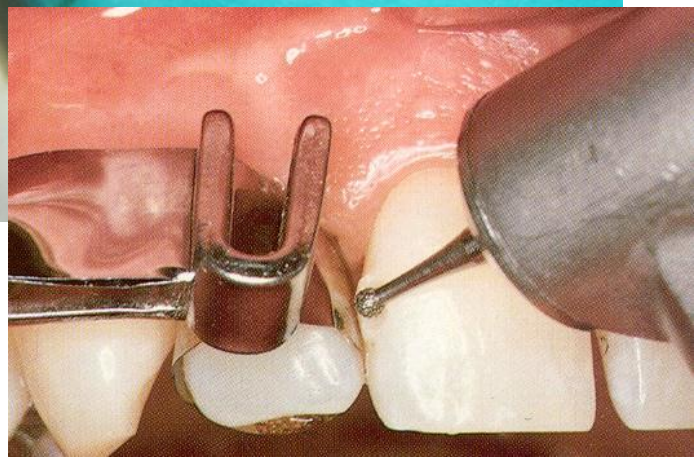
Separation of teeth

Separation or removal of gingiva

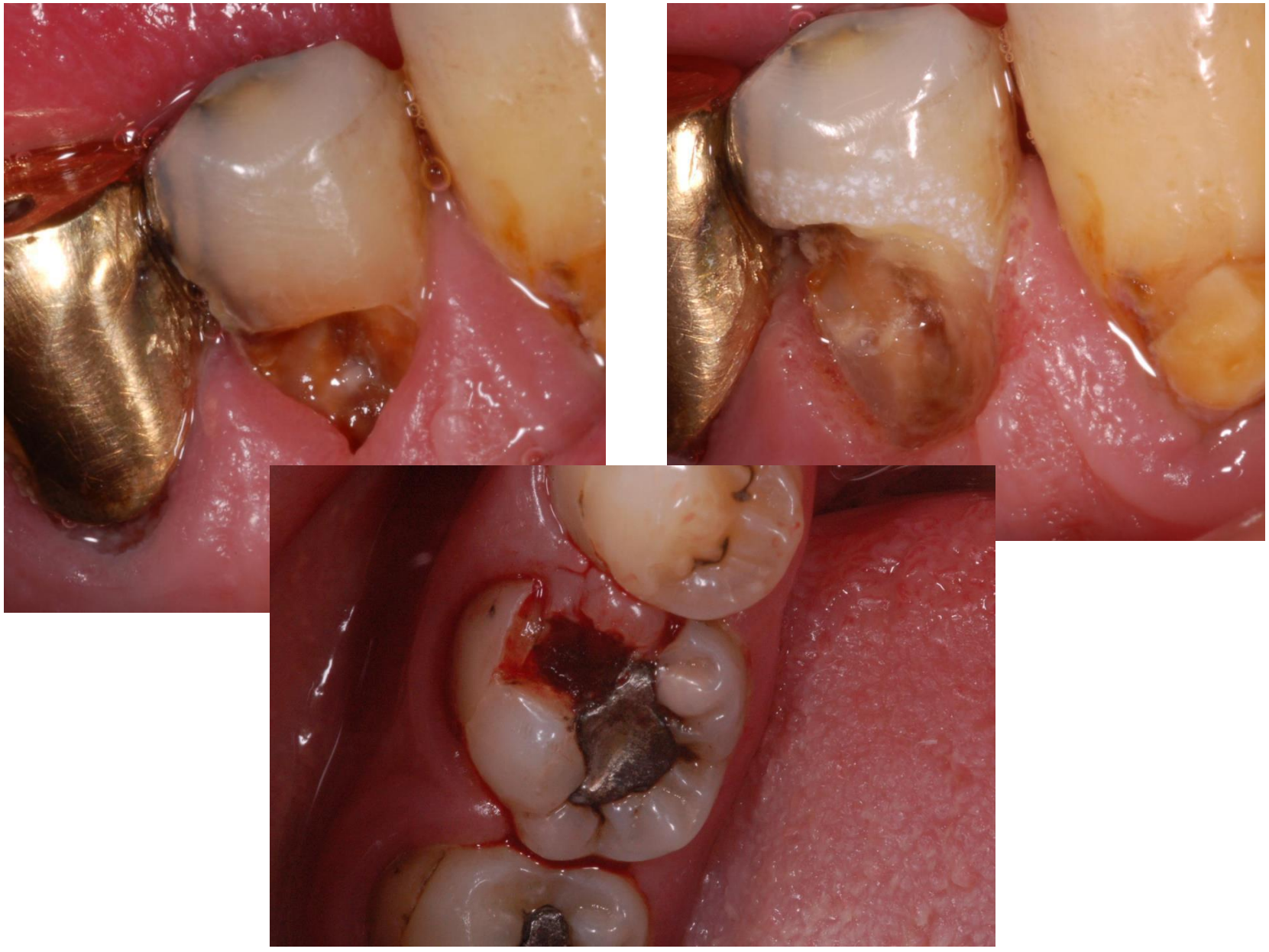








Odstranění staré výplně



Basic rules

Preparation of cavity borders and **extention for prevention (Cavosurface margin)**

Depends on

Dental material

Oral hygiene

Precautions of secondary caries

Basic rules

Retention of the filling

Precautions of its lost

Macromechanical retention

Micromechanical retention

Chemical retention

Basic rules

Resistance of the restored tooth

Against occlusal and other forces

Depends on

- *Material*
- *Individual occlusal forces*

Basic rules

Excavation of carious dentin

Necessary (risk of recurrent caries)

Ball shaped (spheric) bur - slow speed (3000 rpm)

or

Excavator (hand instrument)

Basic rules

Finishing of the walls

Depends on the kind of material

- *Bevel or without bevel*
- *Fine diamond bur*

Basic rules

Final control

Direct or indirect view

Good illumination

Magnification

Preparation

- Hand

Excavator, cleaver

- Power driven

Burs, diamonds

Chisel – for enamel
Cleaver

Chisel for enamel

Excavator

Instruments for cavity preparation

Power driven (powered) instruments for cutting

- Rotary instruments

Comon design characteristics

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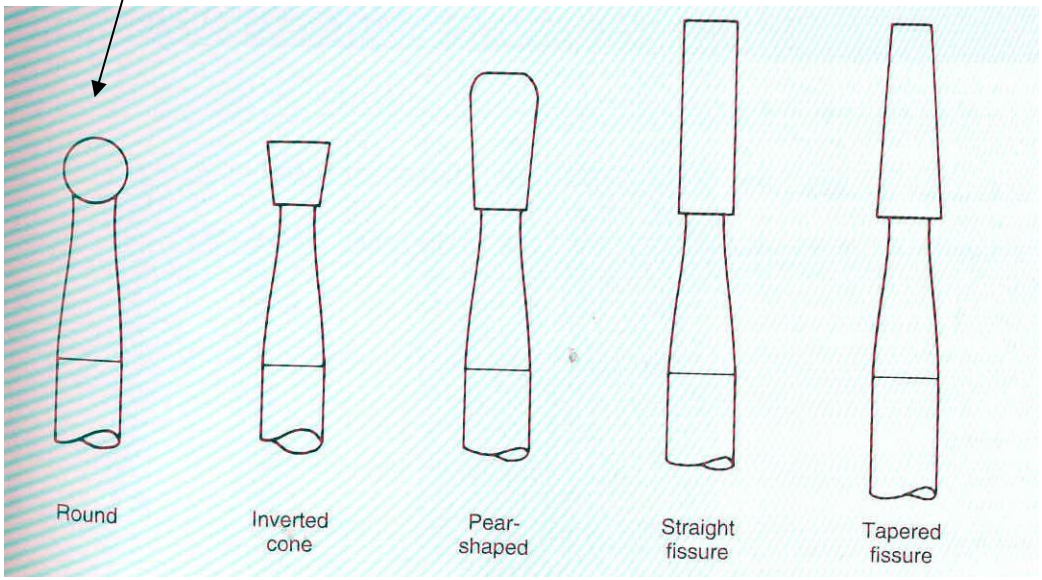
Cutting instruments - burs

Steel

Tungsten carbide

Cutting instruments – burs head shapes

Round (ball shaped)

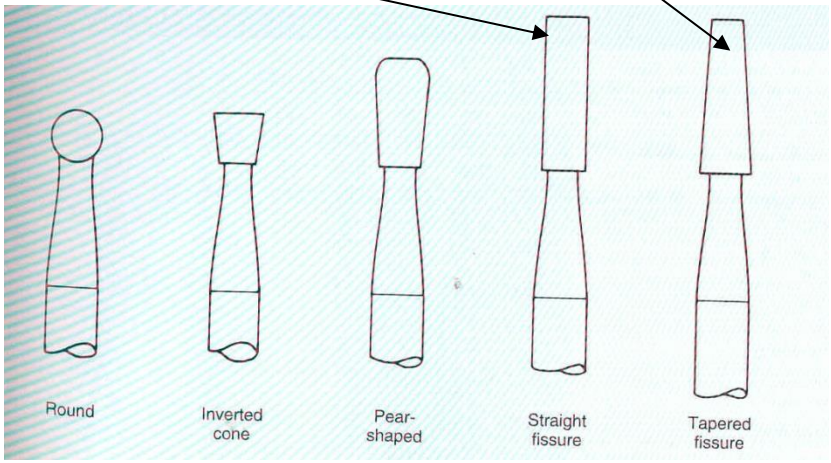


Cutting instruments – burs head shapes

Fissure with flat end

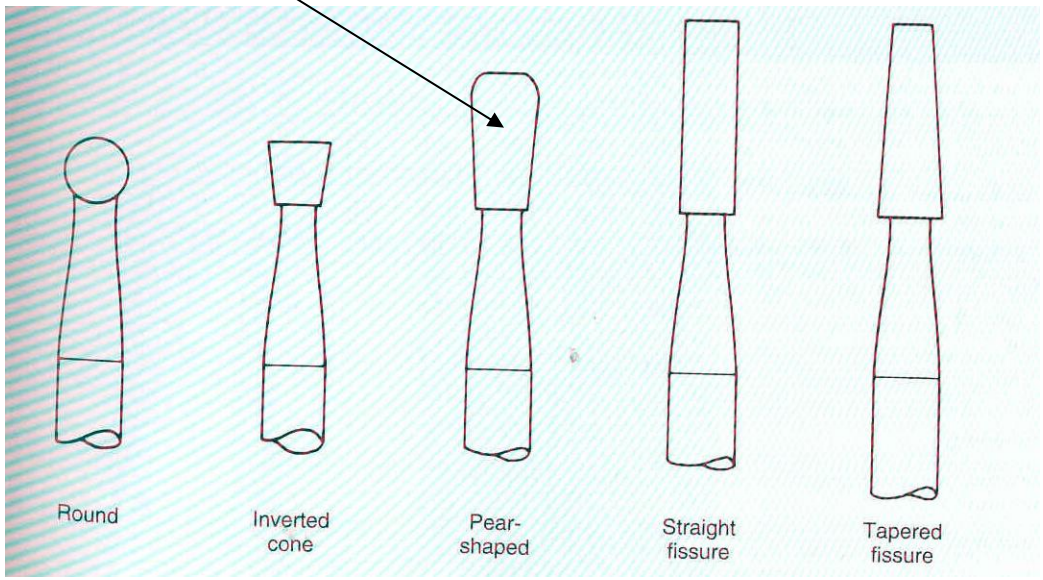
Fissure with pointed end

Straight or tapered form



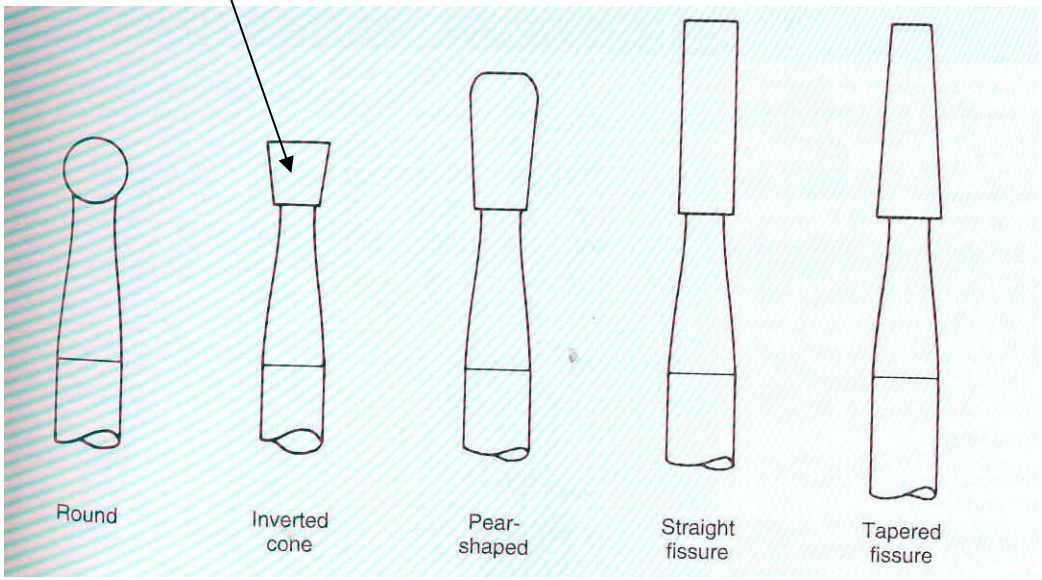
Cutting instruments – burs head shapes

Pear



Cutting instruments – burs head shapes

Inverted conus



Cutting instruments – diamonds

Extra coarse – black

Coarse – green

Standard – blue or without any marker

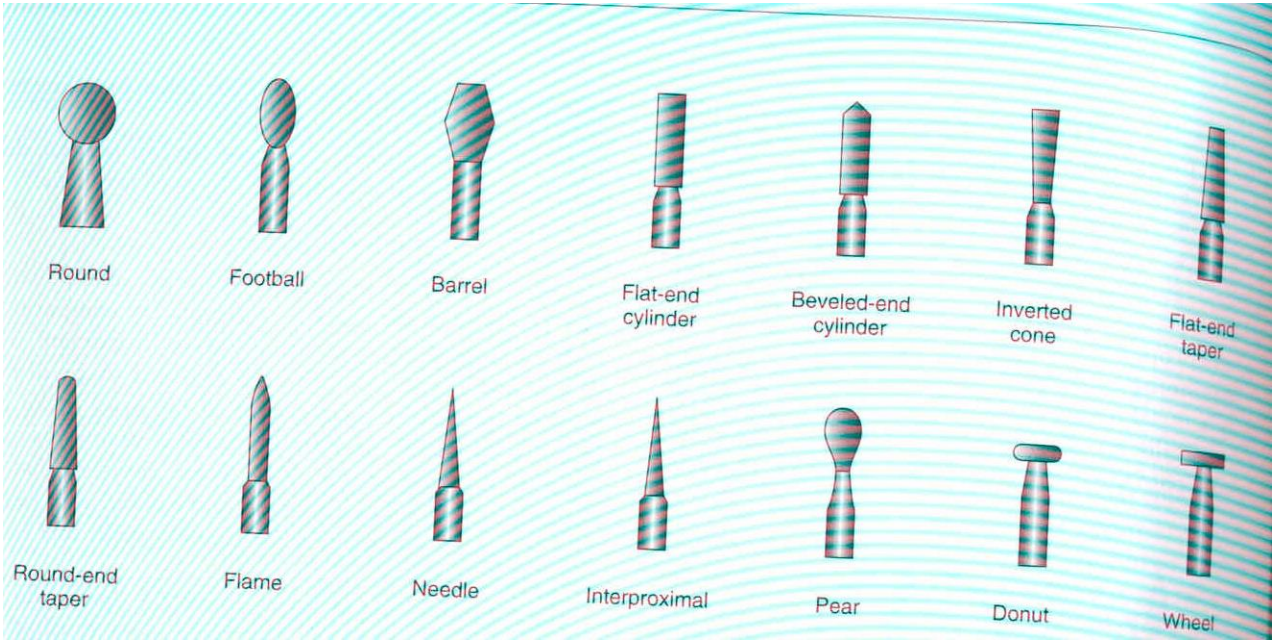
Fine - red

Extra fine - yellow

Ultrafine - white

Cutting instruments – diamonds head shape

- Ball, pear, cylinder,taper,flame, torpedo, lens and others…..



Hazards with cutting instruments

Pulpal precautions

Soft tissue precautions

Eye precautions

Ear precautions

Inhalation precautions

Filling materials

- Temporary
- Definitive, permanent

Temporary filling materials

- Zinkoxidsulphate cement and one component derivates
- Ziknoxidphosphate cement
- Zinkoxideugenol cement
- Polymer based materials
- Guttapercha

Permanent filling materials

Amalgam

Composites

Glasionomers

Amalgam

Amalgam

Metal-like restorative material composed of silver-tin-copper alloy and mercury.

Types of amalgam restorative materials

Low – Copper Amalgam (5% or less copper)

Composition – wt%

Silver	63 - 70 %
Tin	26 – 28 %
Copper	2 - 5%
Zinc	0 - 2%

Types of amalgam restorative materials

High – Copper Amalgam (13% - 30%) copper

Composition – wt%

Silver	40 - 70 %
Tin	26 – 30 %
Copper	2 - 30%
Zinc	0 - 2%

Particles of the alloy

- ✓ Irregulary shaped (filings - lathe cut)
- ✓ Microsphers
- ✓ Combination of the two.

Particles shape

High – Copper Amalgam

Microsphers of the same composition (unicompositional)

Mixture of irregular and spherical particles of different or the same composition (admixed)

Production of irregular particles

Metal ingrediences heated, protected from oxidation, melted and poured into a mold to form an ingot.

Phases of the alloy: (intermetallic compounds)

Ag_3Sn - γ

Cu_3Sn - ε

Cu_6Sn_5 - η

Ag_4Sn - β

Production of irregular particles

cooled slowly

Ingot heated at 400°C (6 – 8 hours)
(homogeneous distribution of Ag_3Sn)

Ingot cut on the lathe, particles passed trough a fine sieve and ball milled to form the proper particle size.

Aging of particles (60 - 100°C, 6 – 8 hours)

Particle size: 60 – 120 μm in length
10 – 70 μm in width
10 – 35 μm in thickness

Production of irregular particles

Molten alloy is spraying into water under high pressue

Irregulary shaped high-copper particles

Production of spherical particles

Molten alloy is spraying under
high pressue of inert gas through a fine
crack in a crucible into a large chamber

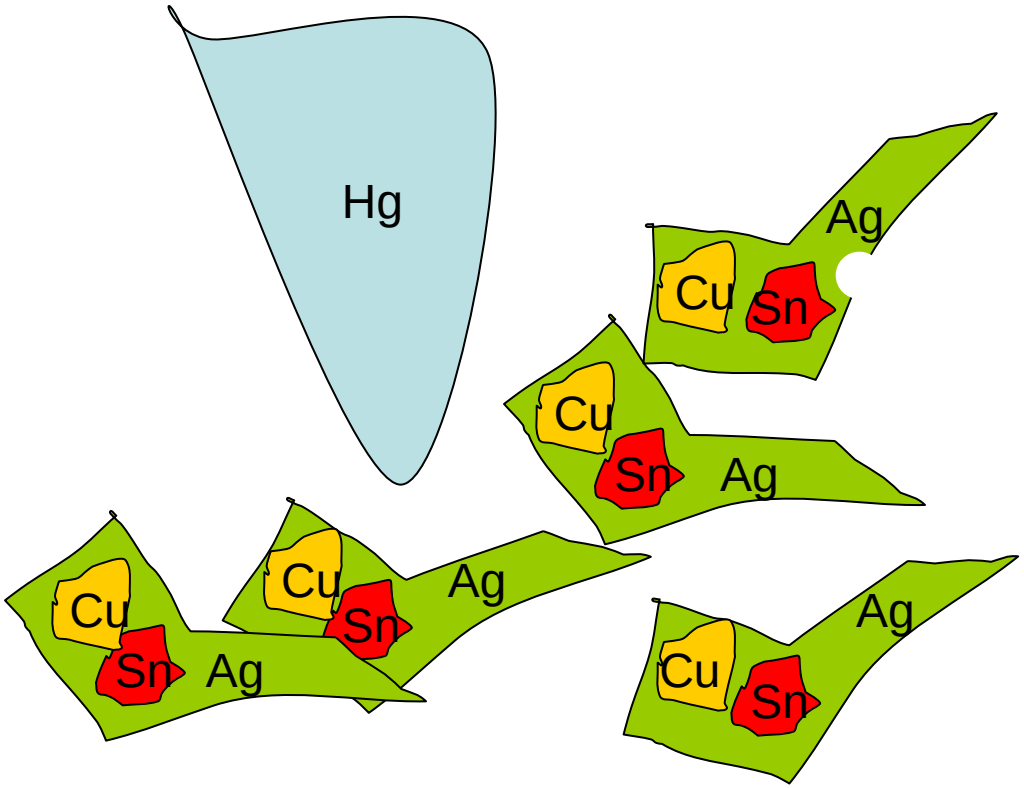
Diameter of the spheres: 2 – 43μm

Amalgamation processes

alloy is mixed with pure mercury

Trituration

Amalgamation processes



Ag_3Sn – γ

Cu_3Sn – ε

Setting of low copper amalgam

Principle of setting is crystallization

Structure of the amalgam filling

Ag-Hg: gamma 1

Sn-Hg: gamma 2

These phases crystallized

Gamma phase (Ag-Sn) does not dissolve completely

Risks of the gamma 2 phase

- Non stable
- Tin is released due to electrogalvanism in oral cavity and mercury from this phase reacts with remaining gamma phase.
- This is external electrochemical corrosion.

Low copper amalgam has worse mechanical and corrosion resistance than high copper amalgam

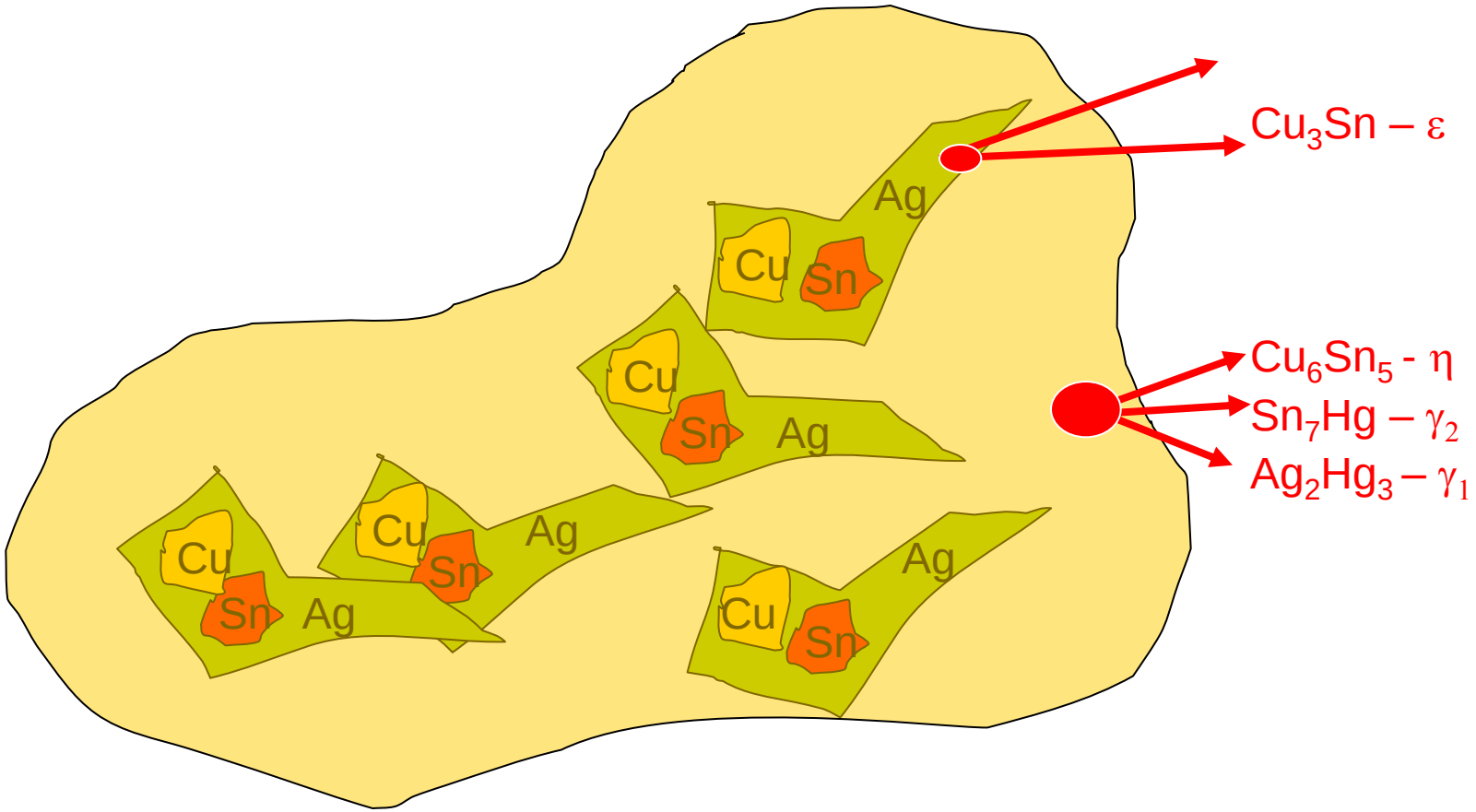
High copper amalgam

- Content of copper increased: 12 – 13%
- (less tin)

- Or up to 25% (Less tin and silver)

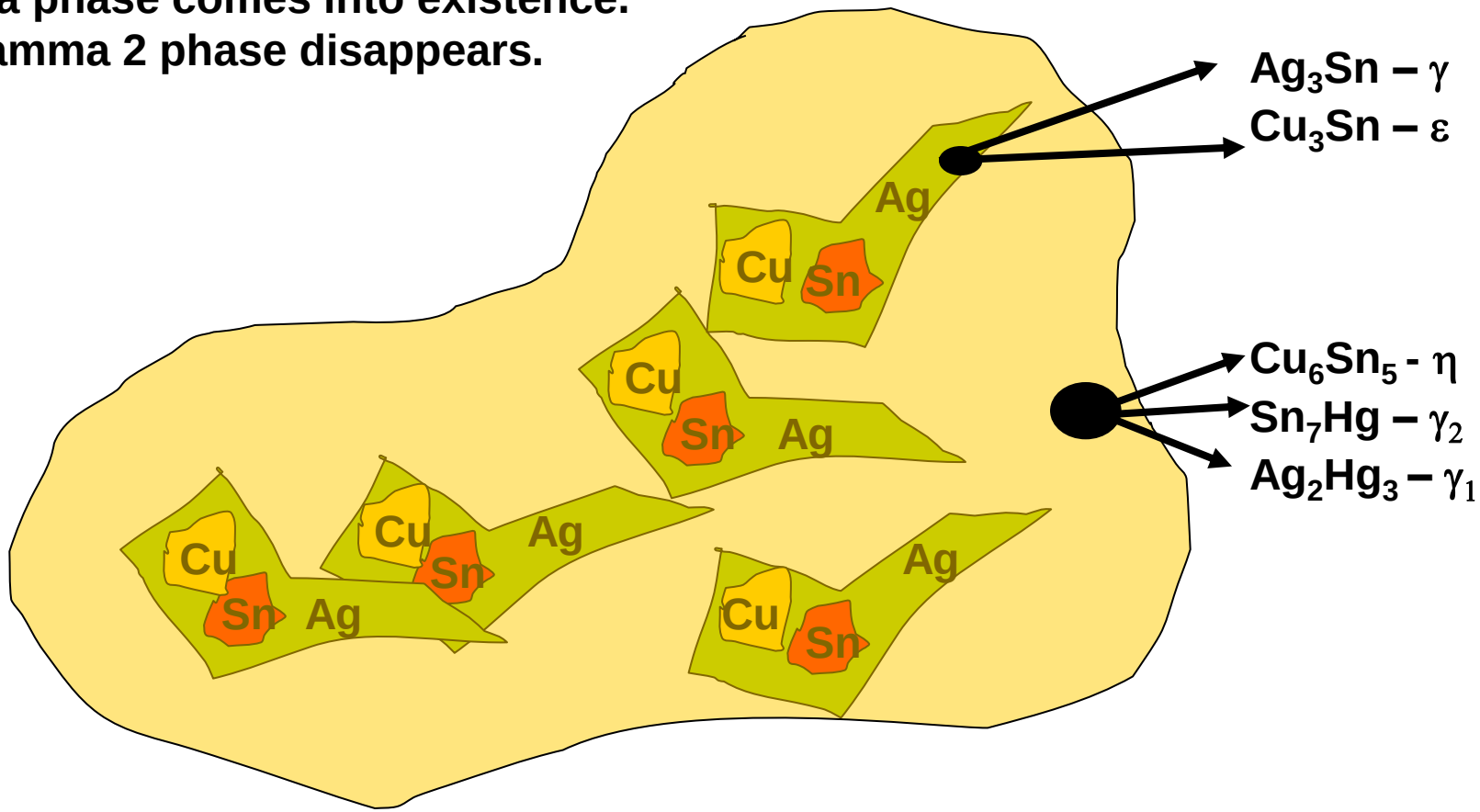
Better mechanical and corrosion resistance

Amalgamation processes



Amalgamation processes

High copper amalgam – copper dissolved in mercury has high reaction afinity to tin that is also dissolved in mercury. It reacts with tin in gamma2 phase and eta phase comes into existence.
The gamma 2 phase disappears.



Amalgam - properties

Amalgam

- **Wear and pressure resistance (2mm thickness ast least**)- brittleness
- **Easy handling**
- **Low price**
- **Thermal and electrical conductivity**
- **Corrosion**
- **Bad aesthetics**
- **Creep**
- **Flow**

Biocompatibility

- More than 160 years, more than 200 milions Ag fillings every year in USA.
- Allergy rare
- Precautions in children and in pregnancy.

AMALGAM IS STILL A MATERIAL OF CHOICE

Toxicity

- Organic compounds

Vapours, aerosol

Precautions

- Ventilation
- Rests of amalgam in water
- Amalgam separators
- Dangerous waste (180 110)

Indications and contraindications of amalgam

Indications

- Moderate and large cavities in posterior area (class I., II. V)

Contraindications

Fillings in frontal area

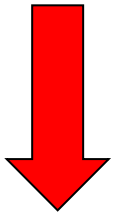
Pregnancy, children till the age of 15

Allergy

Mixing of amalgam

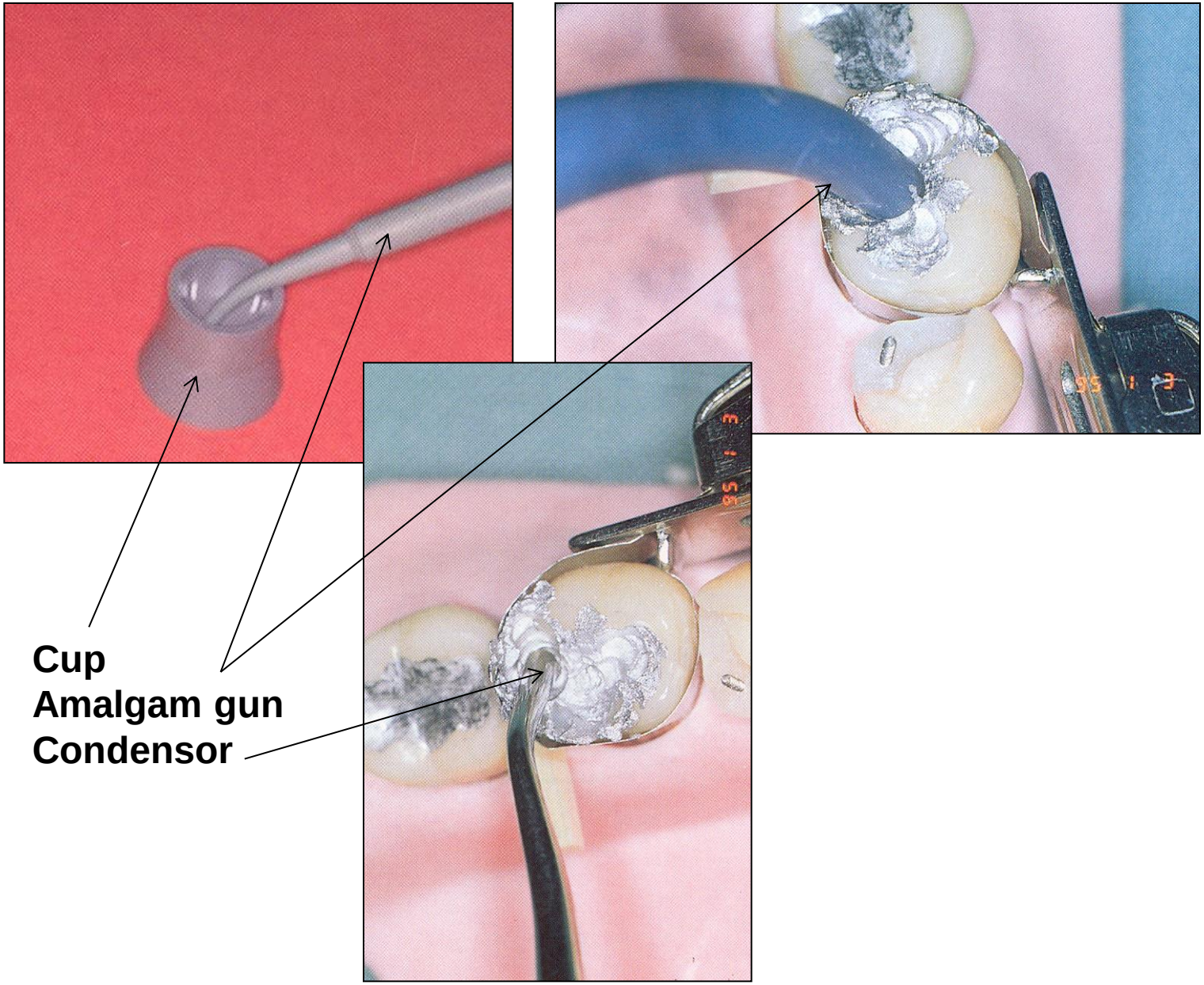
- **Hand mixing (obsolete)**

- **Power driven trituration**



Amalgamators

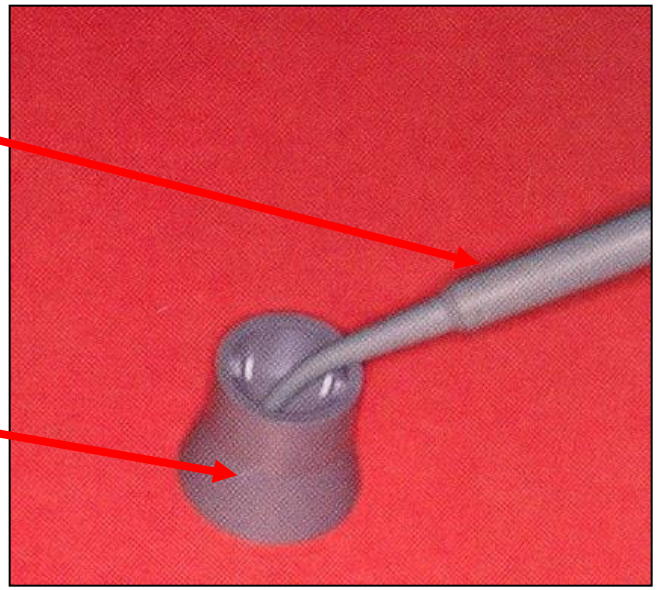

LARIOVIBRO
LARIO MEDICAL
Degussa

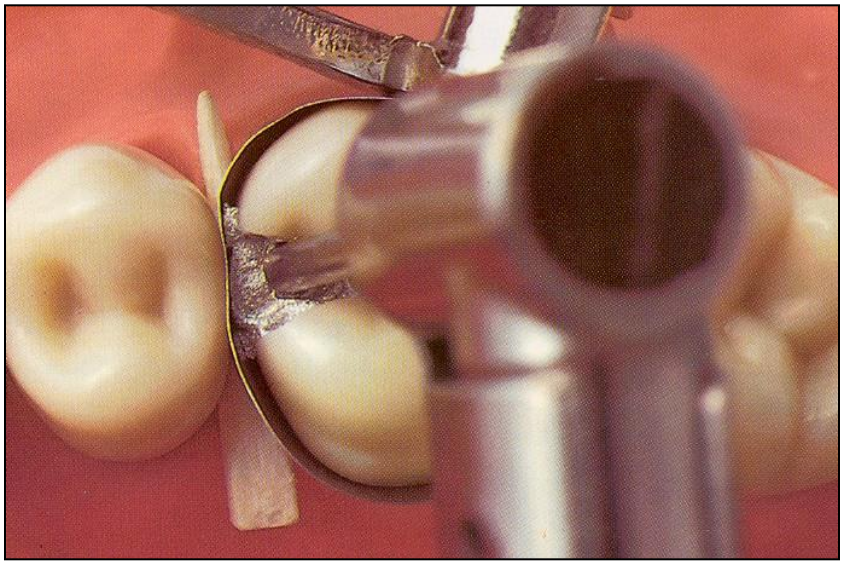


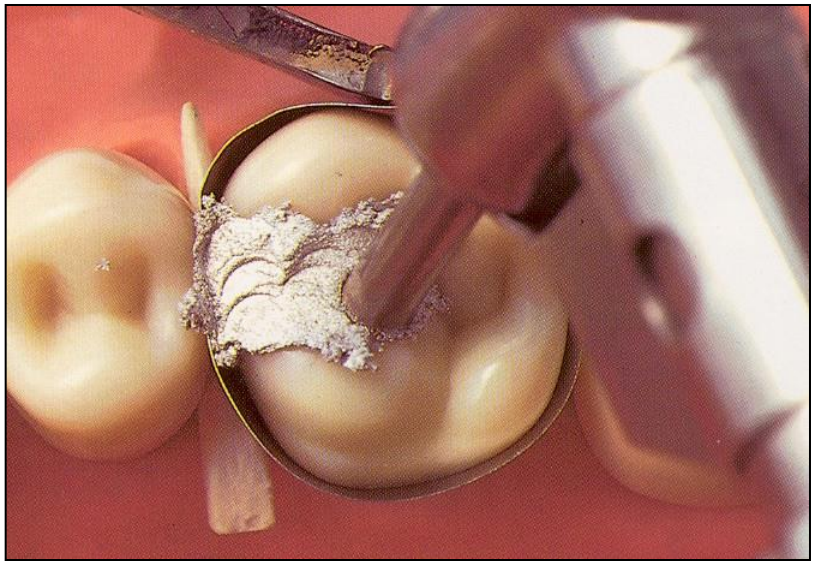
Cup
Amalgam gun
Condensor

Amalgam gun

Crucible (cup)

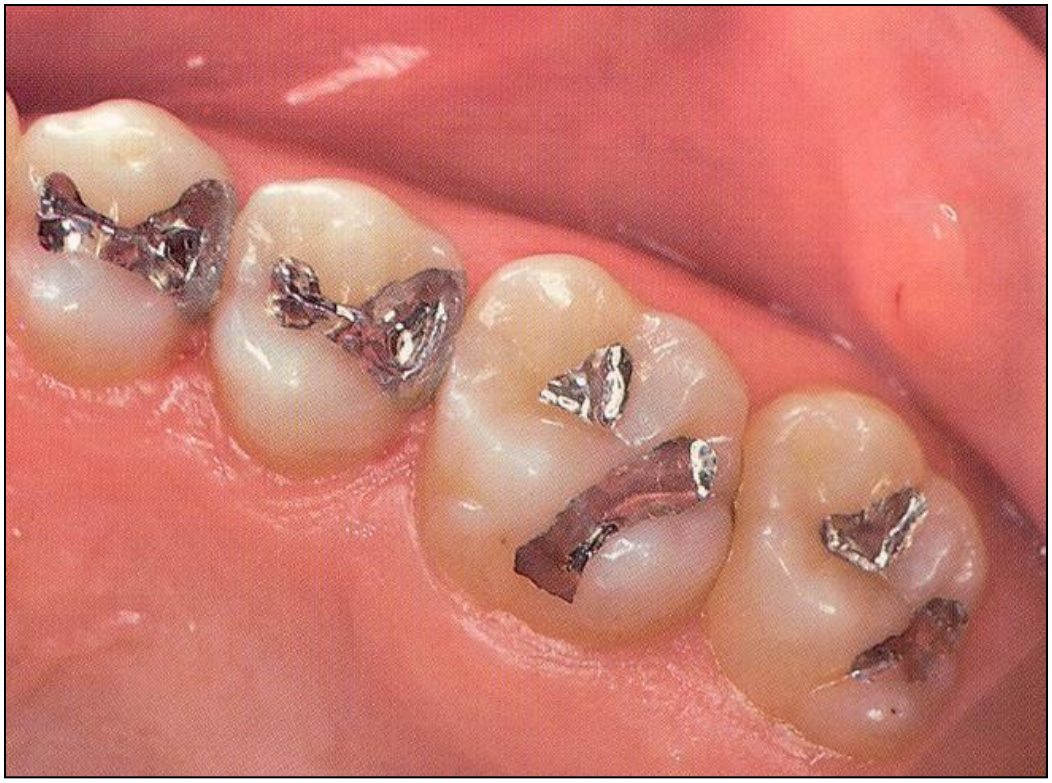






Power driven condensation

handpiece
condensor



Instruments

- **Preparation instruments**
- **Filling instruments**
- **Carvers**
- **Burnishers**

Instruments

Preparation instruments - power driven

Burs

Diamonds

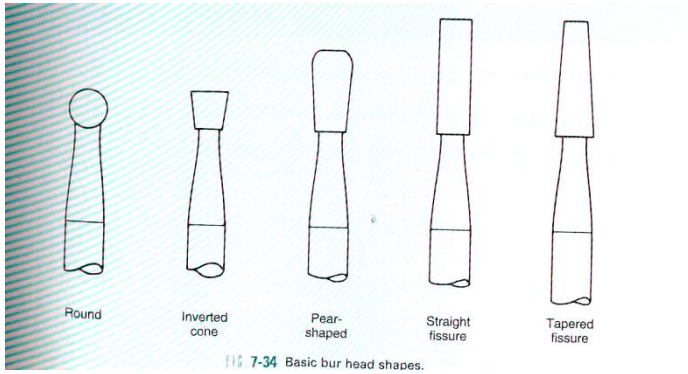
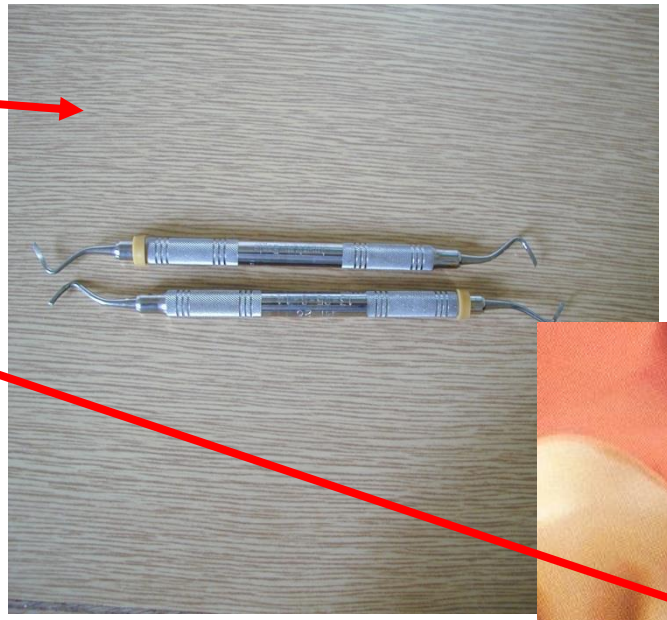


FIG 7-34 Basic bur head shapes.

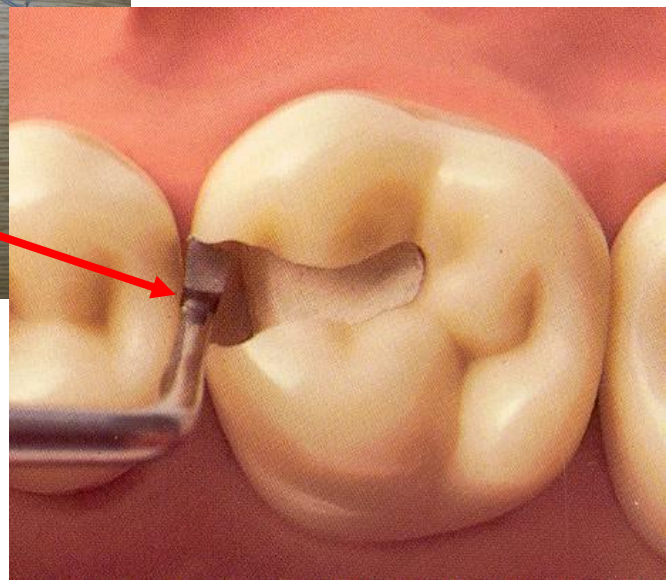
Instruments

- **Preparation instruments - hand**

Chisel



Excavator



Amalgam carrier

Amalgam carrier

Instruments

- **Filling instruments condensors and spatulas**

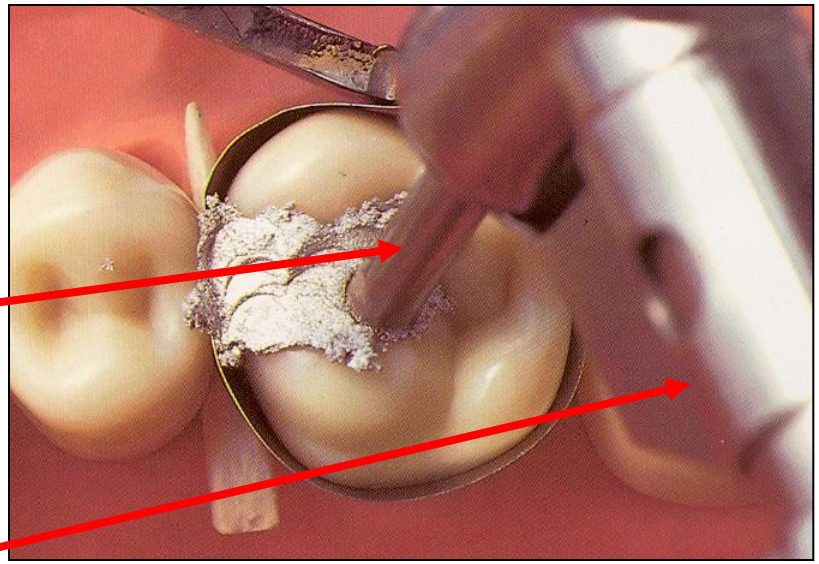
Condensor with
flat front

Condensor with flat front

Condensor and burnisher - spatula combined

Power driven condensor

Special handpiece



Burnisher - spatula
Angular- trough edge trough face

Burnisher – spatula, angular three face

Instruments

- **Burnishers**

Ball condensor – used as a burnisher at most