

# Preclinical dentistry I.

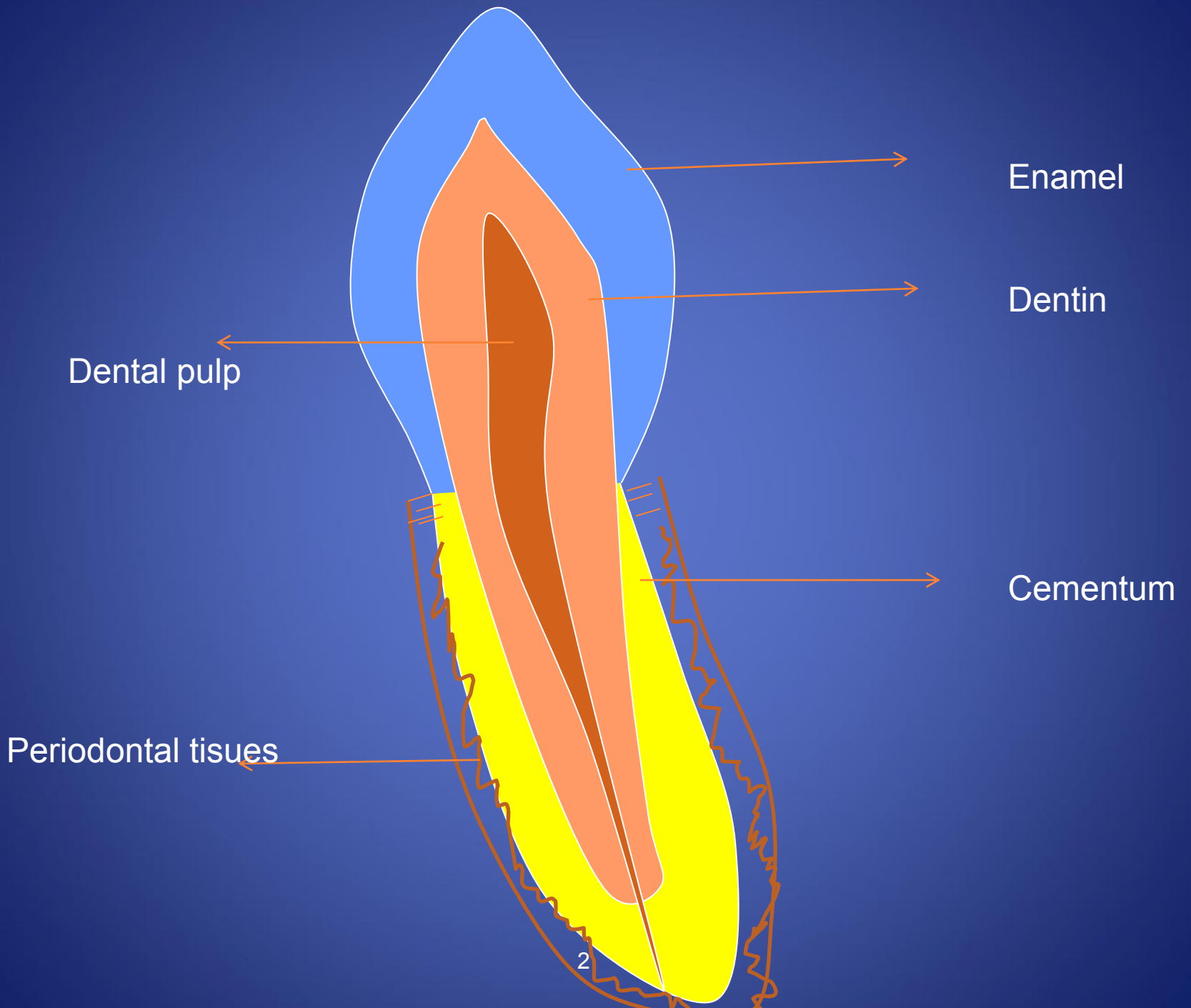
## 1.lecture

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# Restorative dentistry

Diseases of hard dental tissues, dental pulp and periodontal tissues (of pulpal origin)

Aethiology, ,pathogenesis,diagnosis,therapy and prevention.



# Diseases of hard dental tissues

Congenital – genetic reasons

Postnatal

- Before eruption
- After eruption



# Congenital

- Amelogenesis imperfecta

Enamel is affected

- Dentinogenesis imperfecta

Dentine is affected



# Before eruption

- Hypomineralization (white, brown spots)
- Defects of enamel (hypoplasia)

## Reasons

- local (inflammation, traumatic dental injuries)
- systemic (systemic diseases, antibiotics)



# After eruption

- **Dental caries**
- Trauma
- Attrition, abrasion
- Erosion
- V-shaped defects





# Antony van Leeuwenhoek

(1632 – 1723)

nizozemský přírodovědec a vynálezce. Obchodník v [Amsterdamu](#) a vědec samouk, byl členem královské společnosti. Zhotovil jednoduchý [mikroskop](#) s jedinou čočkou, který zvětšoval 300krát. Prostudoval řadu mikroorganismů a popsal jejich způsob života. Mj. objevil [krevní kapiláry](#), jako první podal v roce 1683 přesný popis bakterií a prvoků, popsal příčné pruhování svalů. Popisem buněčné stavby rostlin se stal jedním ze zakladatelů rostlinné [anatomie](#).

**First observation  
of microbes in oral cavity**

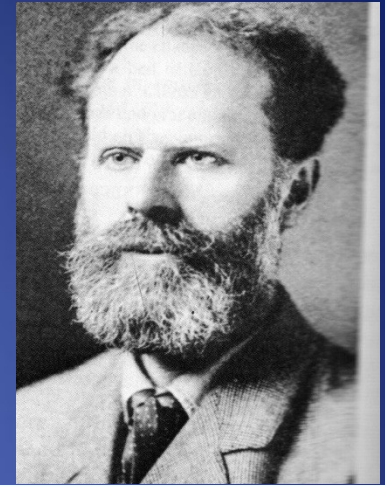
**17.century**





# Dental caries

- **Willoughby Dayton Miller**  
(1853 -1907)



- Explanation – theories

*Miller's theory: chemical – bacteriological explanation*



# Origin of dental caries

- Dental caries originates as decalcification of hard dental tissues. This decalcification is caused by microbes that are present on tooth surfaces in the dental biofilm. These microbes utilize sugars.
- After this decalcification also the decomposition of organic substances follows due to proteolytic microbes.

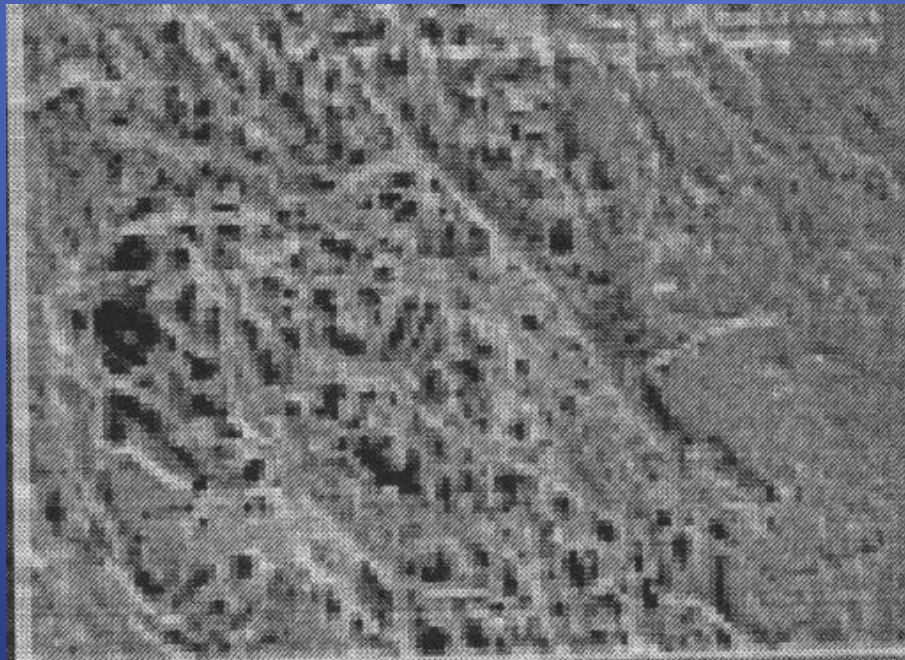


# Dental biofilm – plaque.



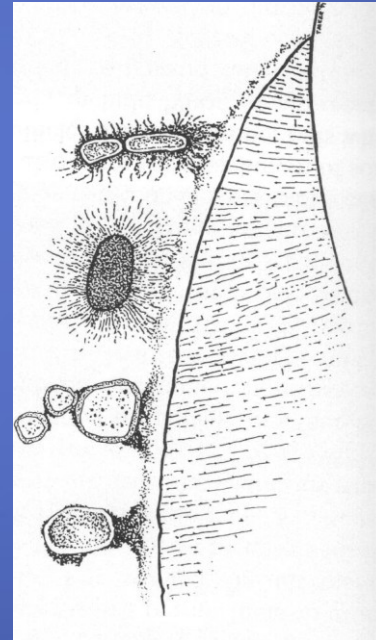
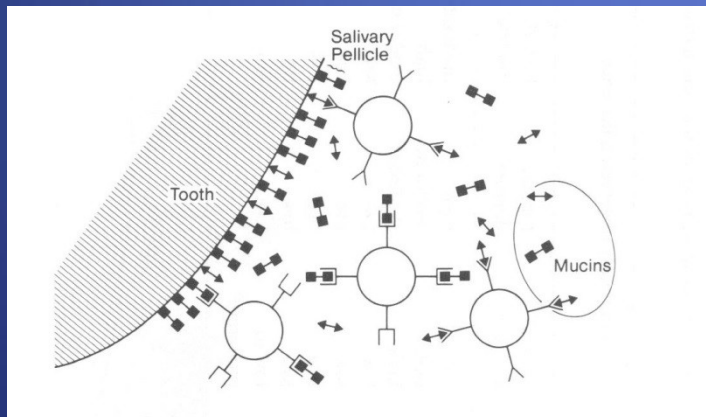
# Pelicle

- A layer of proteins from saliva that precipitate on the tooth



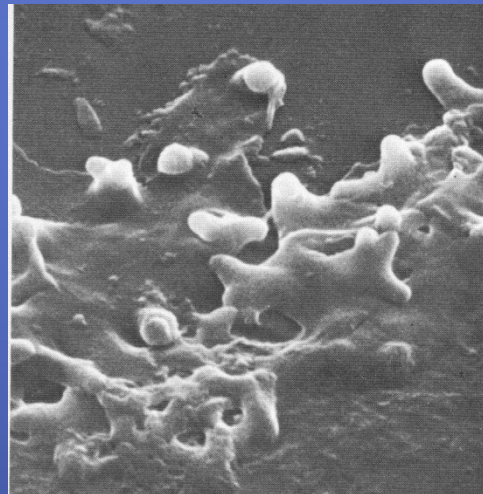
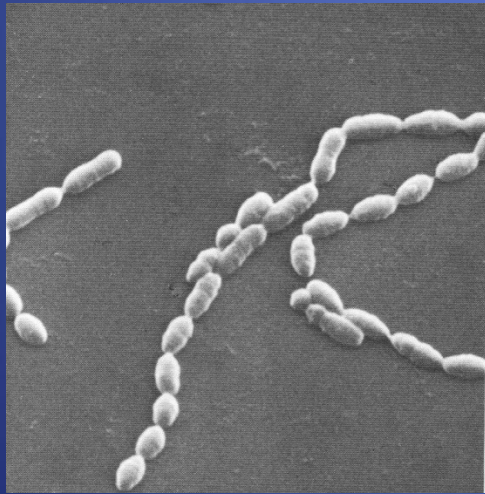
# Dental biofilm

- Adherence



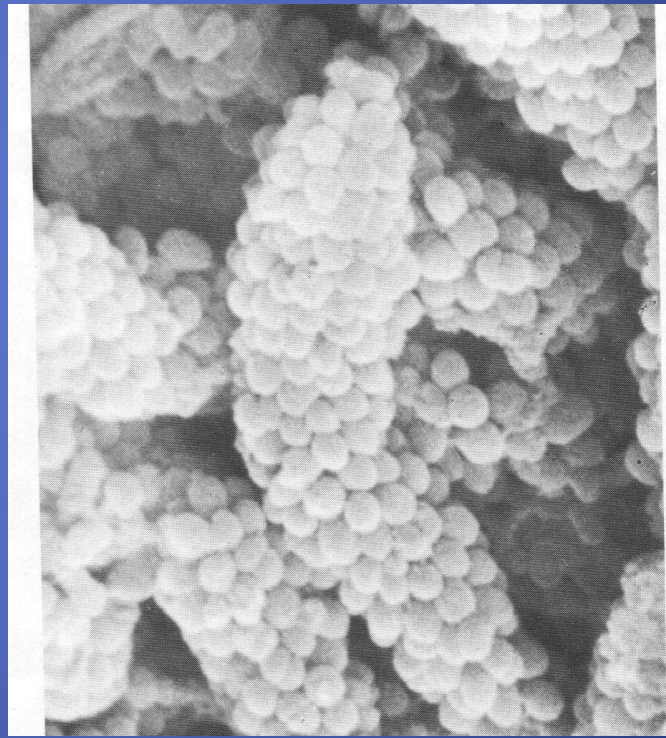
# Dental biofilm

- Colonization and coaggregation

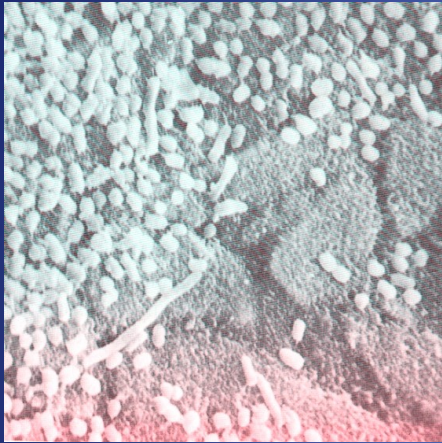


# Dental biofilm

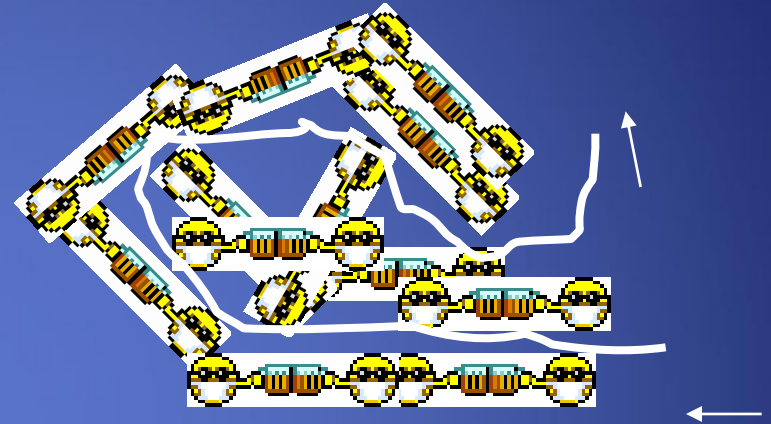
- Maturation



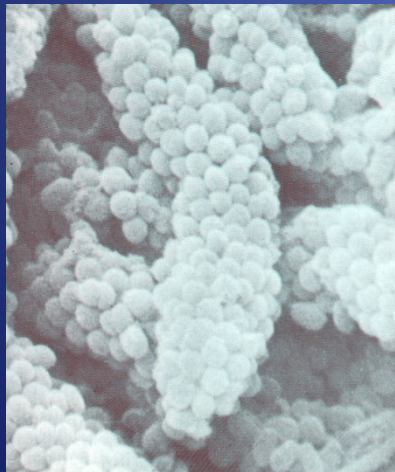
# Dental biofilm



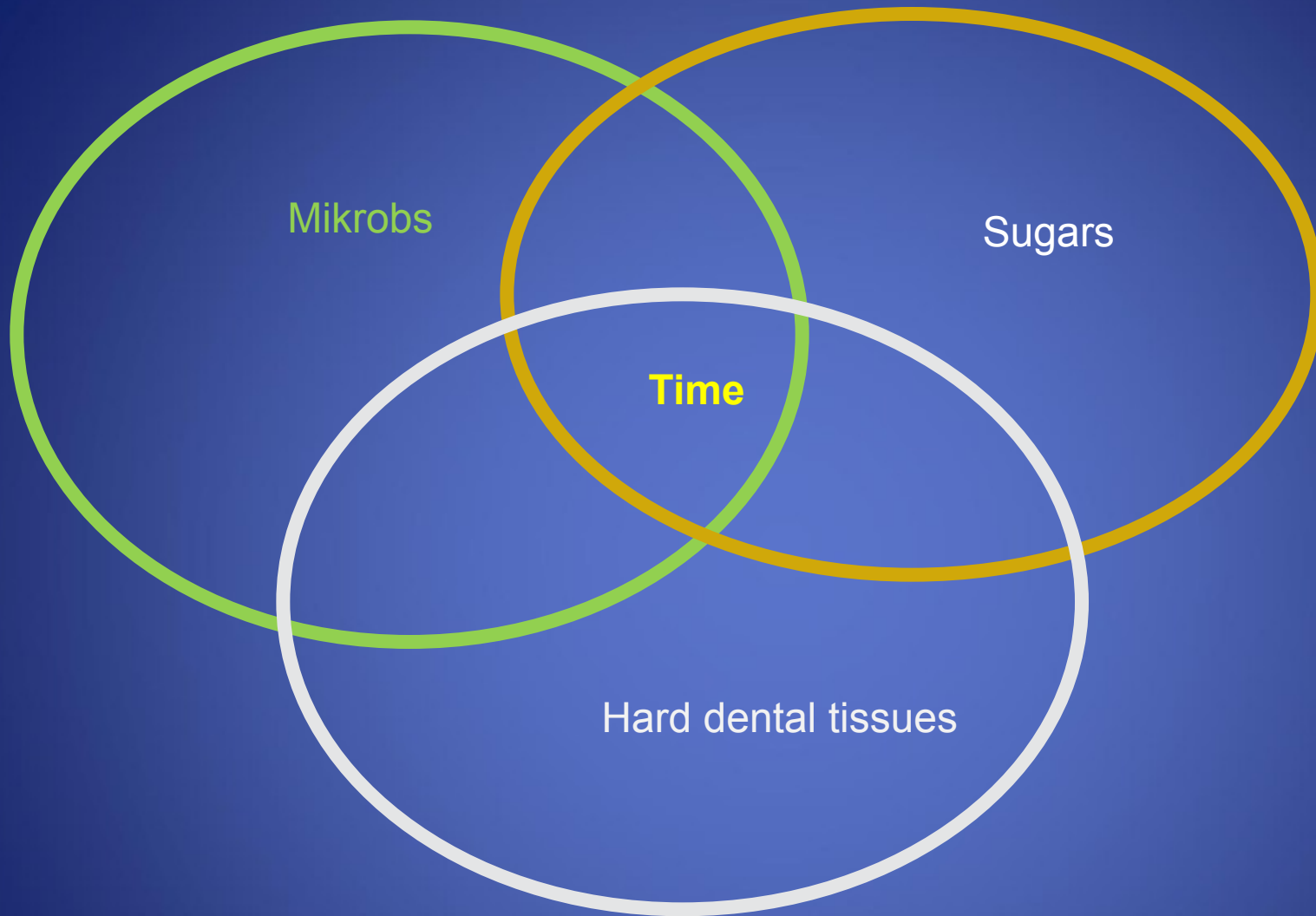
Community



More species,  
Better conditions for survival  
Higher resistancy  
Higher virulency







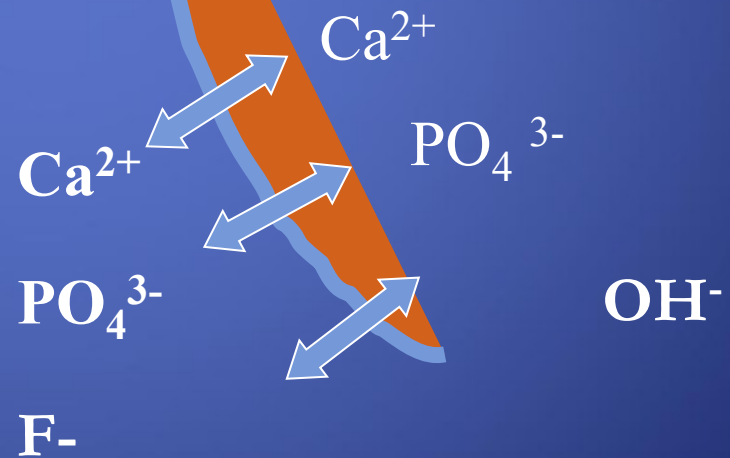
# Metabolic activity



Stephan

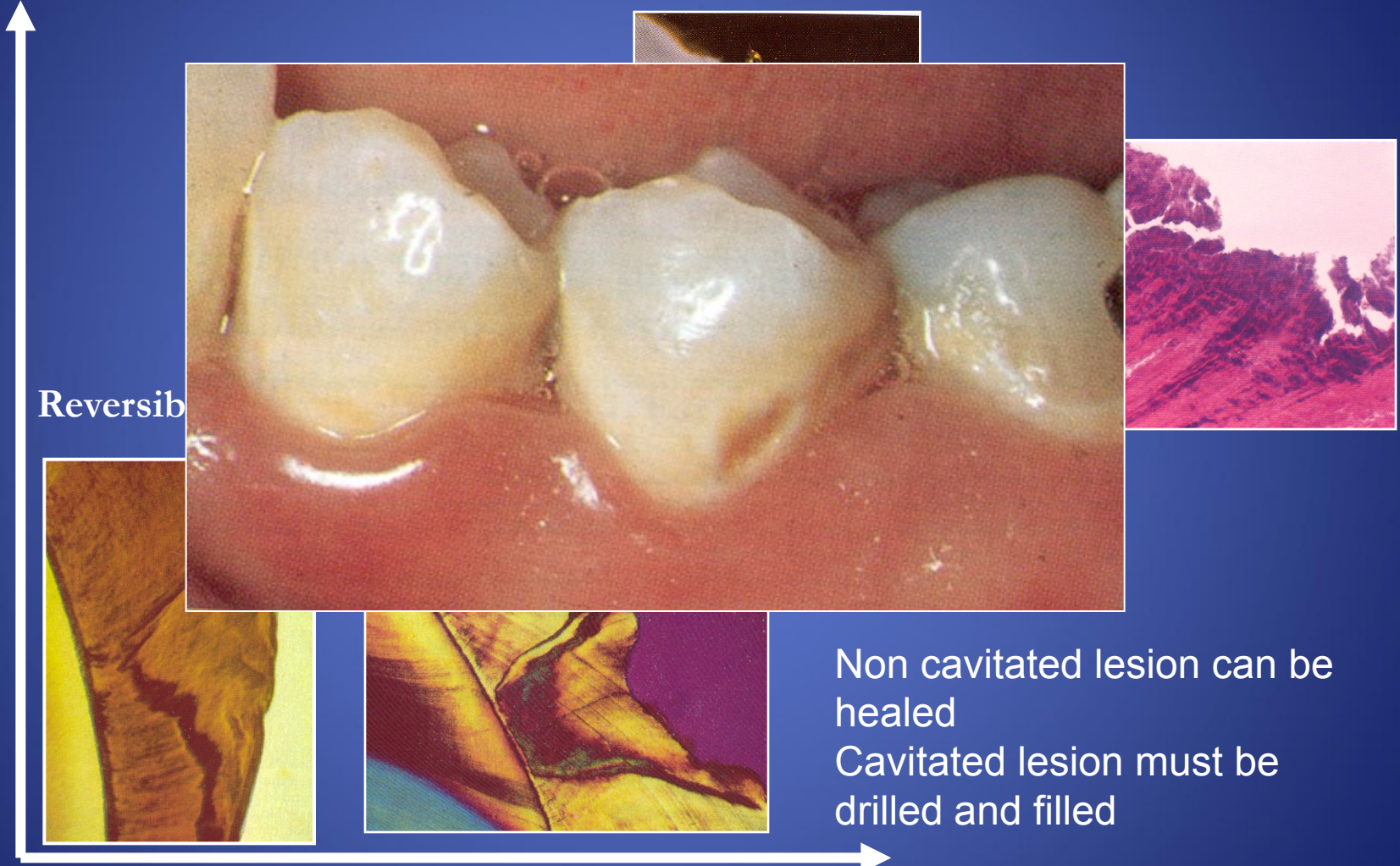
Dissolving of enamel





Irreversibil: non cavitated lesion

Demineralization



Reversibil

Non cavitated lesion can be healed  
 Cavitated lesion must be drilled and filled

Time

# Dental caries is multifactorial disease

- Essential factors
  - - necessary
  
- Co condition factors
  - - not necessary but can influence the expansion



# Co committans factoras

- Quality of hard dental tissues and position of teeth
- Food – composition and consistency
- Systemic health
- Age
- Heredity (liking of sweetness?)
- Climate



# Caries danger areas

- Pits and fissures
- Proximal surfaces below the contact point
- Cervical third of dental crown (area below the maximum convexity)
- Exposed root

= habitually unclean areas









# Habitually clean places

- Incisal edges
- Cusps and their slopes
- Areas above the maximal convexity
- Enamel ridges : transverse ridge,  
oblique ridge



# Classification of dental caries

Acc to topograpoy

- Coronal caries
- Root surface caries

According to affected surfaces

- See classification acc to Black

According to affected tissues

- Caries in enamel
- Caries in dentin
- Caries in cementum



# Classification of dental caries

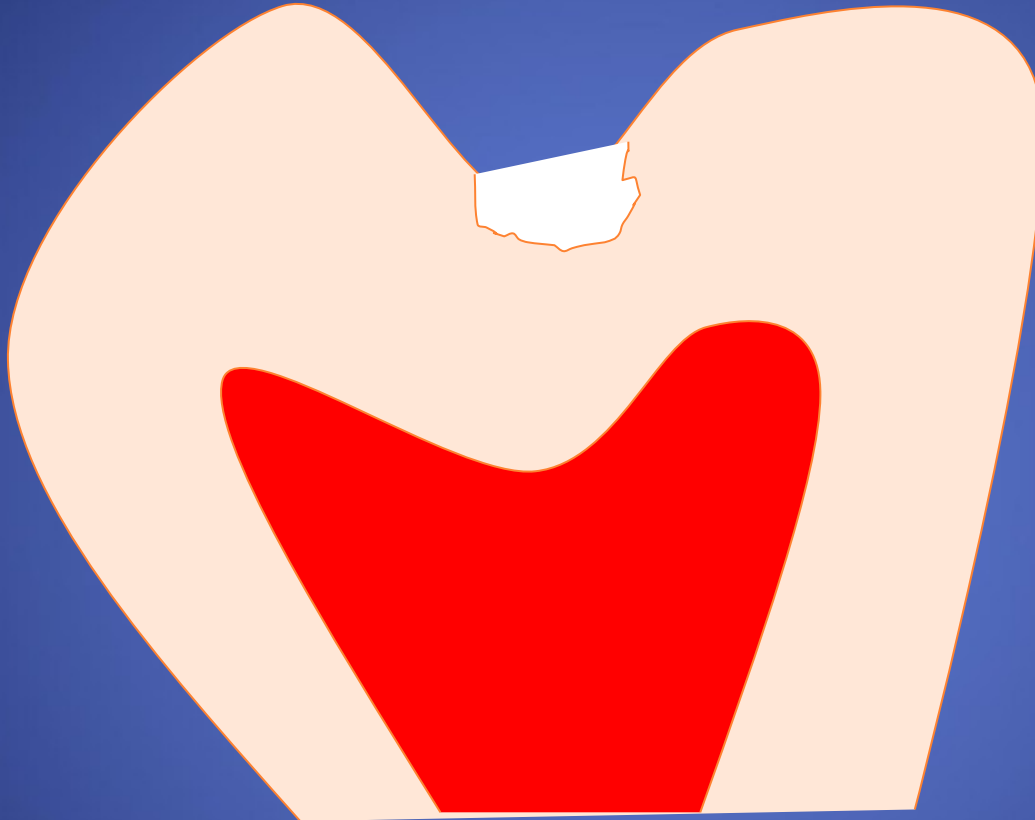
According to its depth

- Surface caries (caries superficialis)
- Middle caries (caries media)
- { Caries next to dental pulp (caries pulpae proxima)
- { Caries penetrating into dental pulp (caries ad pulpam penetrans)

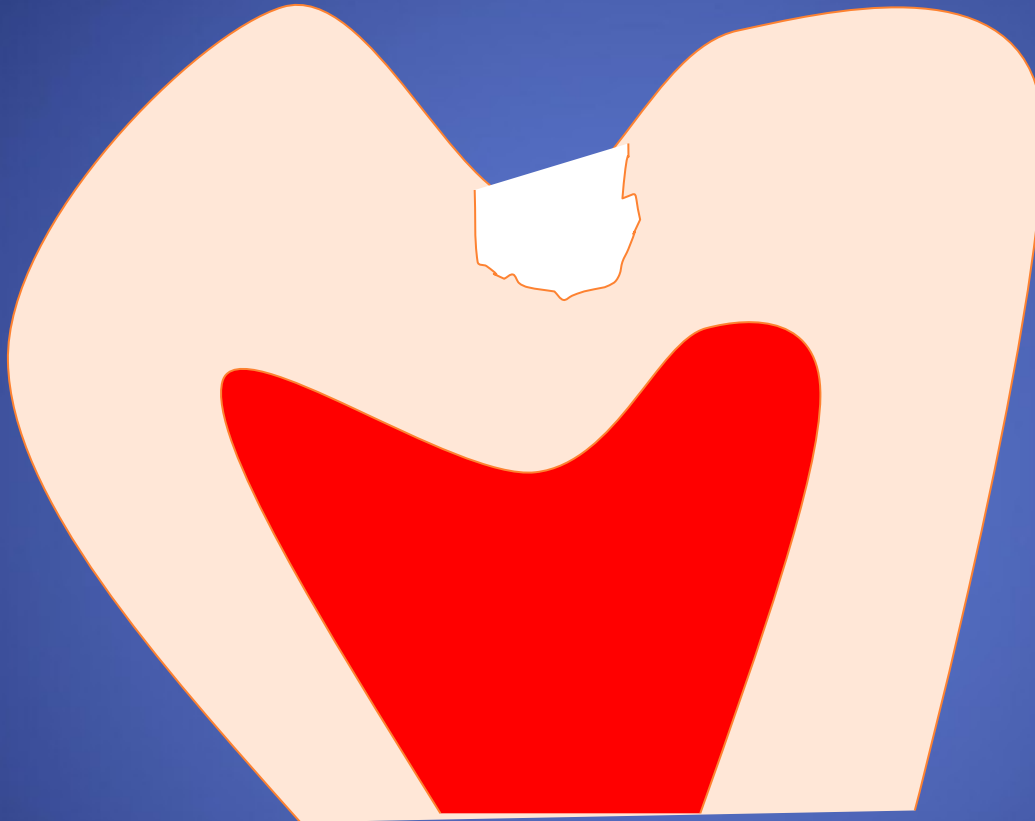
Deep caries



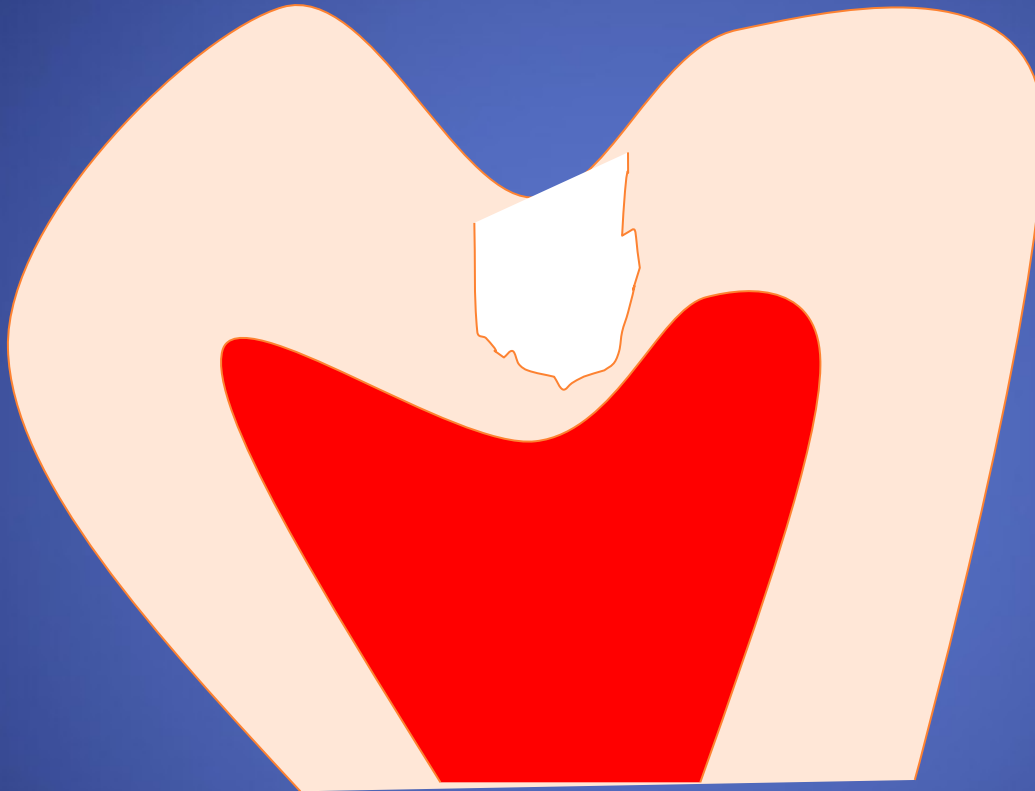
## Surface caries



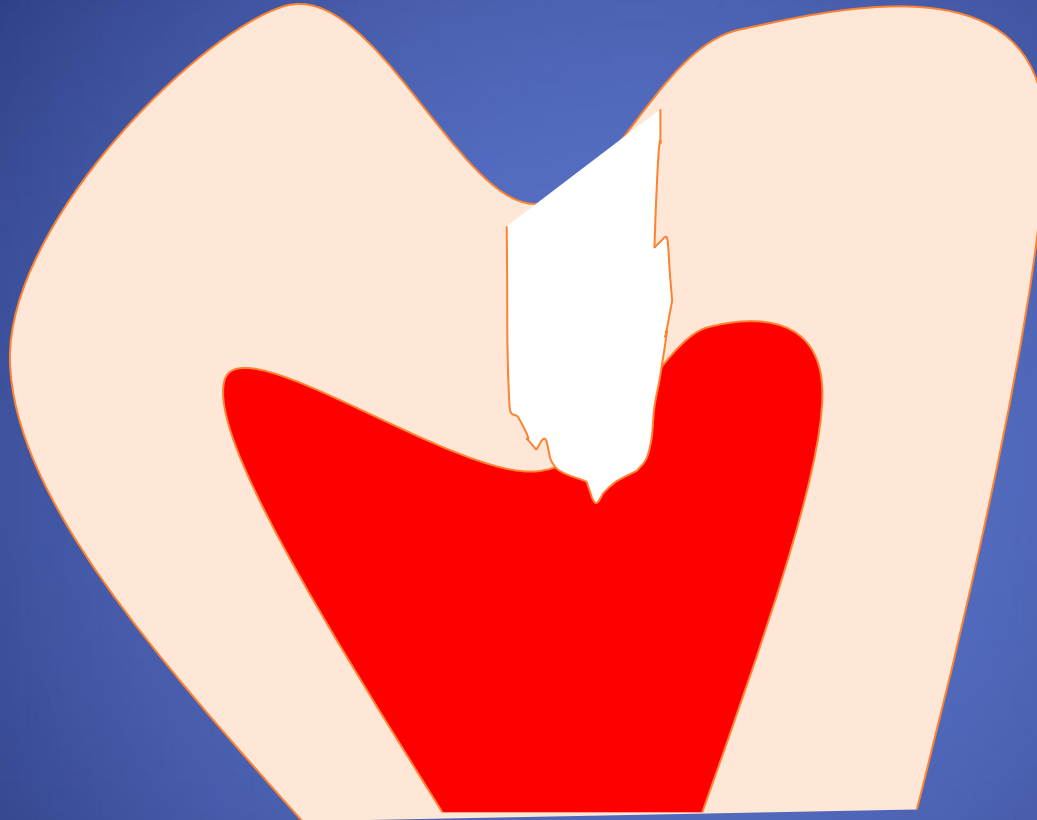
## Middle caries



## Caries next to dental pulp



# Caries penetgrating into dental pulp





# Classification of dental caries

According to history

- Acute
- Chronic
- Arrested



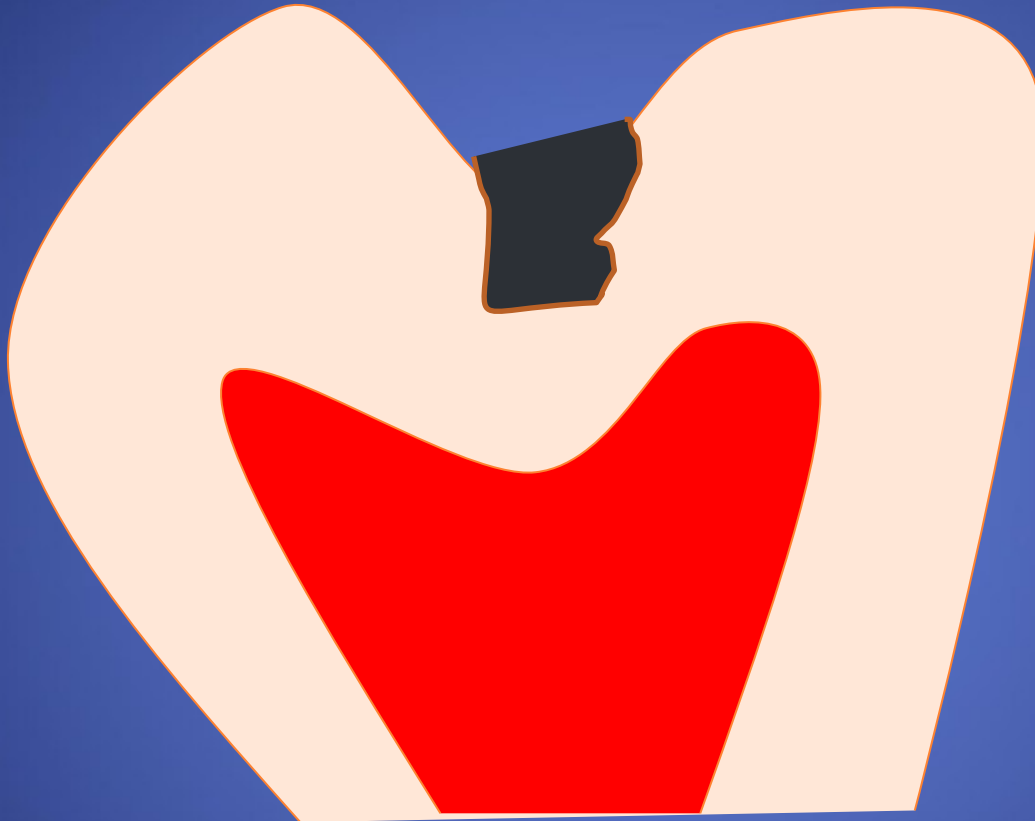
# Classification of dental caries

According to origin

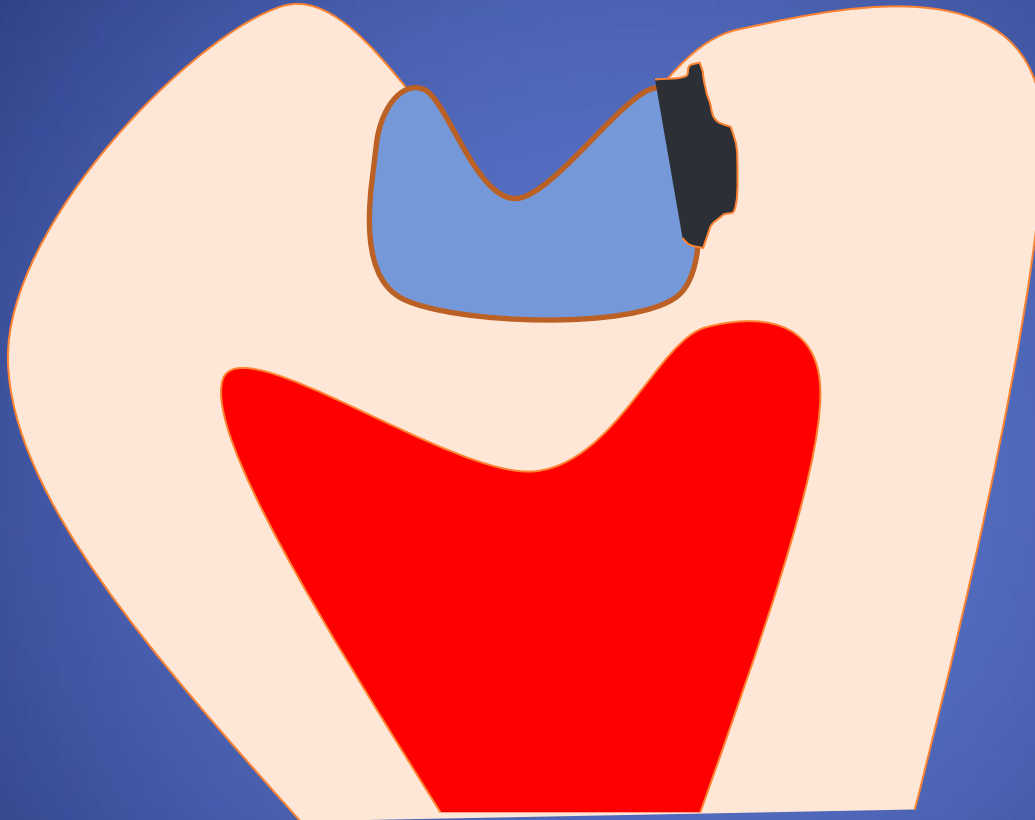
- Primary caries
- Secondary caries
- Recurrent caries



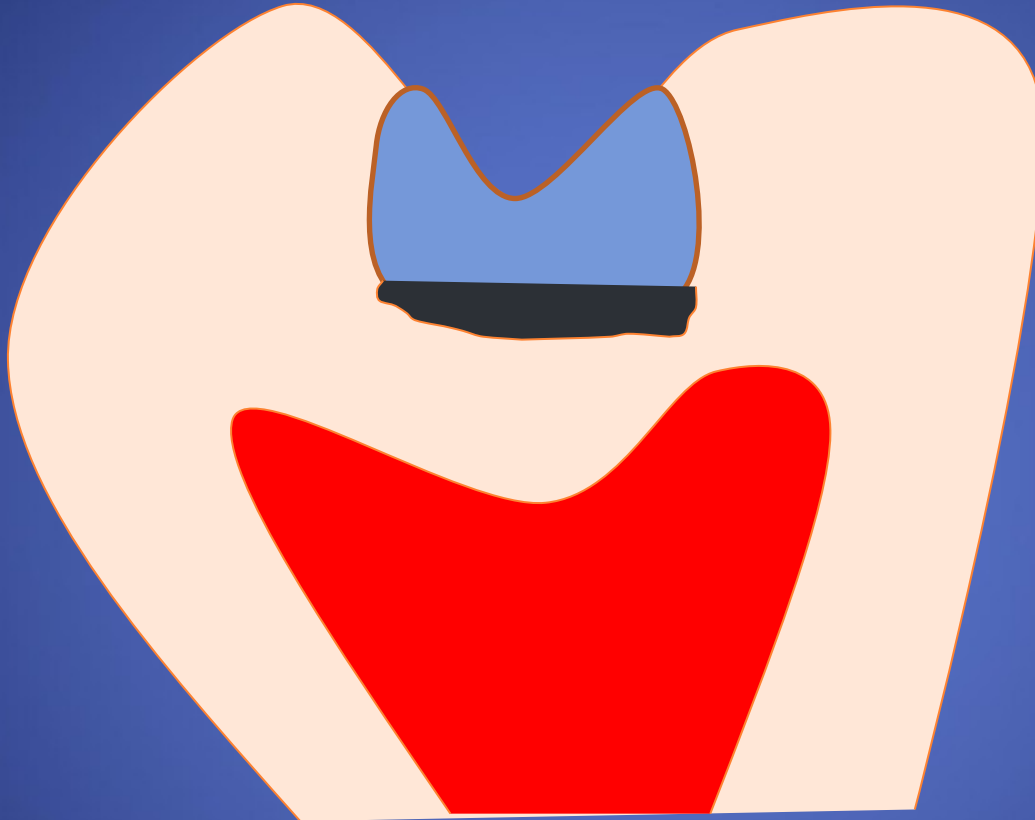
## Primary caries



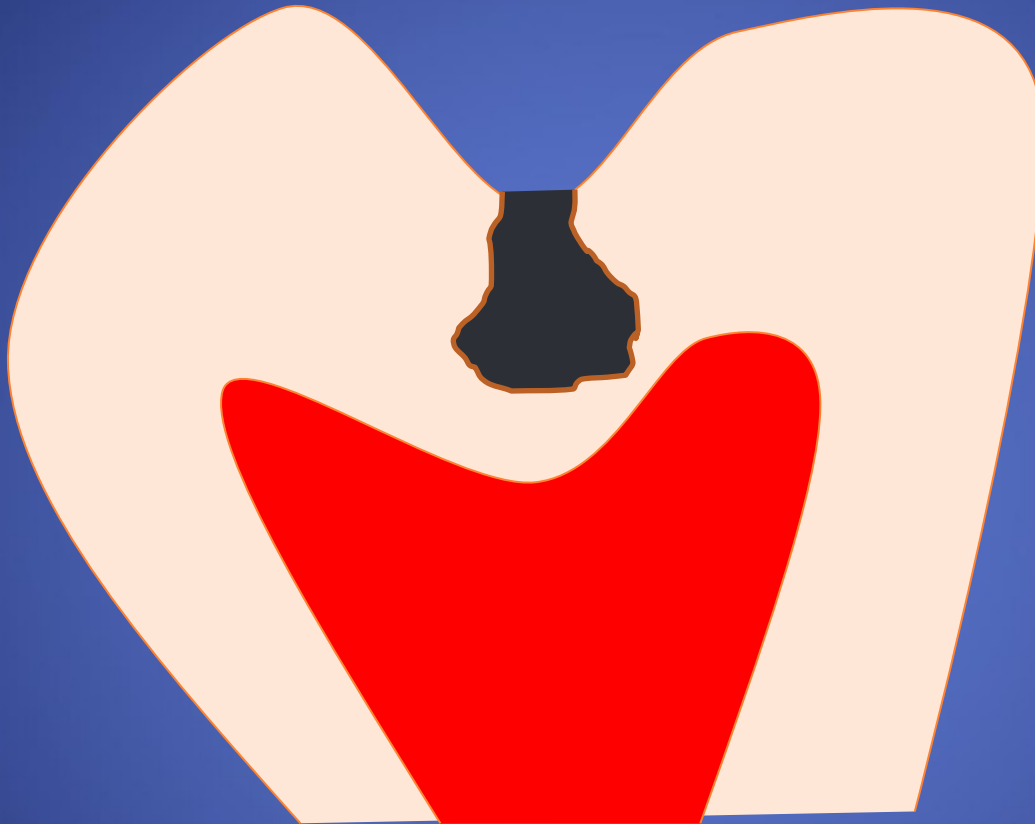
## Secondary caries



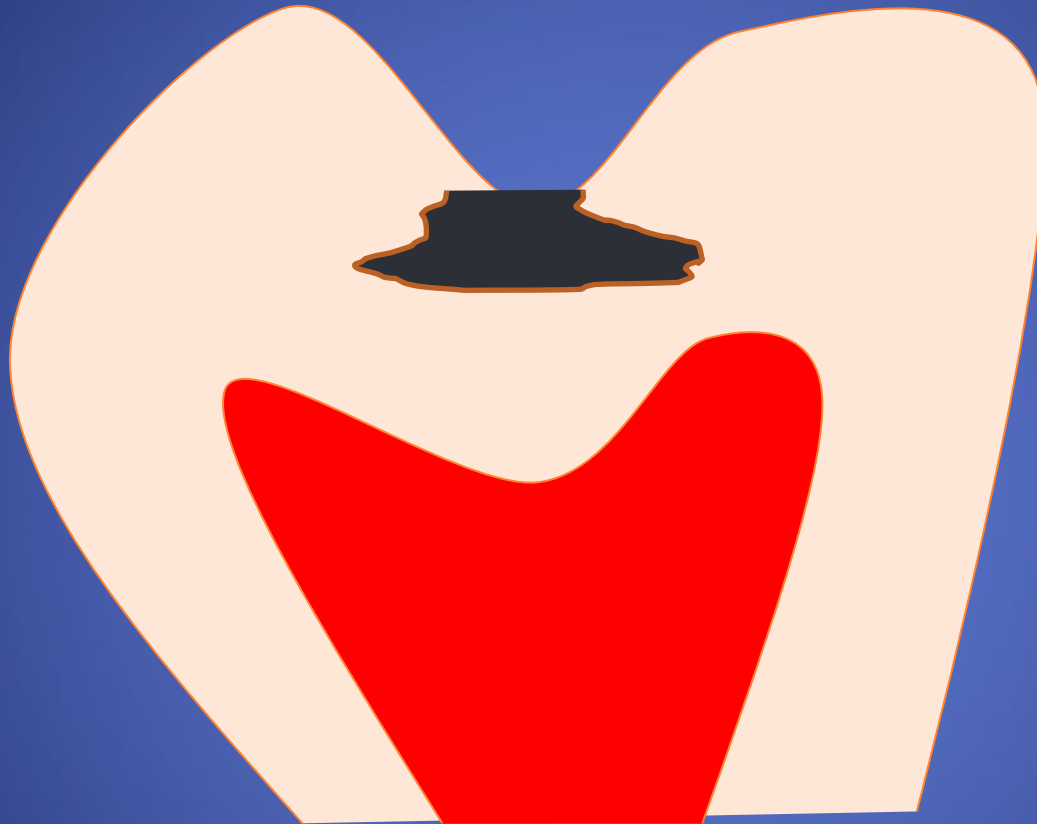
## Recurrent caries



## Penetrating caries

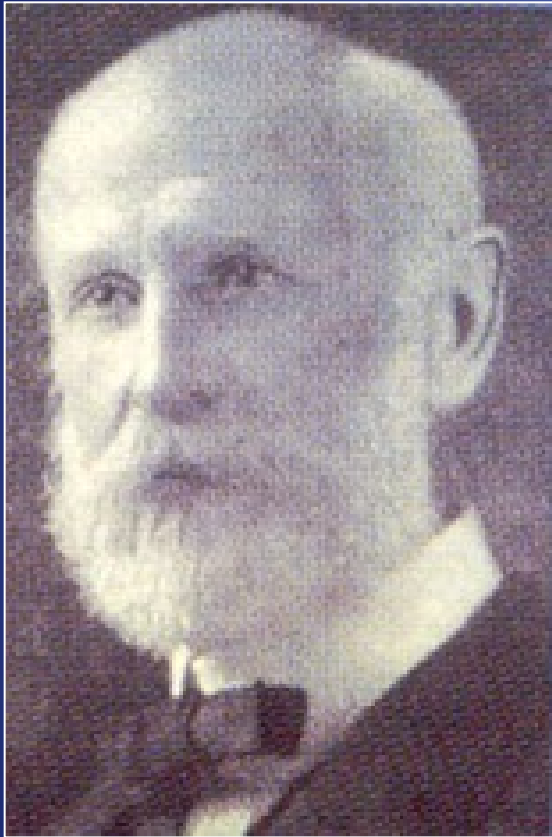


## Undermining caries



# Green Vardiman Black

(1836 – 1915)



American professor

Established the scientific bases of dentistry

Formulated basic rules of preparation of cavities

Developed the guidelines for amalgam fillings including the optimal composition of amalgam (balanced alloy)







# Preparation

Preparation is an instrumental treatment of the tooth that has been damaged by dental caries in such a way that

- the reconstruction of this tooth is possible
- the filling does not fall out
- the tooth as well as the filling can face up to occlusal forces
- the risk of the caries on treated surface is minimal

(Black 1914)





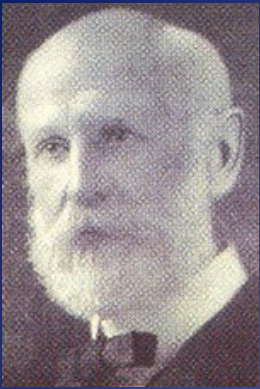
# Preparation

Preparation is an instrumental treatment of the tooth that has been damaged by dental caries in such a way that

- the reconstruction of this tooth is possible
- the risk of the caries on treated surface is minimal- extention for prevention
- the filling does not fall out
- retention
- the tooth as well as the filling can face up to occlusal forces
- resistance

(Black 1914)





- After we understand the reasons of dental caries we will be able to heal it

(Black 1900)



# Classification acc. to Black

- Class I.

Pit and fissure caries



# Classification acc. to Black

- Class II.

Proximal surfaces in premolars and molars



# Classification acc. to Black

- Class III.

Proximal surfaces of incisors and canines  
without  
lost an incisal ridge



# Classification acc. to Black

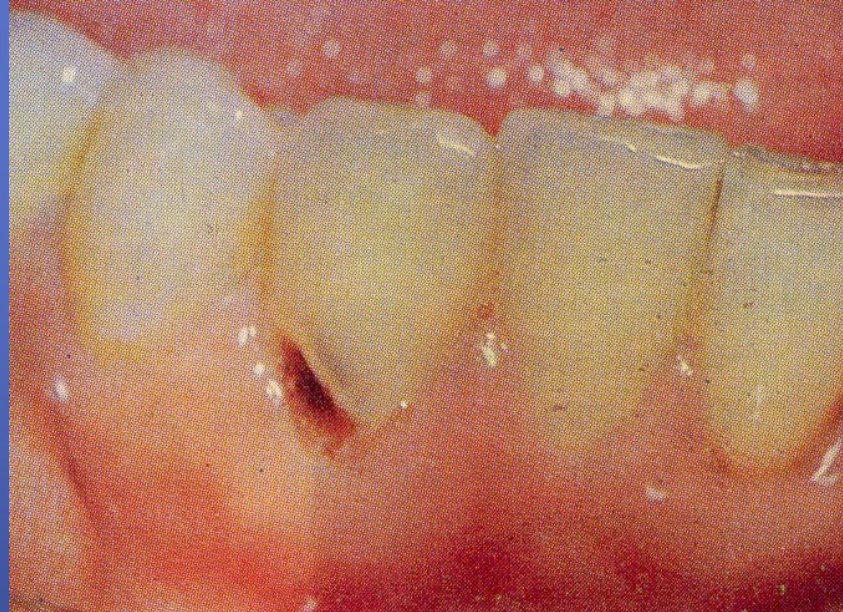
- Class IV.

Proximal surfaces of incisors and canines with lost an incisal ridge



# Classification acc. to Black

- Class V. cervical lesions





# Clasificación acc. to black

- VI. Class
- Caries on incisal edges (abraded)



# Sequence of operations

Access to the cavity

Preparation through the hard dental tissues

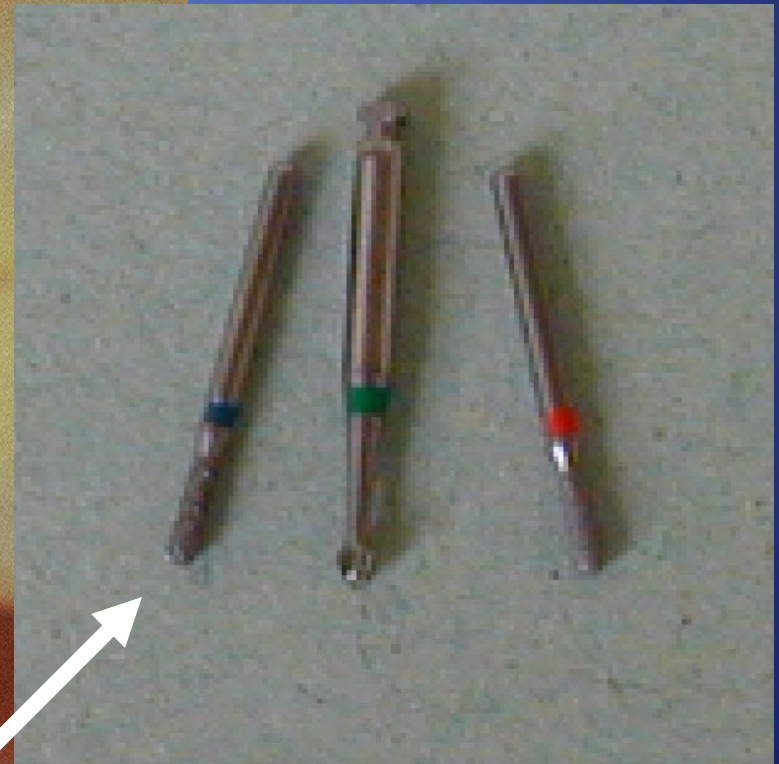
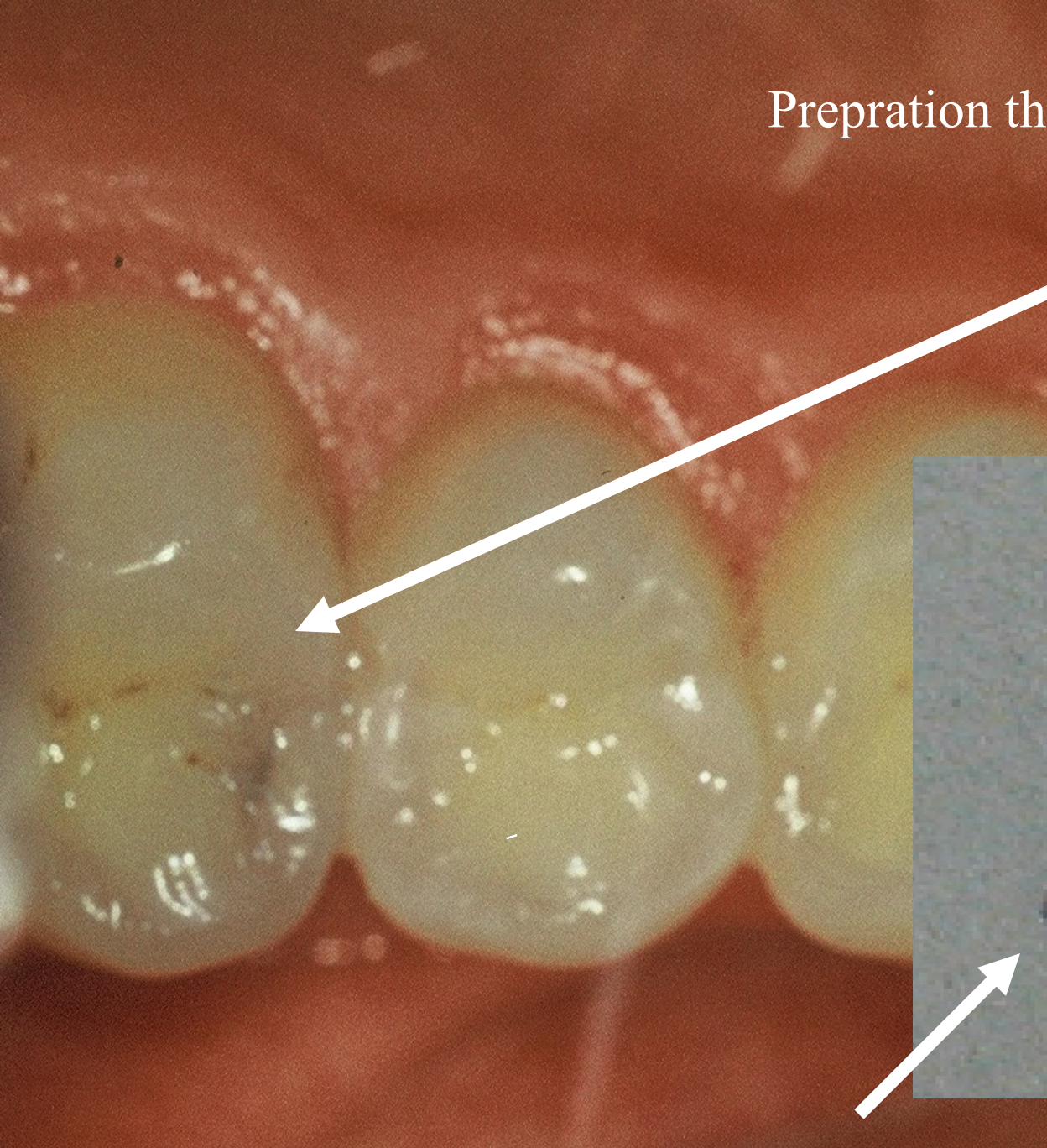
Removal the undermined enamel

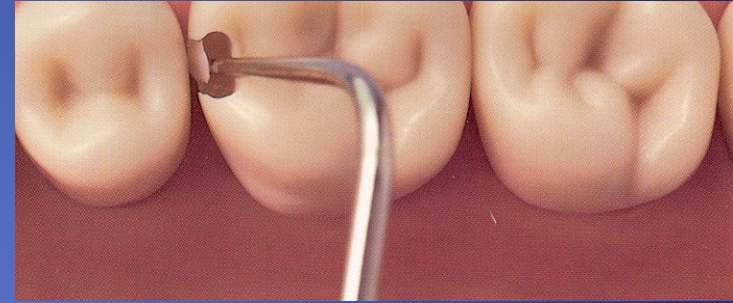
Separation of teeth

Separation or removal of gingiva



Preparation through hard dental tissues

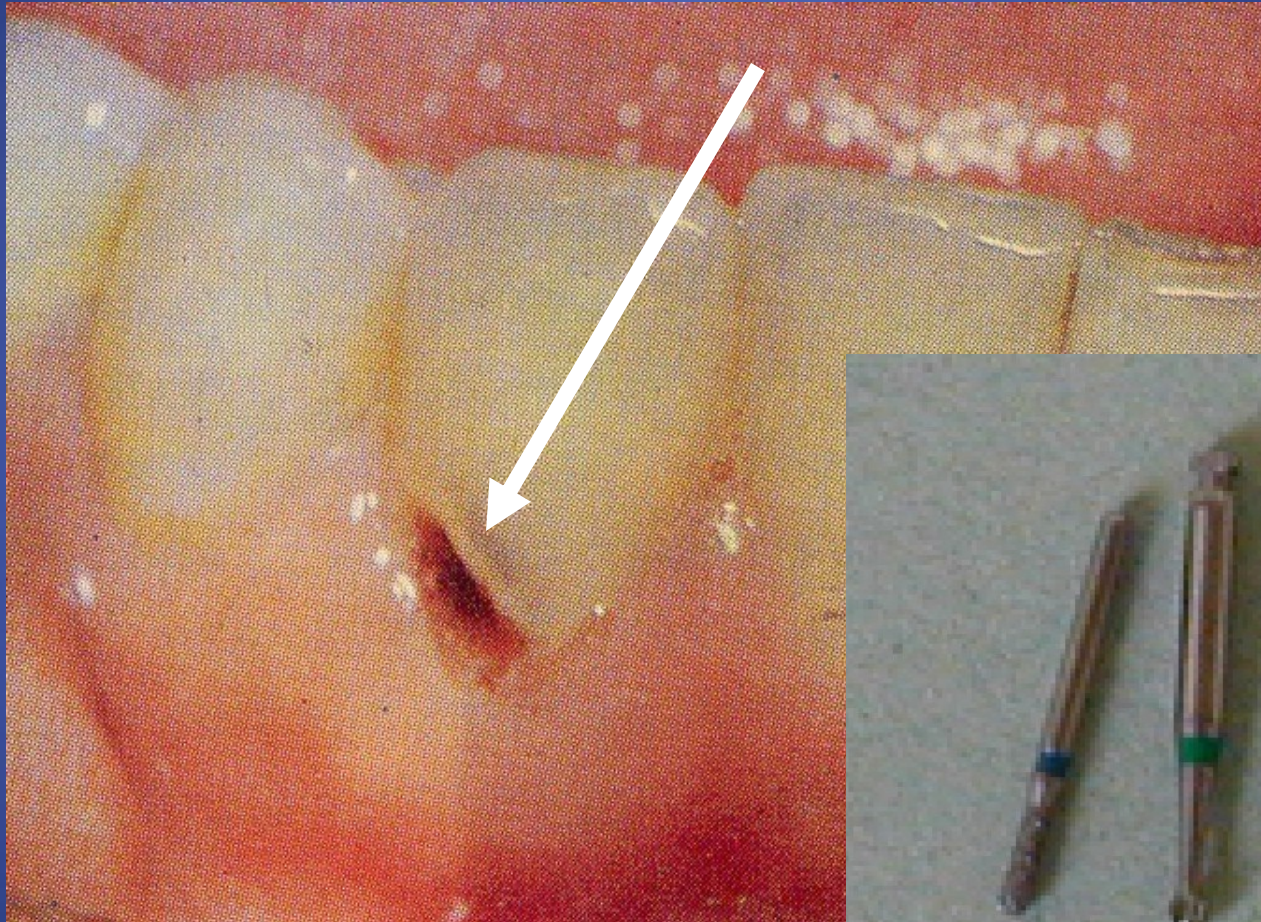


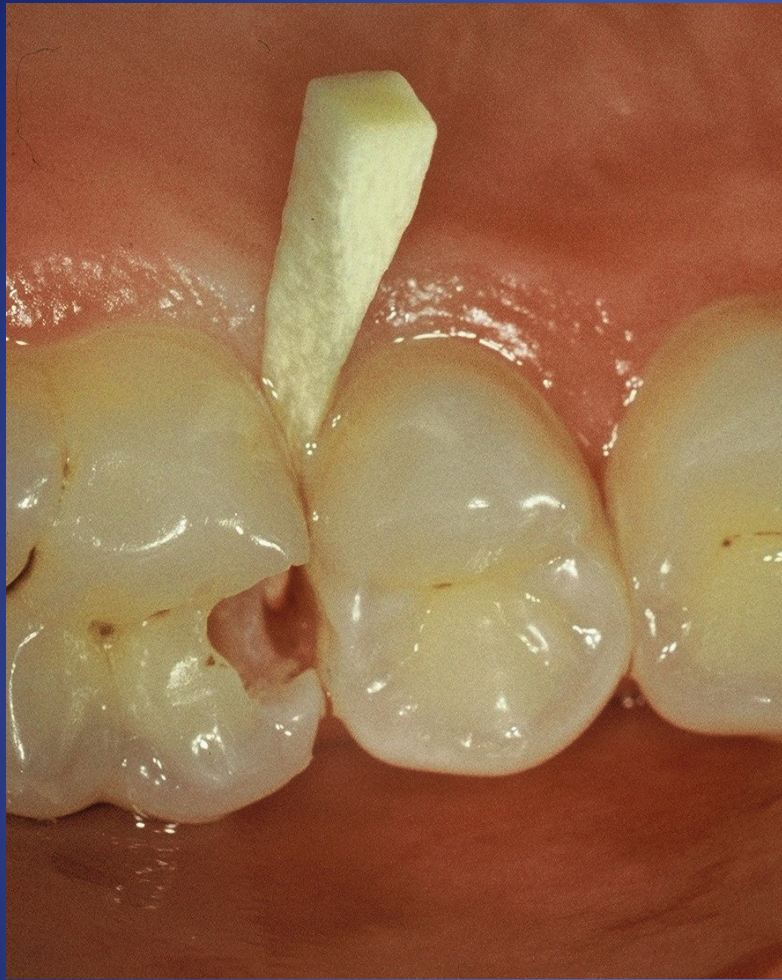


Breaking the enamel



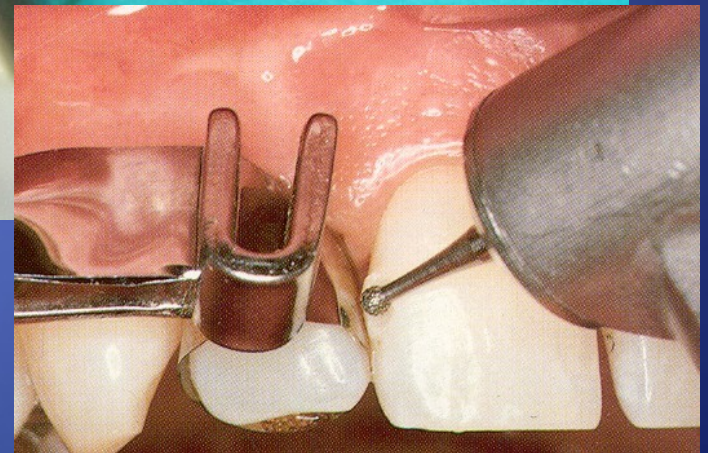
# Removal of the undermined enamel





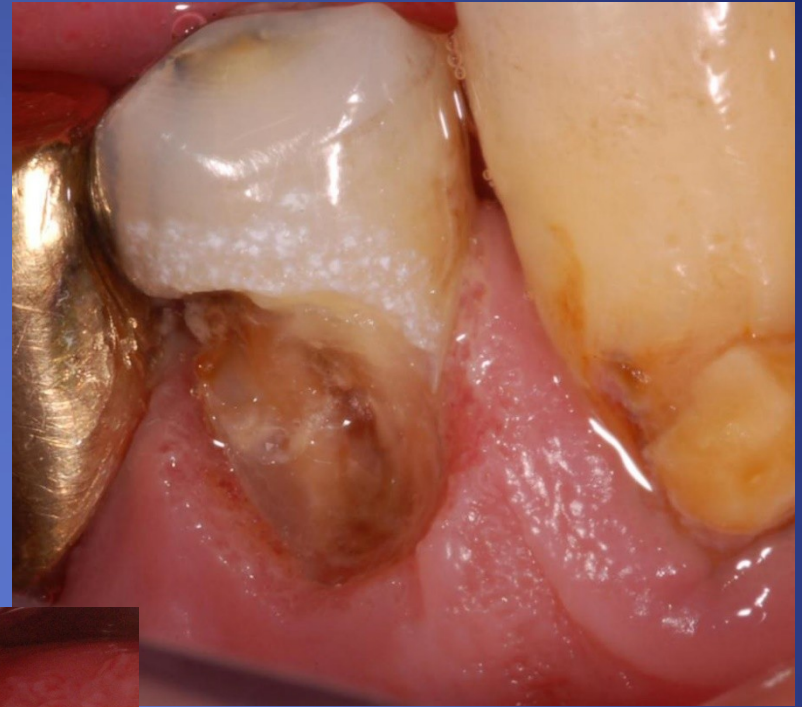
Separation with wooden wedge





Removal of the old filling





Removal of the ingrown gingiva





# Sequence of operations

Access to the cavity

Establishment of the cavosurface margin -  
extention for prevention

Retention of the filling

Resistance of the restored tooth ( the filling  
as well as the restoration)

Excavation of carious dentin

Protection of dentin wound

Finishing of the walls

Final control (light, mirror, magnification)



# Sequence of operations

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

Depends on

*Dental material*

*Oral hygiene*

*Precautions of secondary caries*



# Sequence of operations

Retention of the filling

Precautions of its lost

*Macromechanical retention*

*Micromechanical retention*

*Chemical retention*



# Sequence of operations

Resistance of the restored tooth

Against occlusal and other forces

Depends on

- *Material*
- *Individual occlusal forces*



# Sequence of operations

Excavation of carious dentin

Necessary (risk of recurrent caries)

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

*or*

*Excavator (hand instrument)*



# Sequence of operations

Finishing of the walls

Depends on the kind of material

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



# Protection of dentin wound

- Filling itself
- Base (below the filling – protection against thermal exposure or toxicity of dental materials)



# Sequence of operations

Final control

Direct or indirect view

Good illumination

Magnification





# Preparation

- Hand

Excavator, cleaver

- Power driven
- Rotary
- Non standard preparation

Burs, diamonds



# Chisel – for enamel Cleaver



# Chisel for enamel



# Excavator



# Motors and handpieces



Turbine

Micromotor

Handpiece



# Turbine



# Turbine

300.000 - 400.000 rpm

Big force, les control, small torque



# Motors – micromotors

Electromotors – maximum 40.000/min

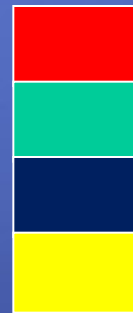
Air motors – maximum 20.000/min

Gear to fast

Gear to slow

1: 1

Blocked rotation





# Gear



**Blue coded handpiece 1:1**



# Gear



**Red coded handpiece 1:5 to fast**



# Gear



**Green coded handpiece – to slow**

**2,7 :1**

**7,5 :1**



# Hendpieces contraangle straight



# Cutting instruments

Burs

Steel

Tungsten carbide

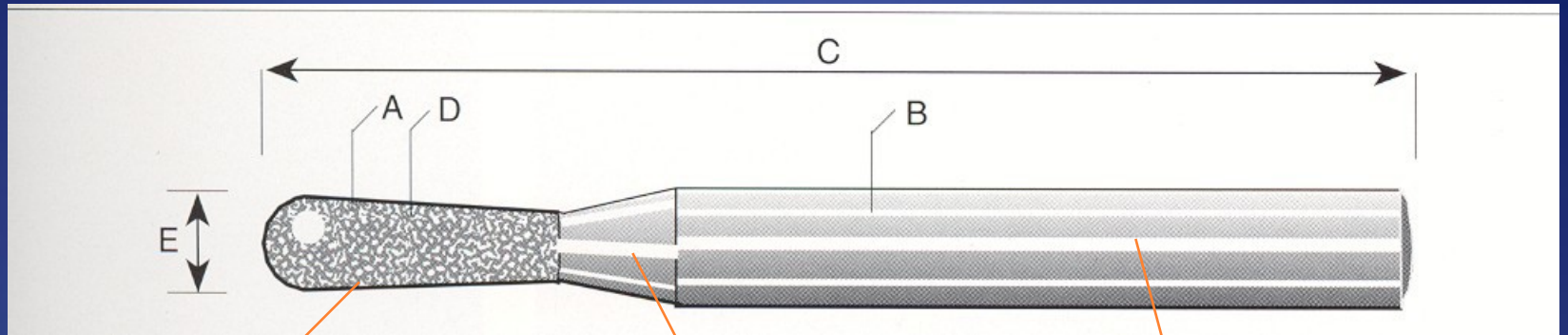
Diamonds



# Cutting instruments

Power driven (powered) instruments for cutting

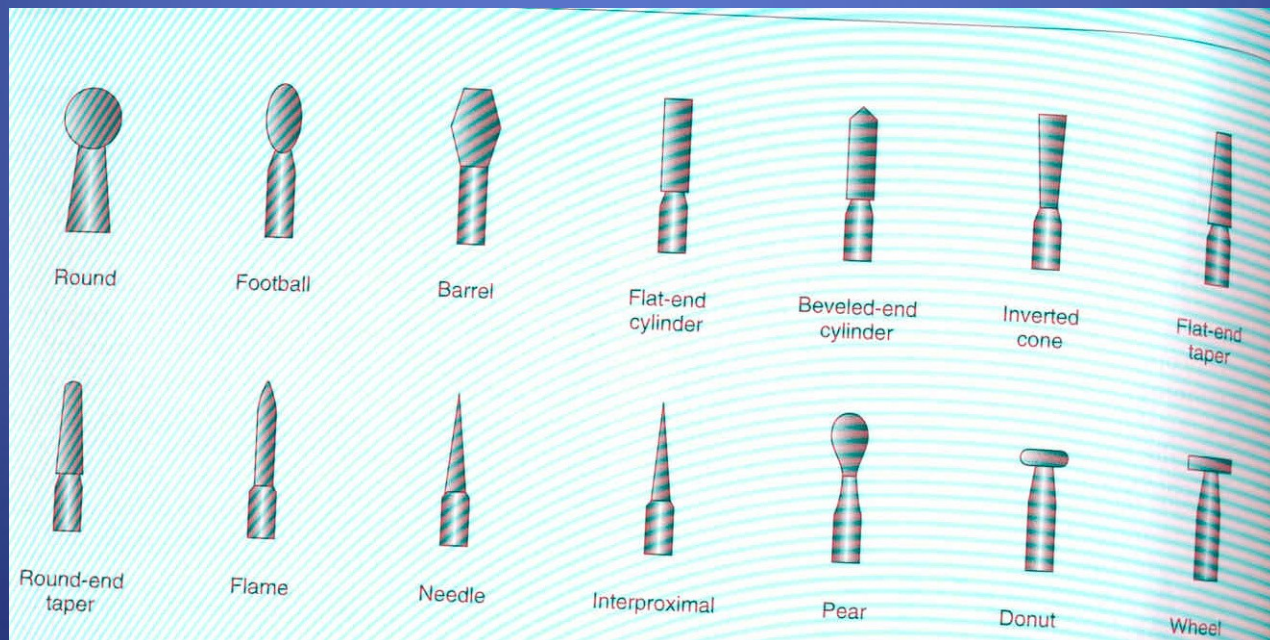


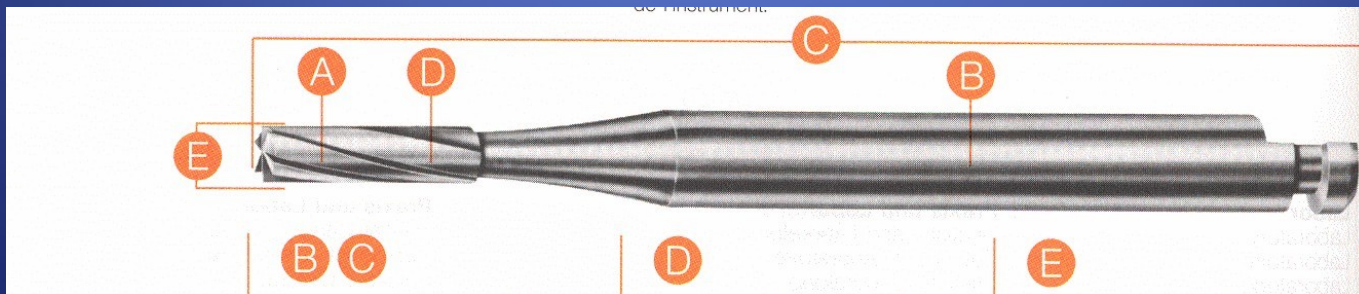
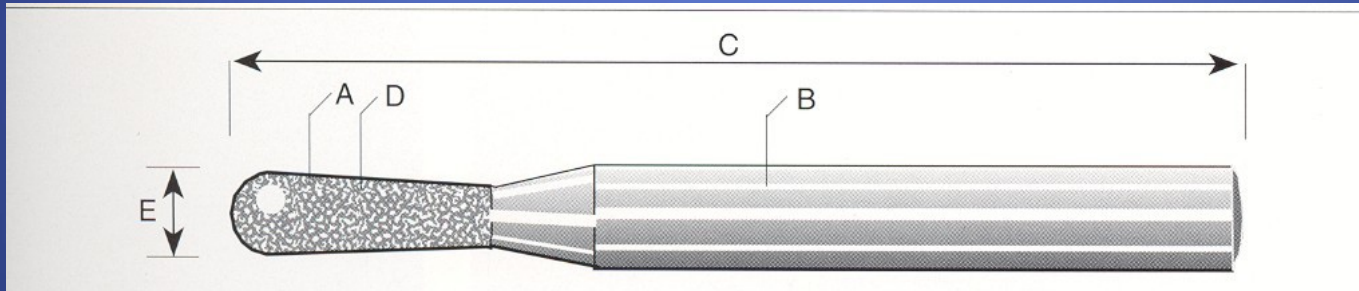


Head (cutting part)

neck

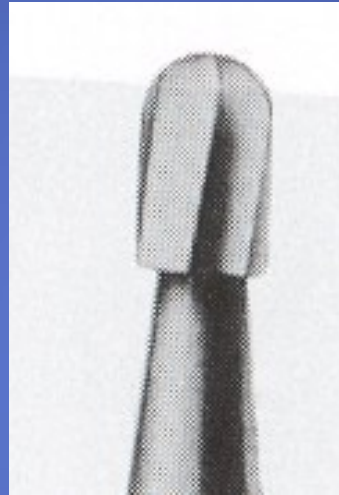
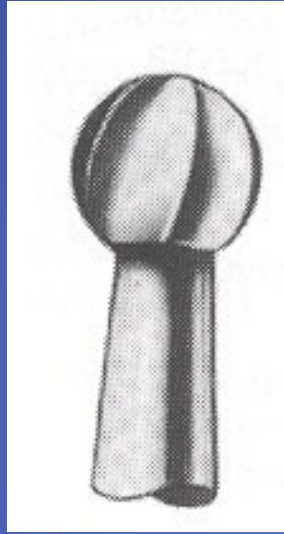
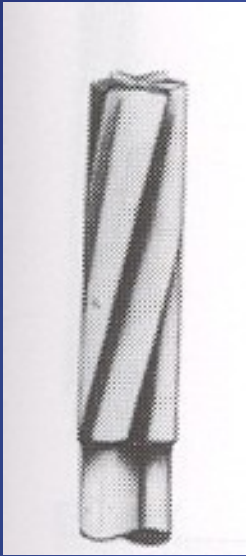
shank







# Burs



↑  
fissure bur , round (ball) bur

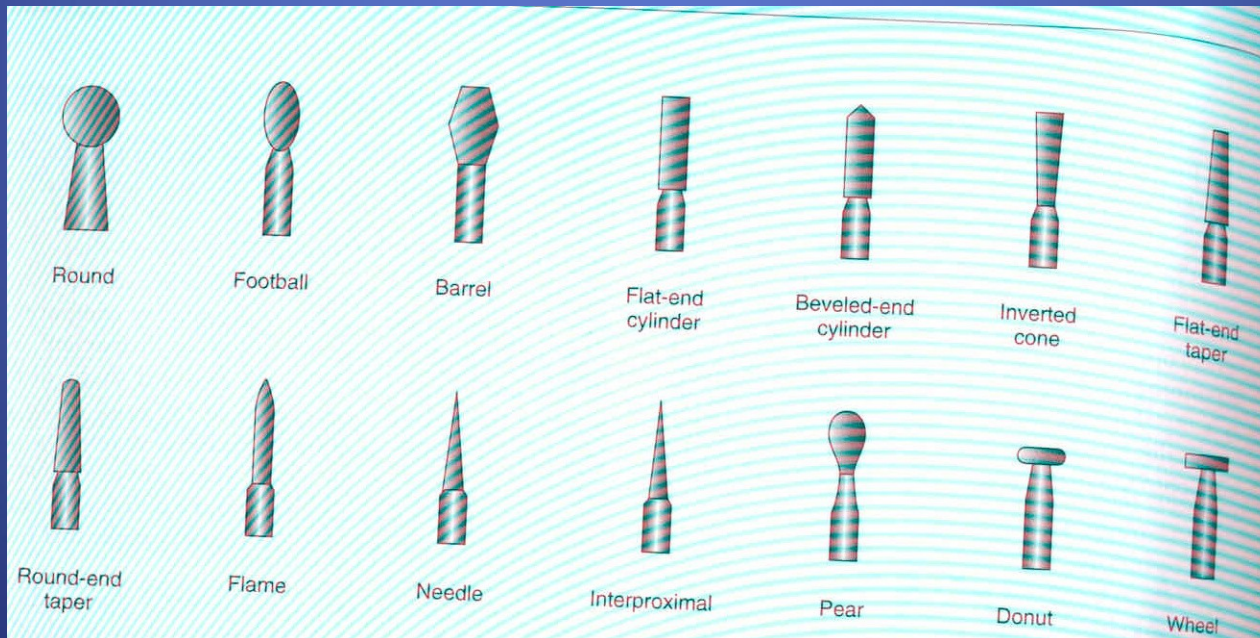
↑  
pear formed bur,,

↑  
inverted cone bur



# Cutting instruments – diamonds head shape

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



# Cutting instruments – diamonds

Extra coarse – black

Coarse – green

Standard – blue or without any marker


Fine - red

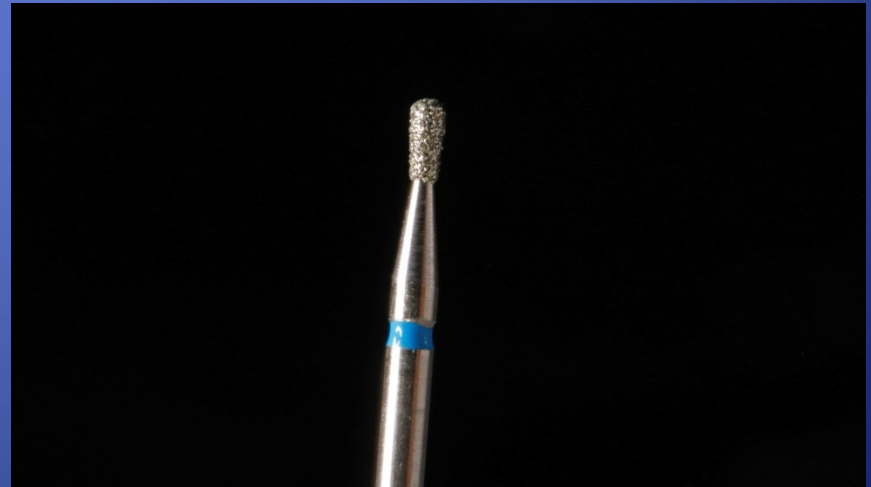
Extra fine - yellow

Ultrafine - white




# Diamonds

- Blue –standard (90 – 120  h) ISO 524  
Universal



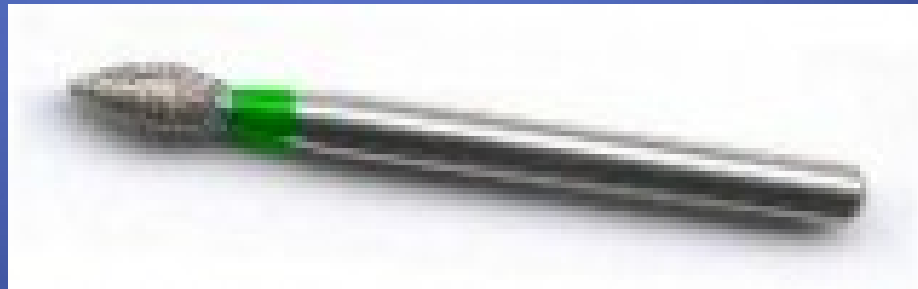
# Diamonds

- Extra coarse (150 – 180 h) ISO 544
- Cutting of crowns, old fillings




# Diamonds

- Removal of old fillings, some preparations in prosthetic




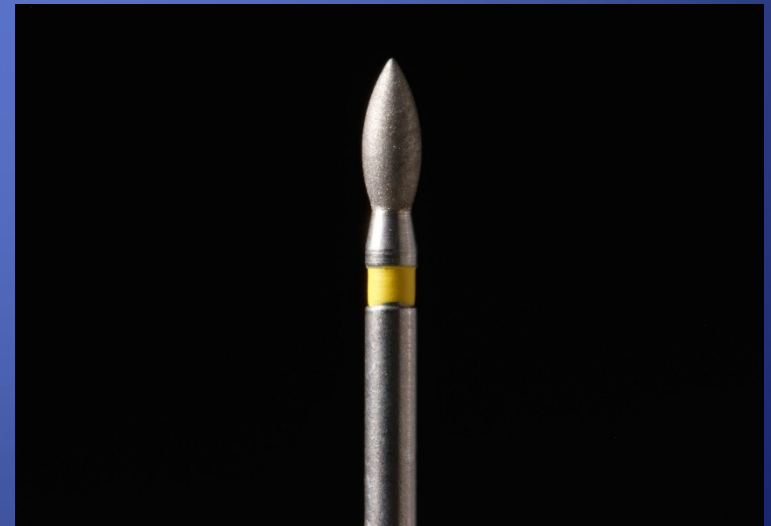
# Diamanonds

- Red fine ( 20 – 40  h) ISO 514
- Finishing of borders of cavities



# Diamanonds

- Extrafine (12 – 22 ) ISO 504, finifshig of composite fillings





# Diamonds

Ultrafine – polishing of composite fillings (6-12  
■) ISO 494



Thank you!