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Preclinical dentistry I.

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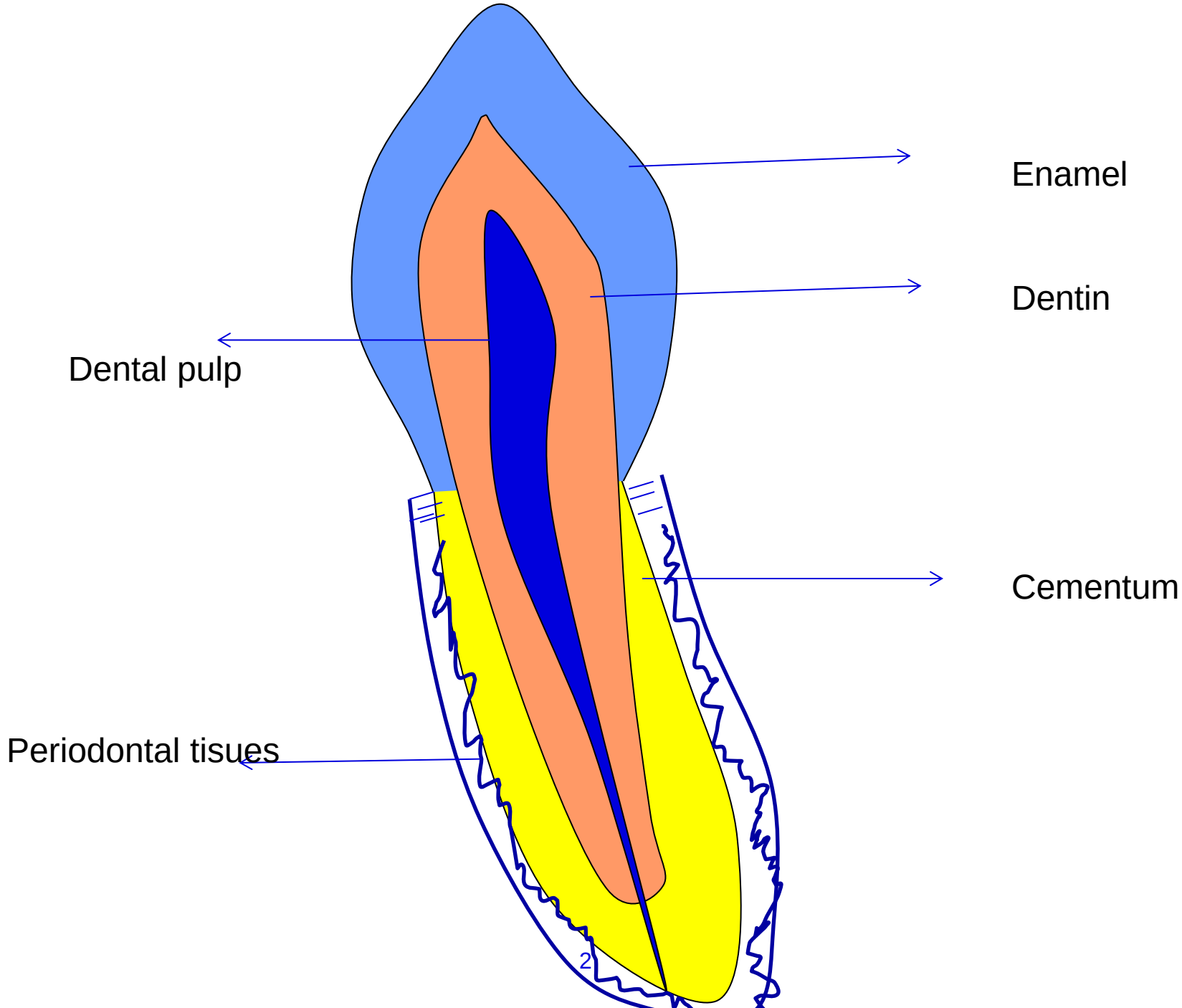
Enamel
Dentin
Dental pulp
Cementum
Periodontal tisues
2

Restorative dentistry

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

Aethiology, ,pathogenesis,diagnosis,therapy and prevention.

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Diseases of hard dental tissues

Congenital – genetic reasons

Postnatal

- Before eruption
- After eruption

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Congenital

- Amelogenesis imperfecta

Enamel is affected

- Dentinogenesis imperfecta

Dentine is affected

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Before eruption

- Hypomineralization (white, brown spots)

- Defects of enamel (hypoplasia)

Reasons

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

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After eruption

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

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First observation of microbs in oral cavity

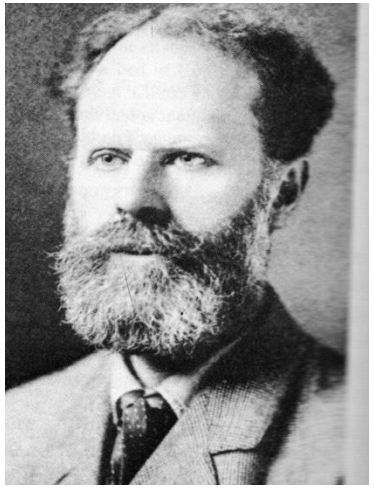
17.century

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.

Dental caries



- **Willoughby Dayton Miller**

  (1853 -1907)

- Explanation – theories

Miller´s theory: chemical – bacteriogical explanation

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Origin of dental caries

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

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Dental biofilm – plaque.

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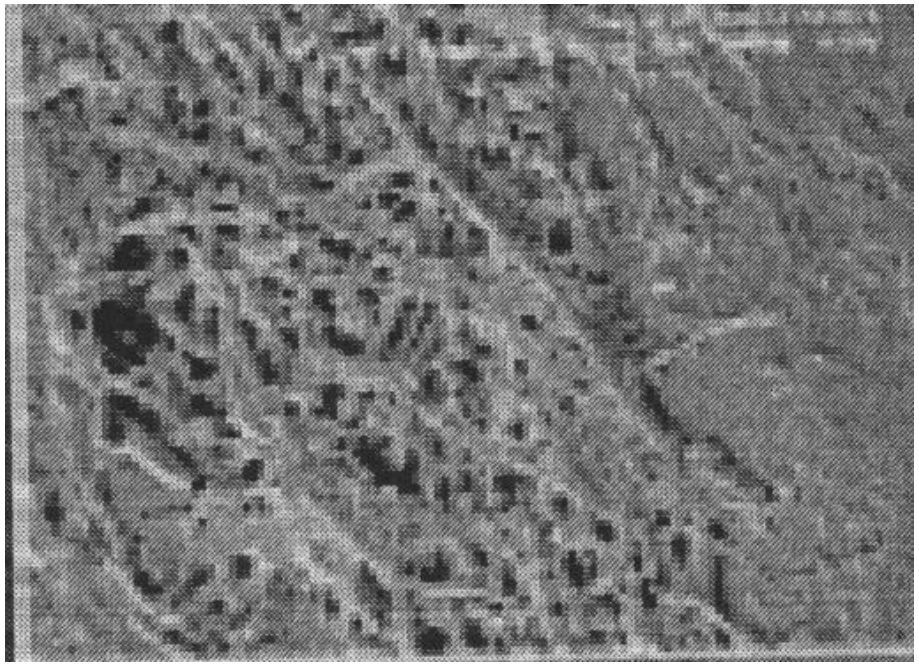
Pelicle

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



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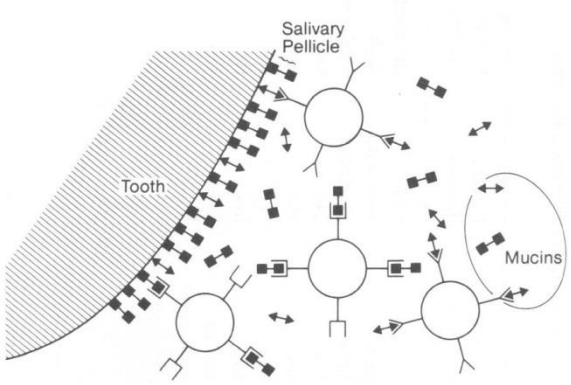
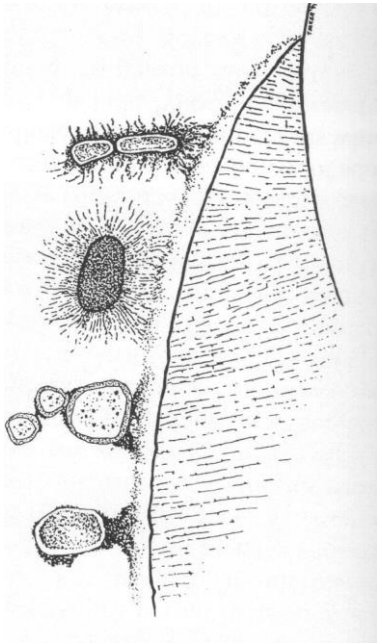
Dental biofilm

- Adherence





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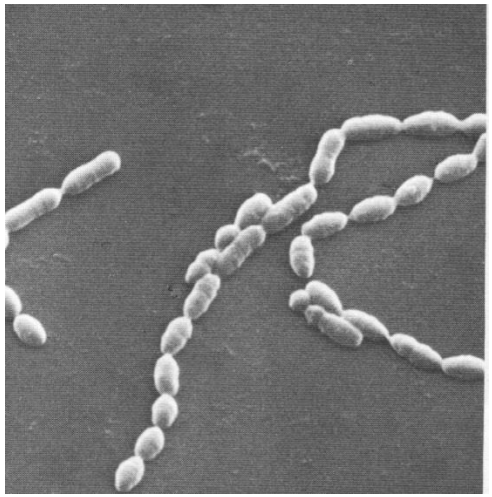
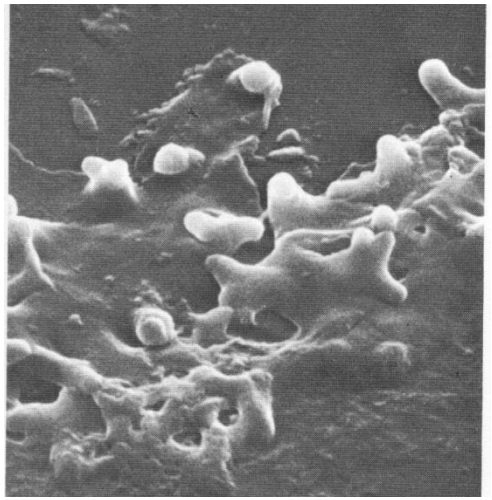
Dental biofilm

- Colonization and coaggregation





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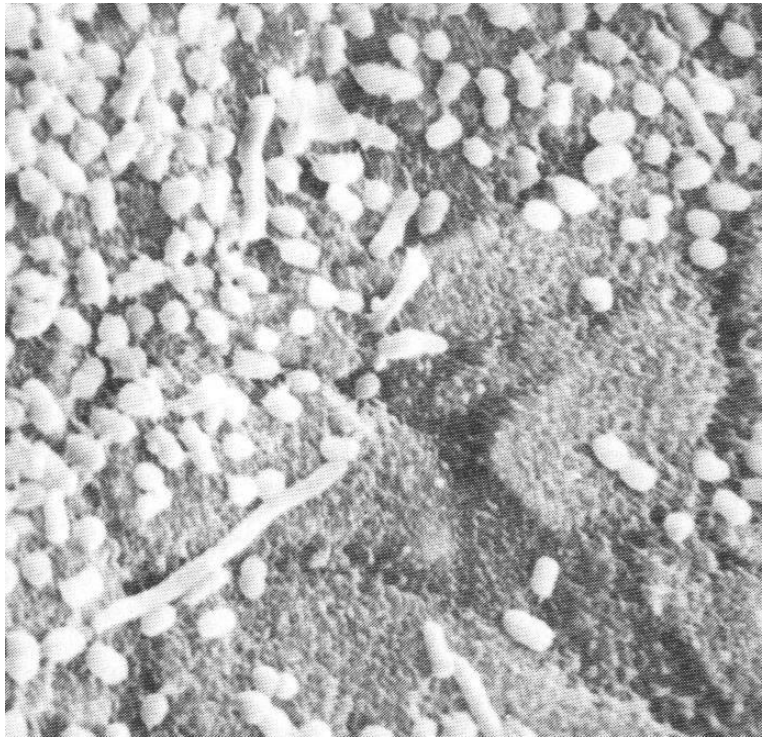
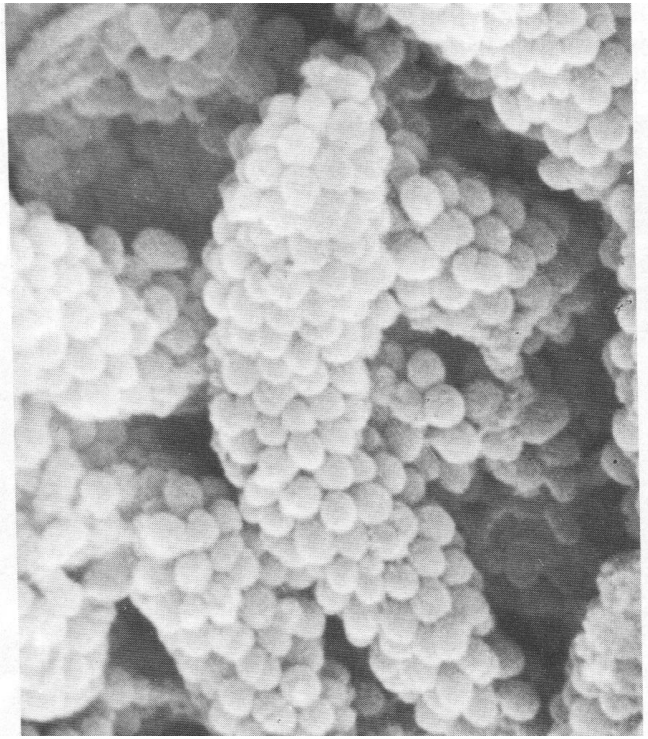
Dental biofilm

- Maturation





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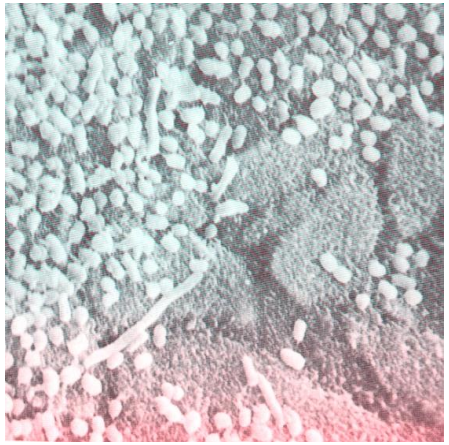
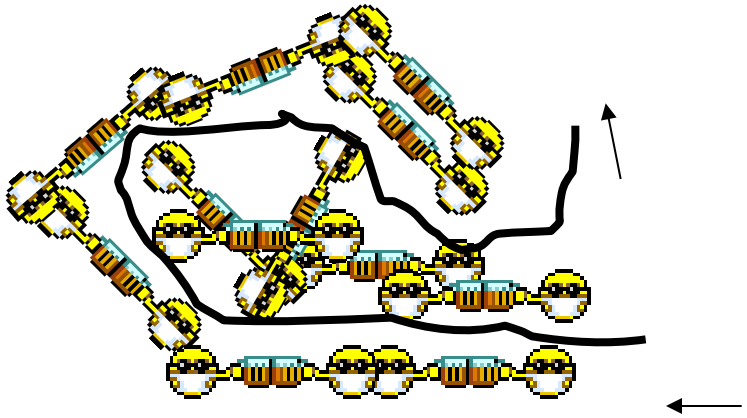
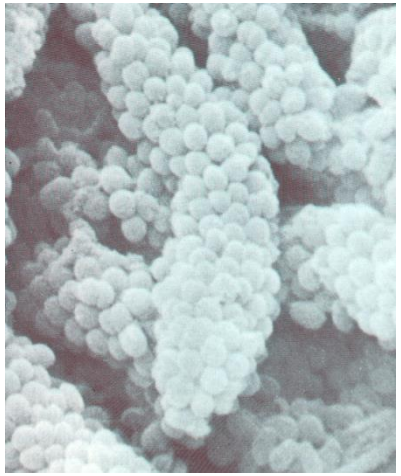
Dental bioifilm

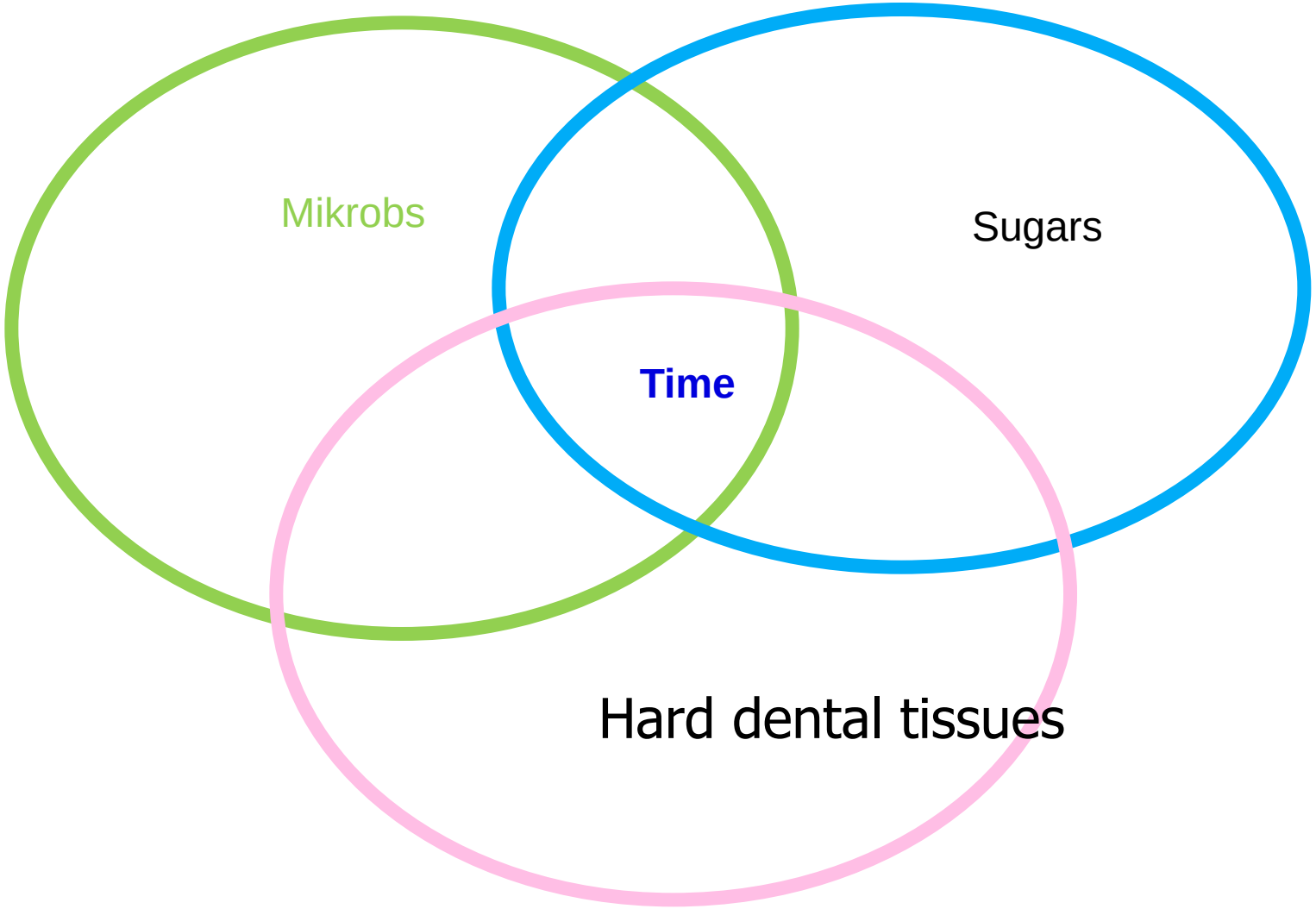


Comunity

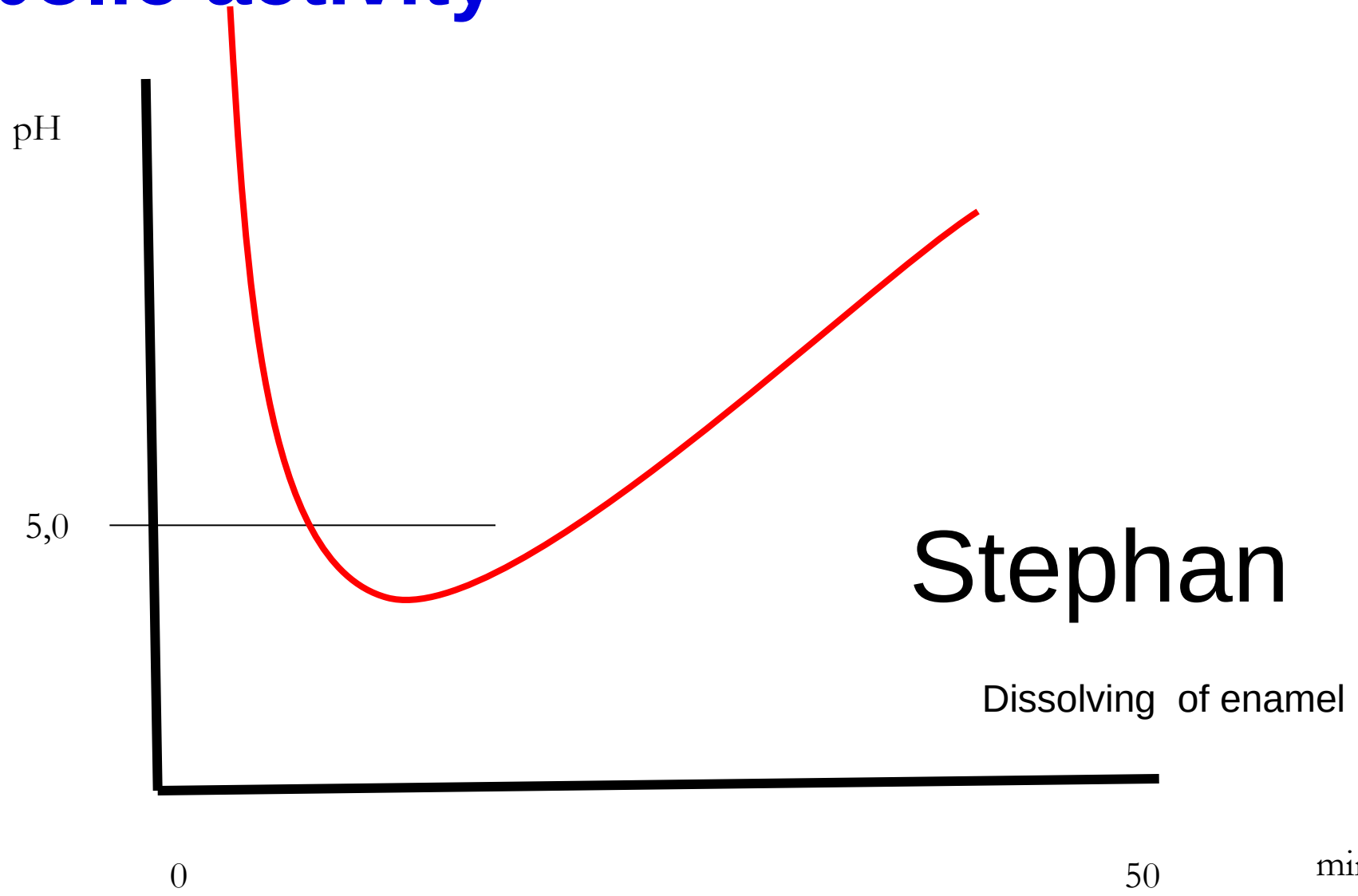




More species,
Better conditions for survival
Higher resistancy
Higher virulency


Mikrobs
Sugars
Time
Hard dental tissues

Metabolic activity



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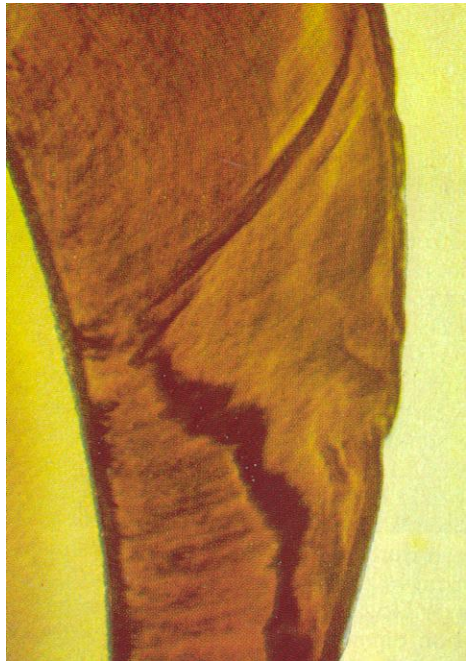
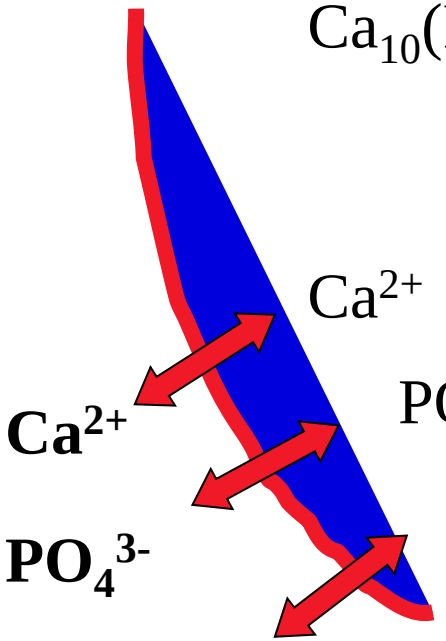


$Ca_{10}(PO_4)_6(OH)_2$

$Ca_{10}(PO4)_6F_2$



Ca^{2+}

PO_4^{3-}

Ca^{2+}

PO_4^{3-}

OH^-

F-

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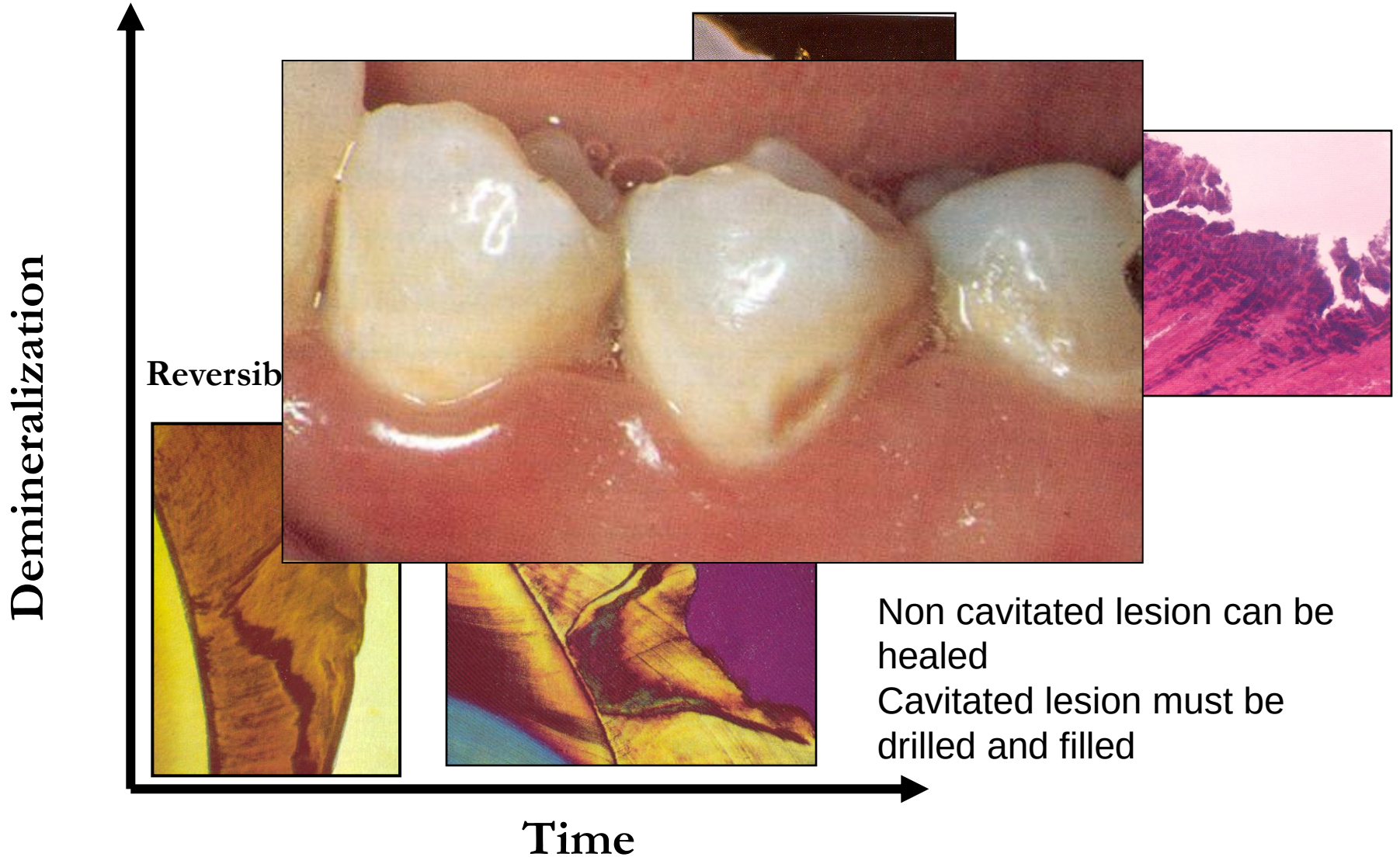
Irreversibil: non cavitated lesion



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

Dental caries is multifactorial disease

- Essential factors
- - necessary

- Co condition factors
- - not necesasary but can influence the expansion

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Co commitans factoras

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

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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

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Habitually clean places

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

  oblique ridge

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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

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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

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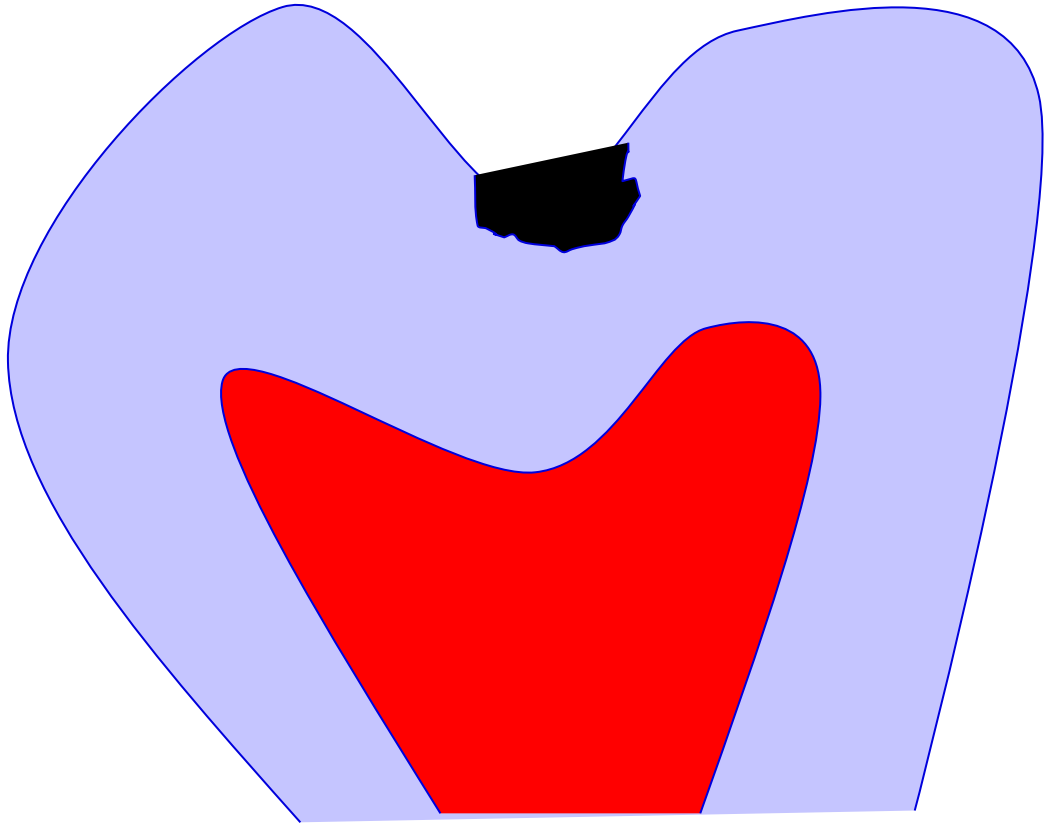
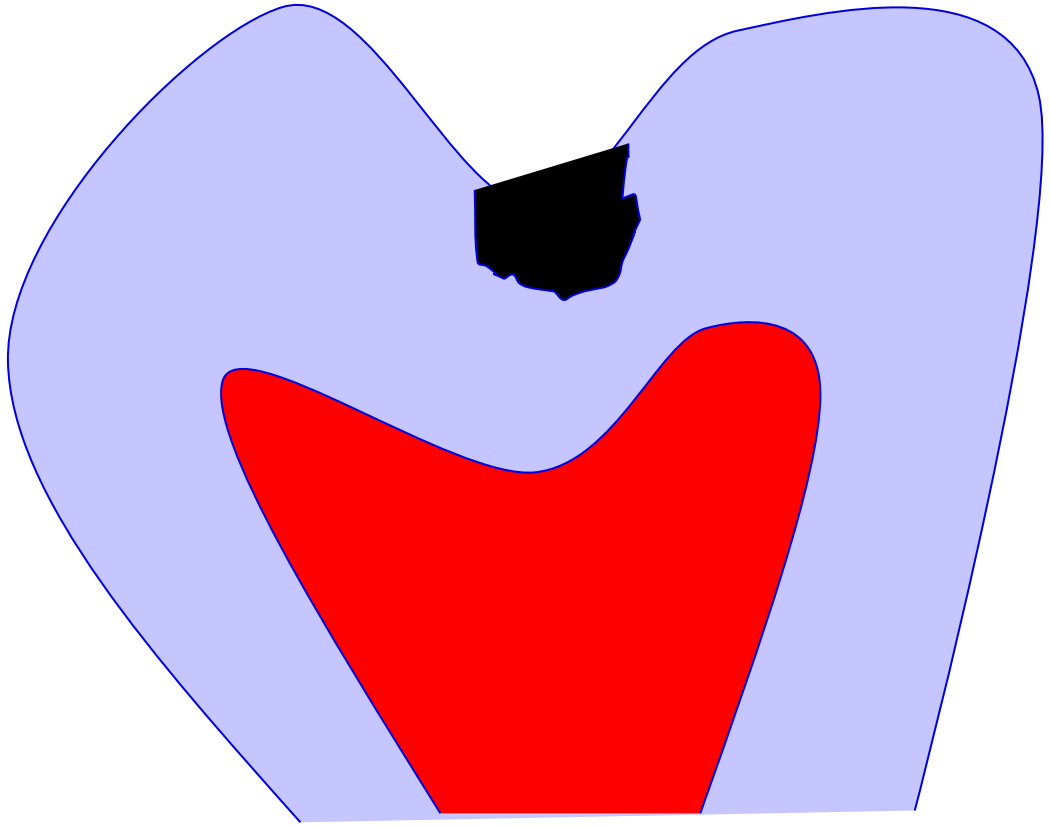
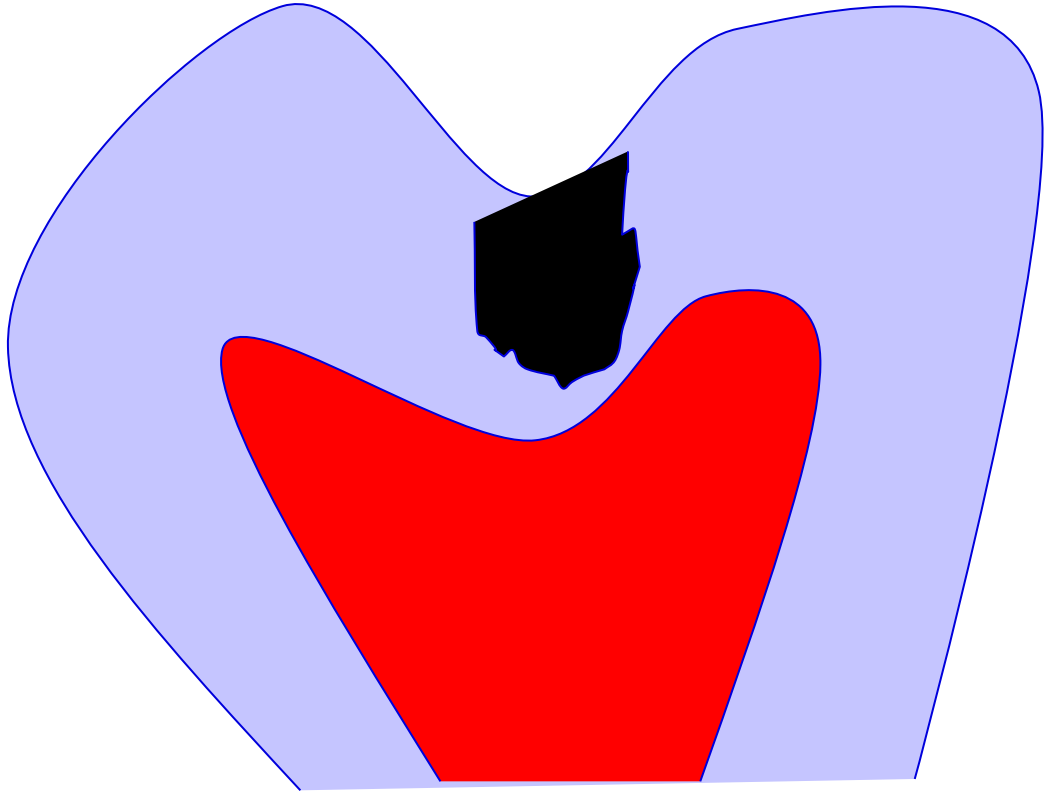
Surface caries



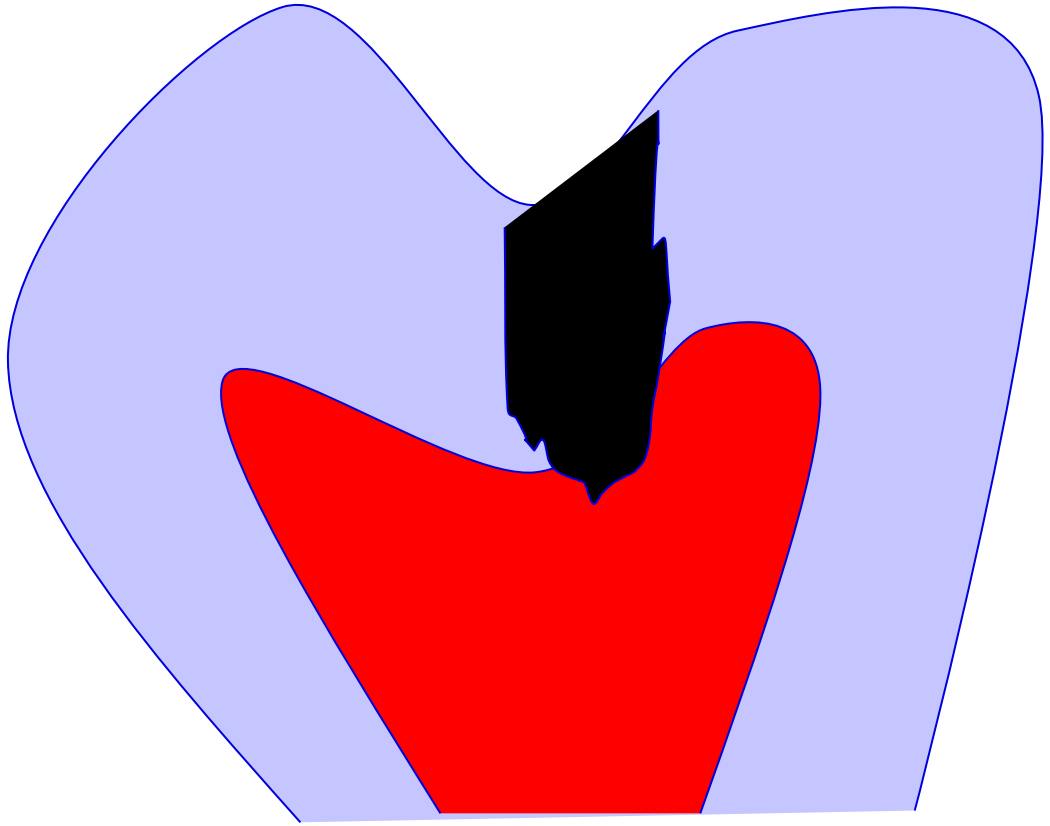
Middle caries



Caries next to dental pulp



Caries penetgrating into dental pulp



Classification of dental caries

According to history

- Acute
- Chronic
- Arrested

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Classification of dental caries

According to origin

- Primary caries
- Secondary caries
- Recurrent caries

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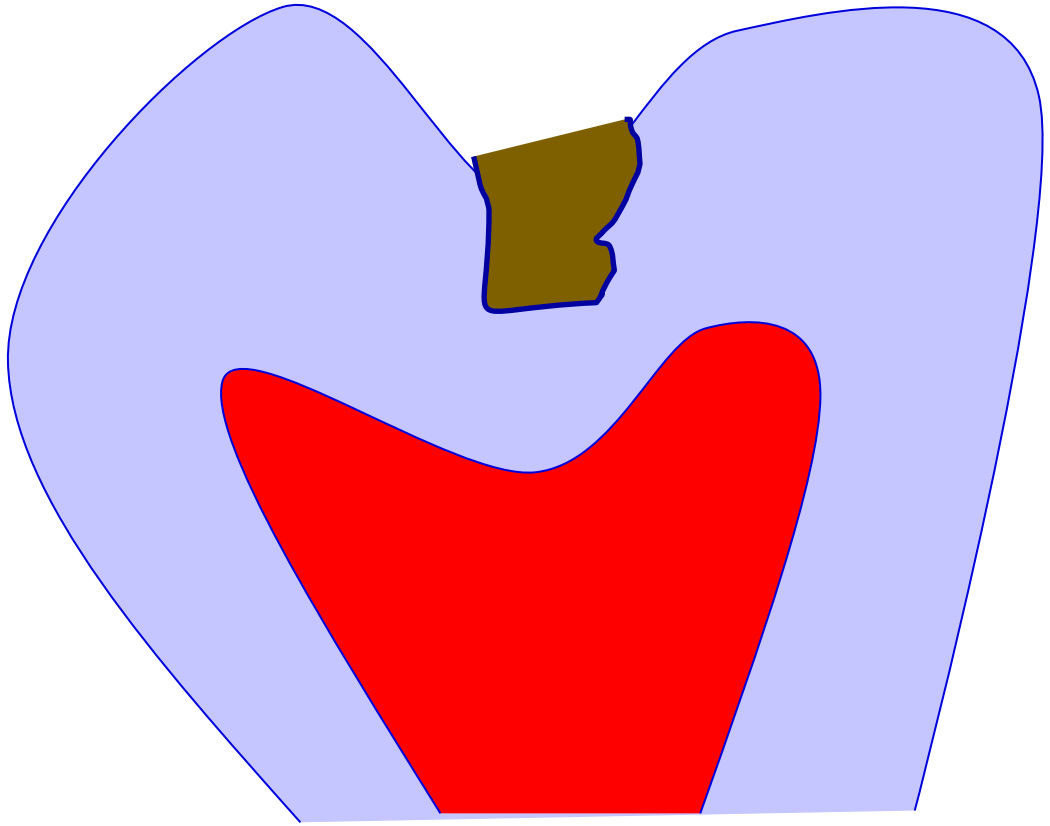
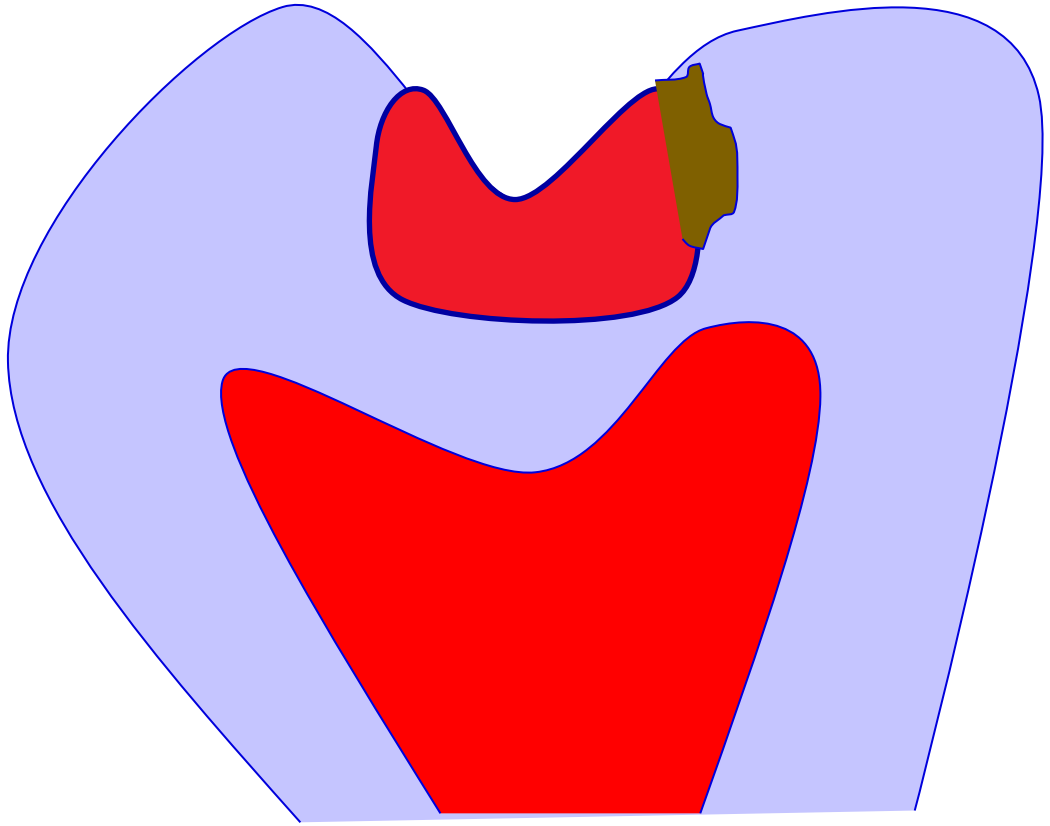
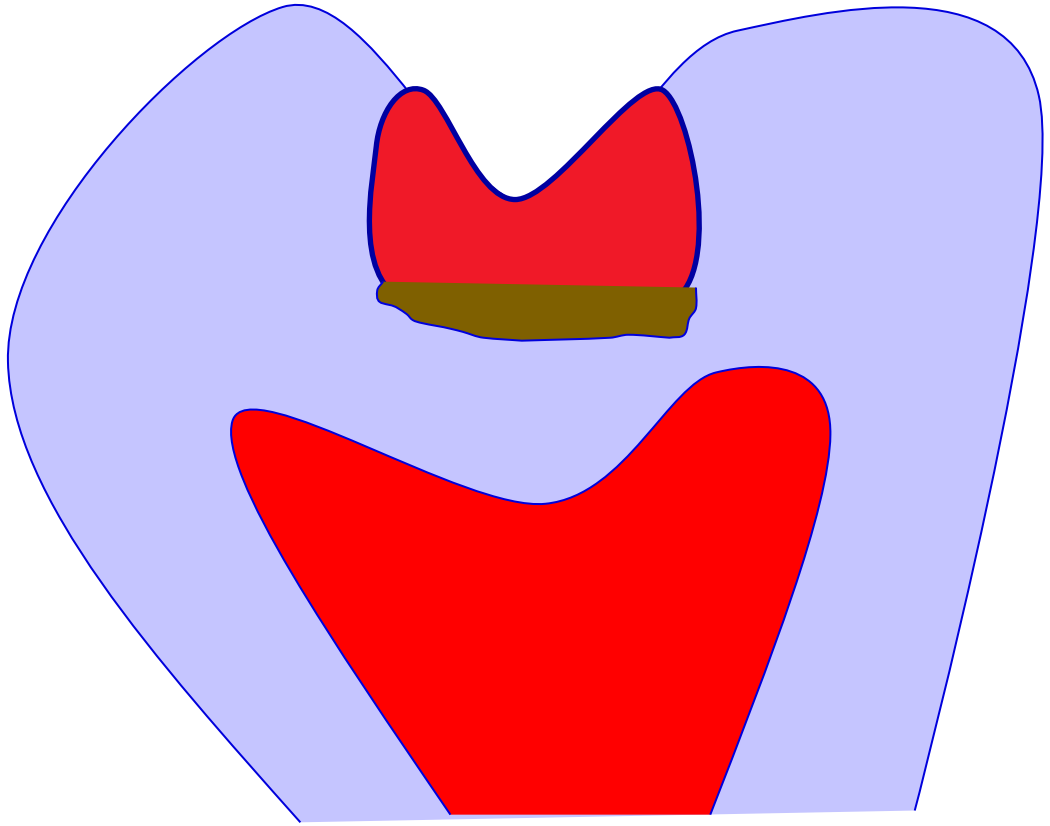
Primary caries



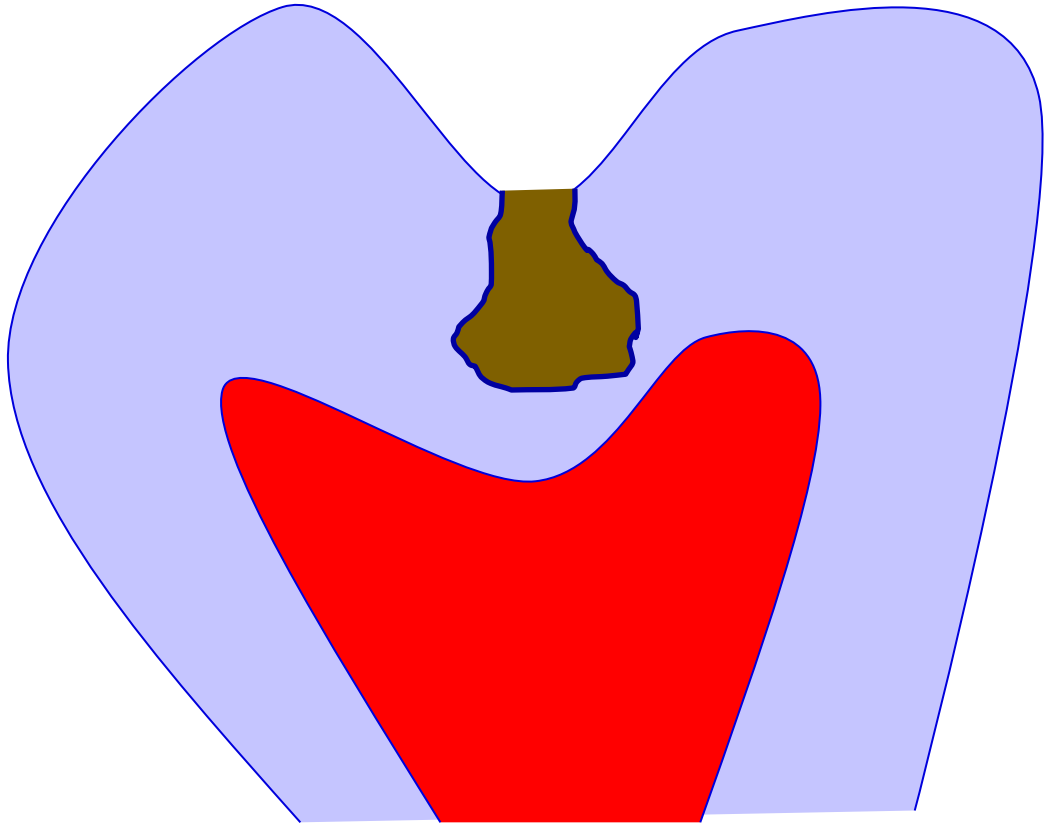
Secondary caries



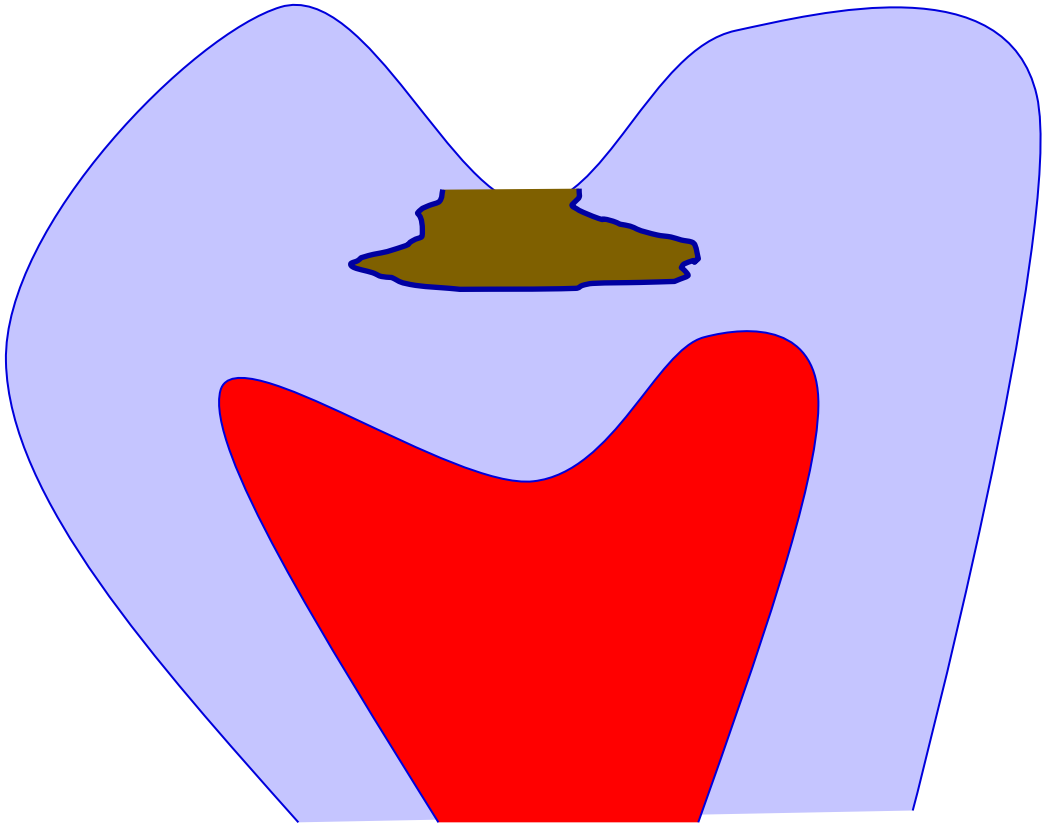
Recurrent caries



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 risk of the caries on treated surface si 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)

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

(Black 1900)

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Classification acc. to Black

- Class I.

Pit and fissure caries

Classification acc. to Black

– Class II.

Proximal surfaces in premolars and molars

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Classification acc. to Black

– Class III.

Proximal surfaces of incisors and canines without

lost an incisal ridge

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Classification acc. to Black

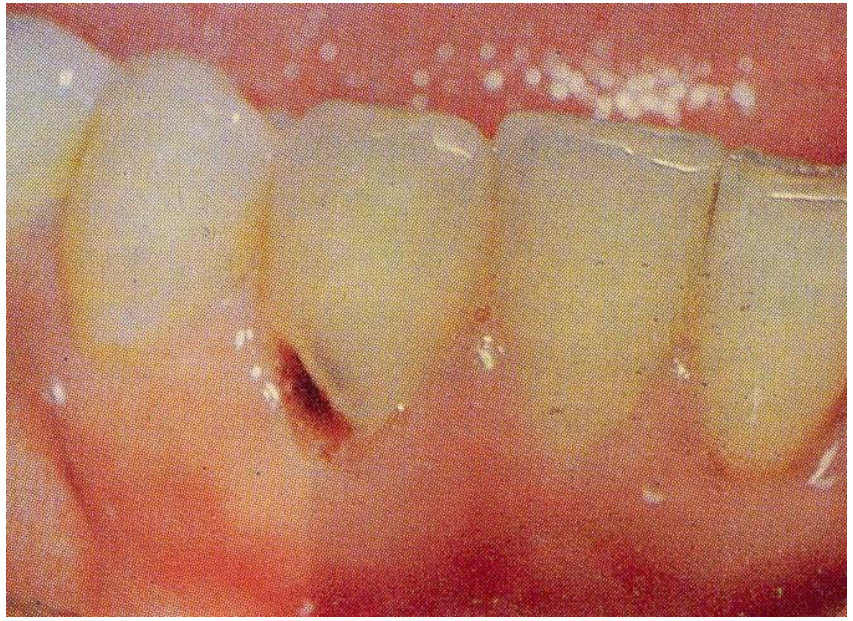
– Class IV.

Proximal surfaces of incisors and canines with

lost an incisal ridge

Classification acc. to Black

– Class V. cervical lesions



Clasification acc. to black

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

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Sequence of operations

Acces to the cavity

Preparation through the hard dental tissues

Removal the undermined enamel

Separation of teeth

Separation or removal of gingiva

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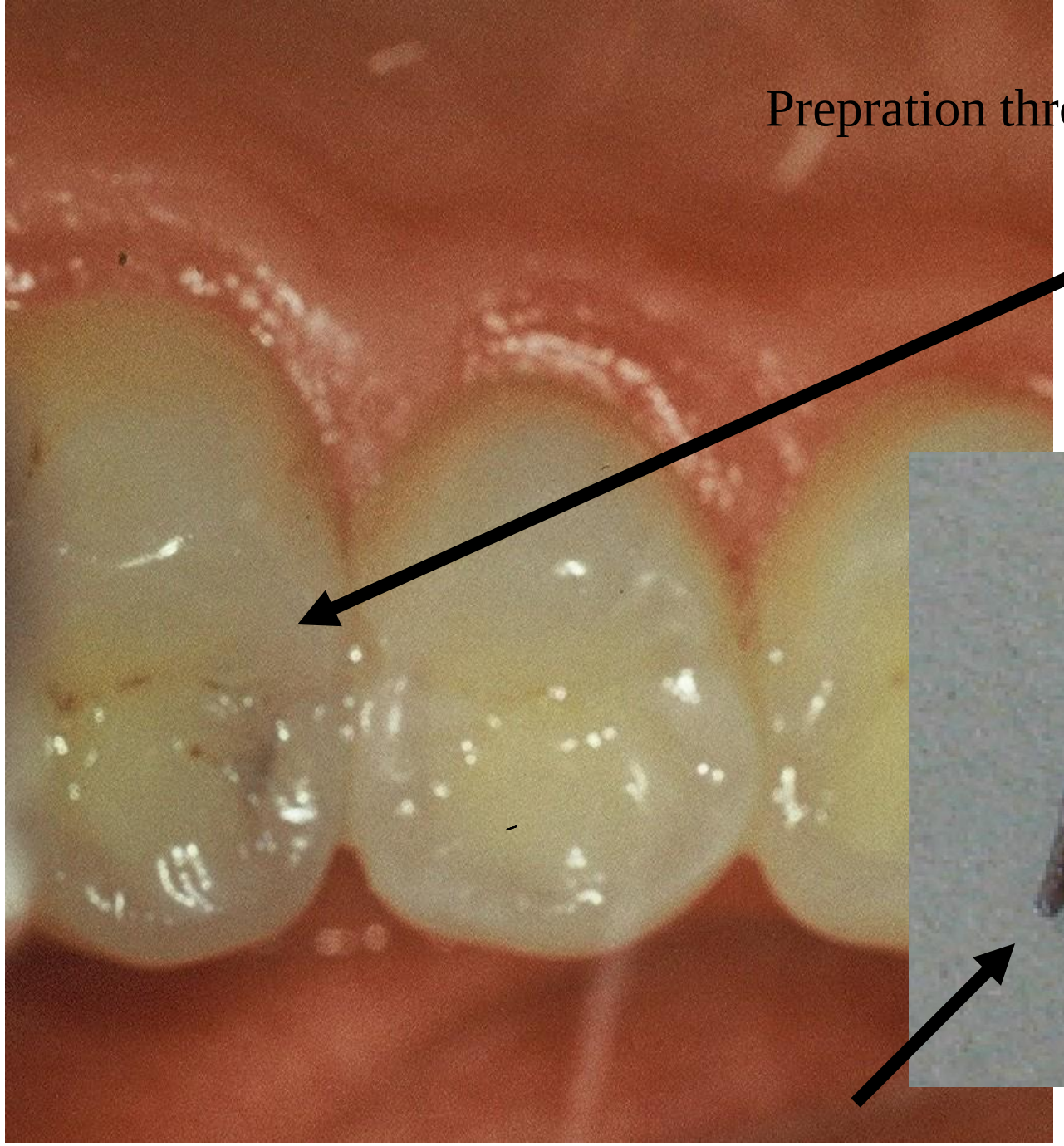
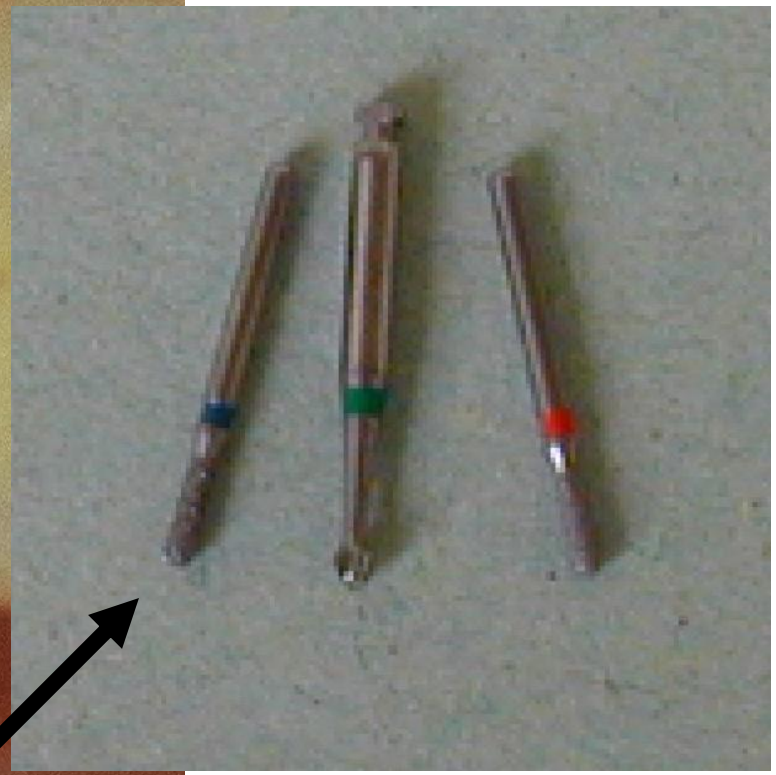
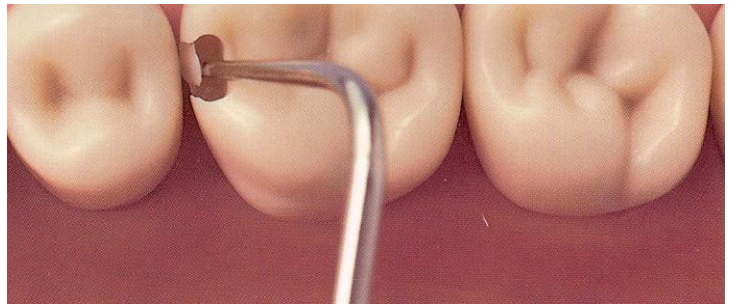
Prepration through hard dental tissues

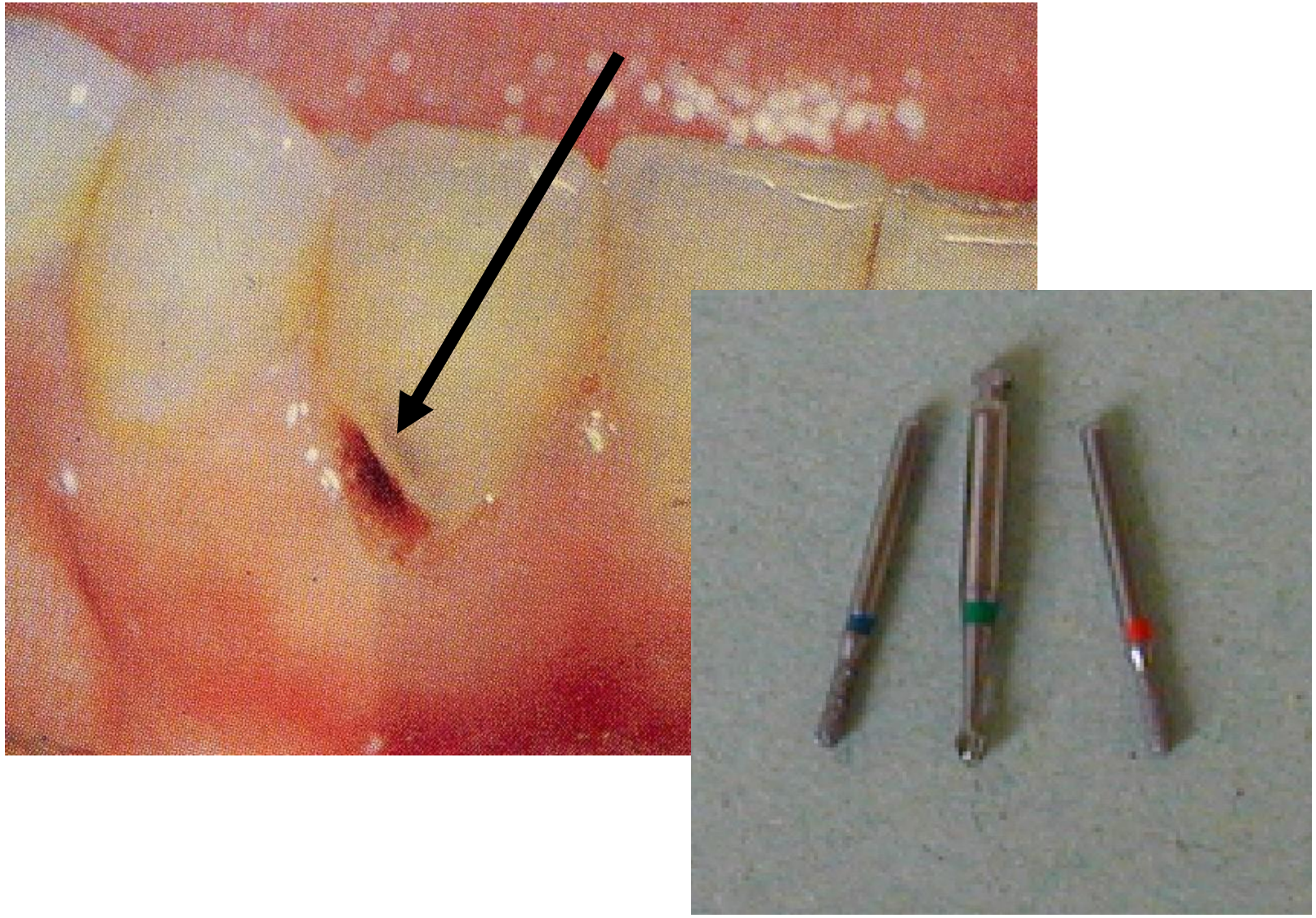






Breaking the enamel

Removal of the undermined enamel



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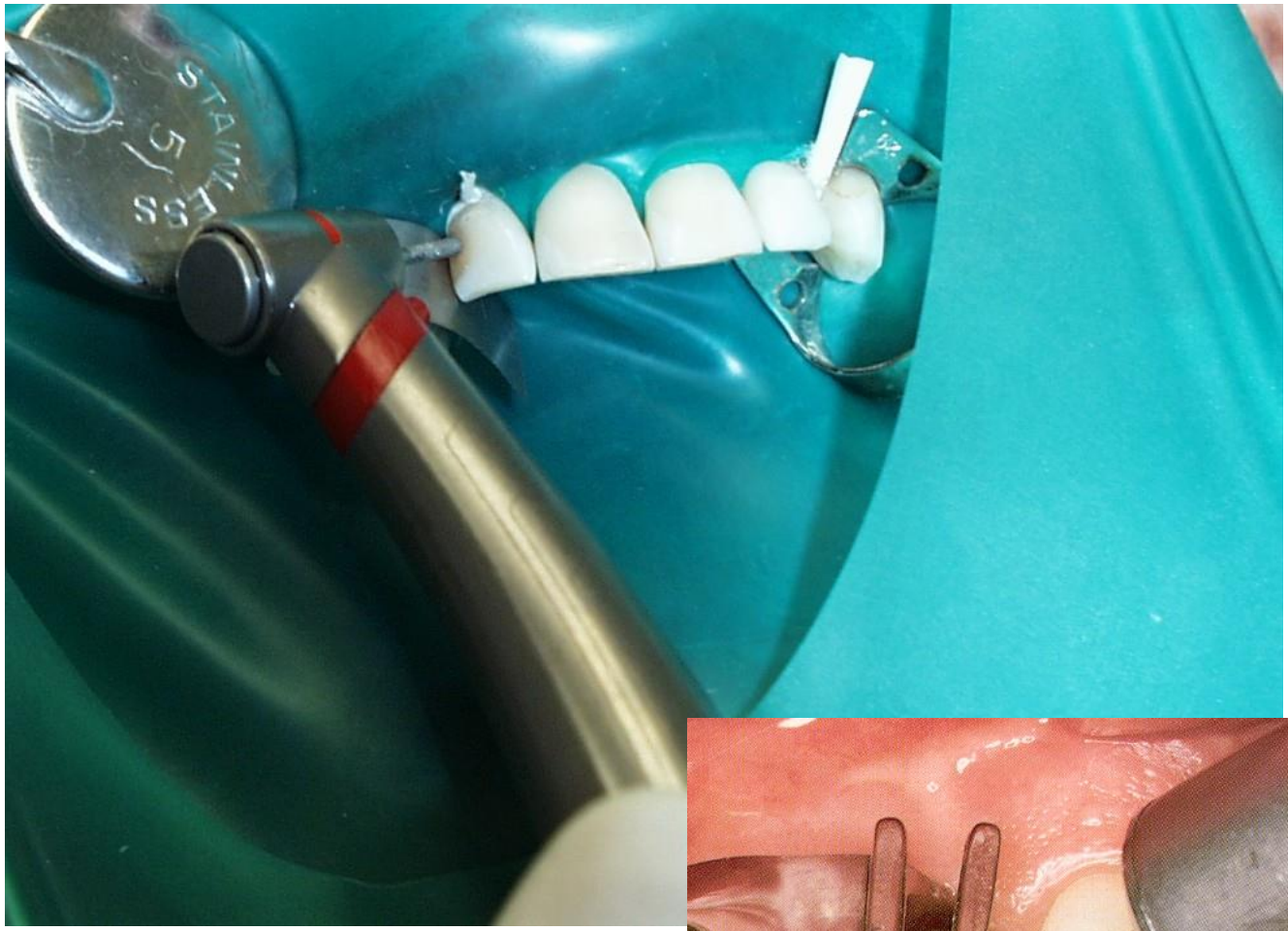
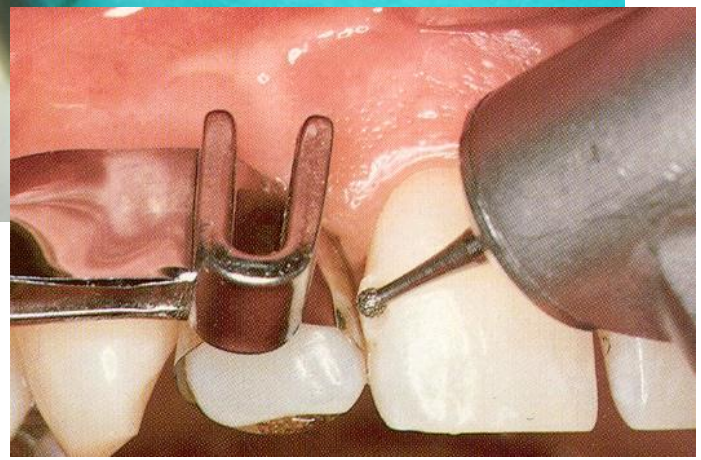
Separation with wooden wedge





Removal of the old filling

Removal of the ingrown gingiva

Sequence of operations

Acces 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, miror, magnification)

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Sequence of operations

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

Depends on
Dental material
Oral hygiene

Precautions of secondary caries

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Sequence of operations

Retention of the filling

Precautions of its lost

Macromechanical retention

Micromechanical retention

Chemical retention

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Sequence of operations

Resistance of the restored tooth

Against occlusal and other forces

Depends on

- *Material*
- *Individual occlusal forces*

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Sequence of operations

Excavation of carious dentin

Necessary (risk of recurrent caries)

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

or

Excavator (hand instrument)

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Sequence of operations

Finishing of the walls

Depends on the kind of material

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

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Protection of dentin wound

- Filling itself

- Base (below the filling – protection against thermal exposure ot toxiccity of dental materials)

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Sequence of operations

Final control

Direct or indirect view

Good illumination

Magnification

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Preparation

- Hand

  Excavator, cleaver

- Power driven
- Rotary
- Non standard preparation

  Burs, diamonds

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Chisel – for enamel
Cleaver

Chisel for enamel

Excavator

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Motors and handpieces

Turbine

Micromotor

Handpiece

Turbine

Turbine

300.000 - 400.000 rpm

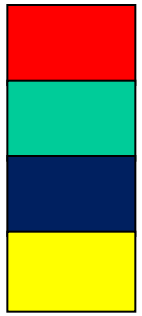
Big force, les control, small torque

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

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Cutting instruments

Burs

Steel

Tungsten carbide

Diamonds

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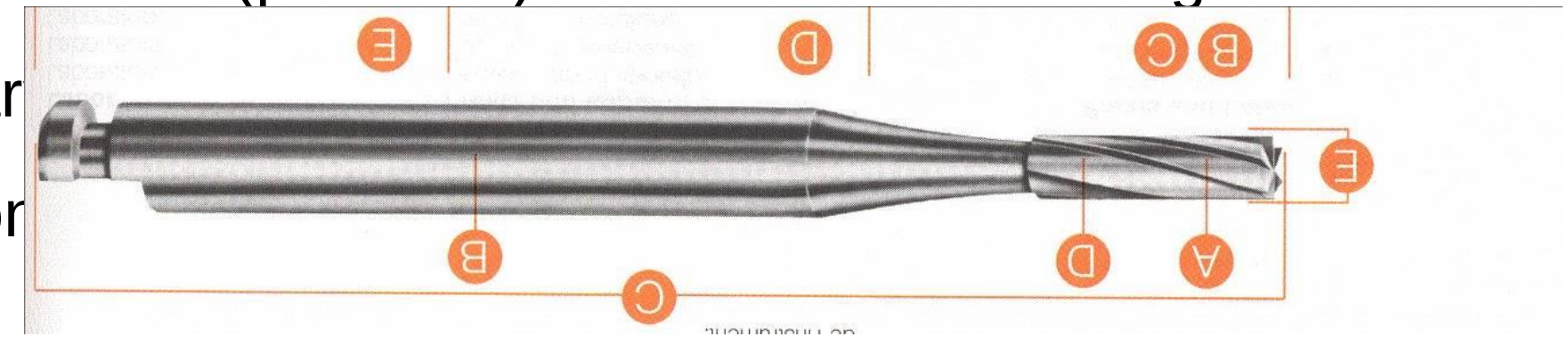
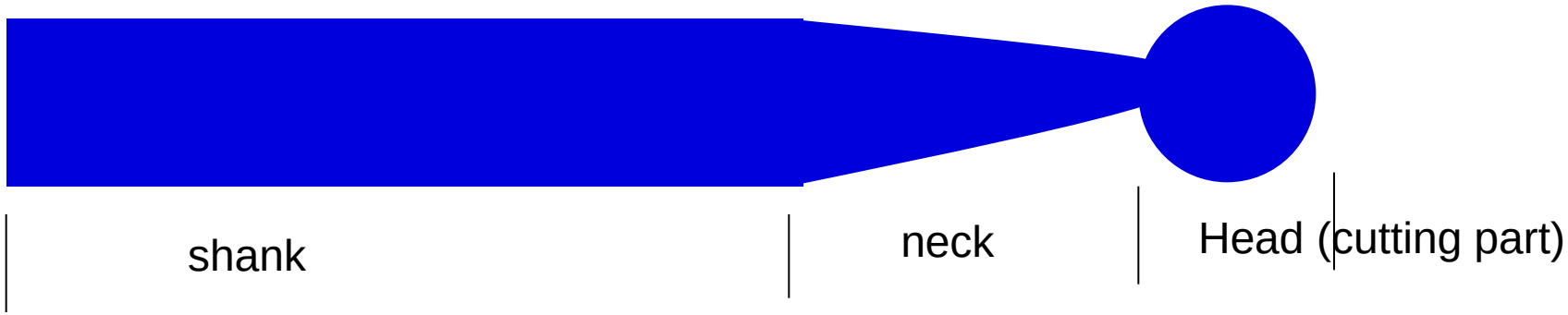
Cutting instruments

Power driven (powered) instruments for cutting

- Rotar

Comor





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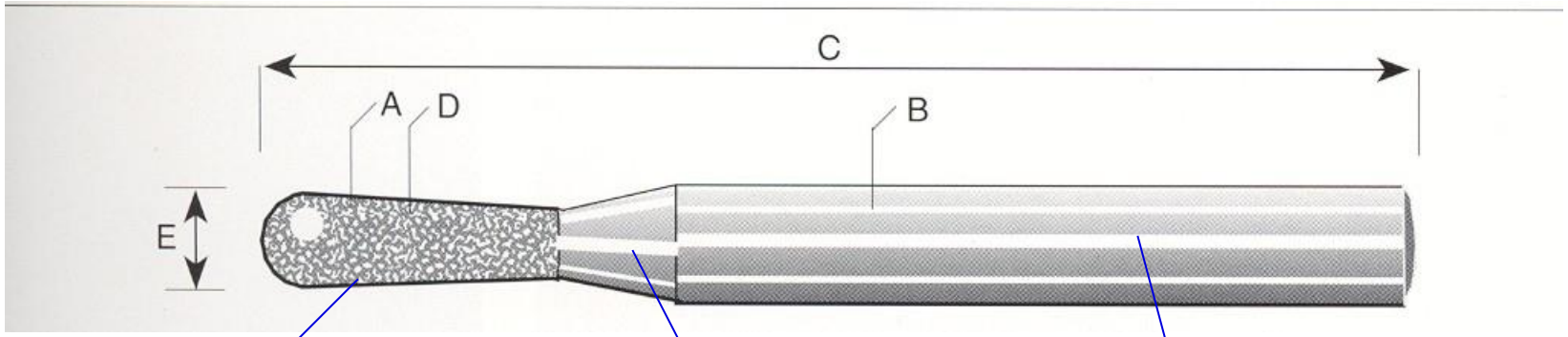
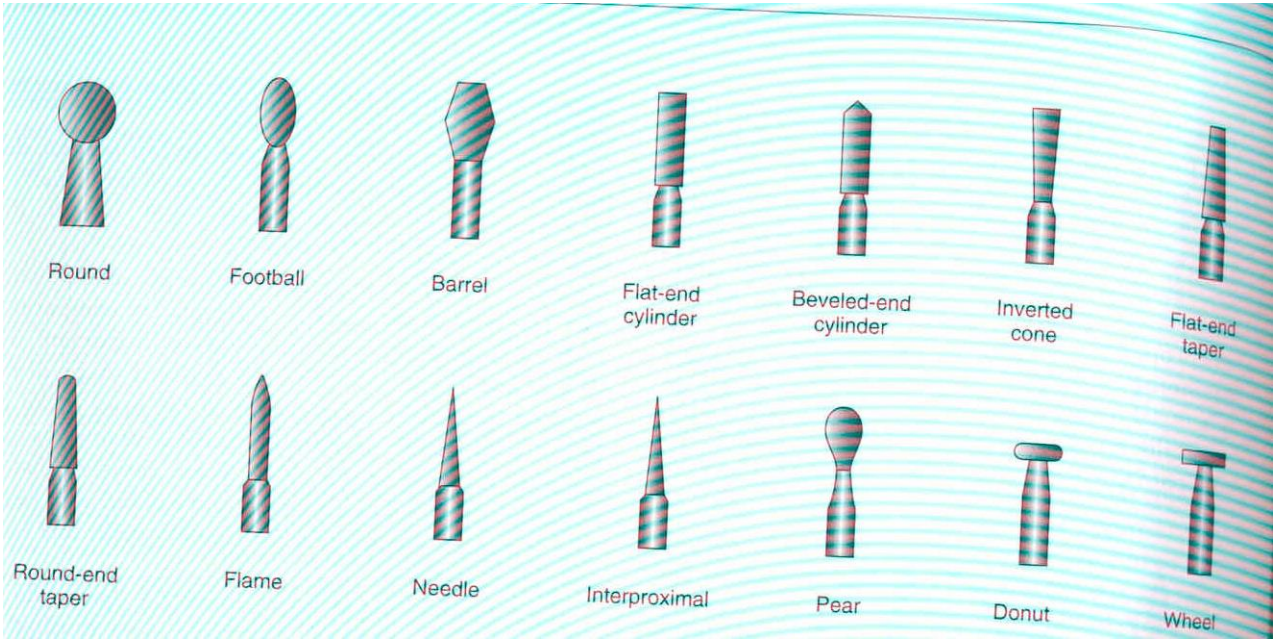
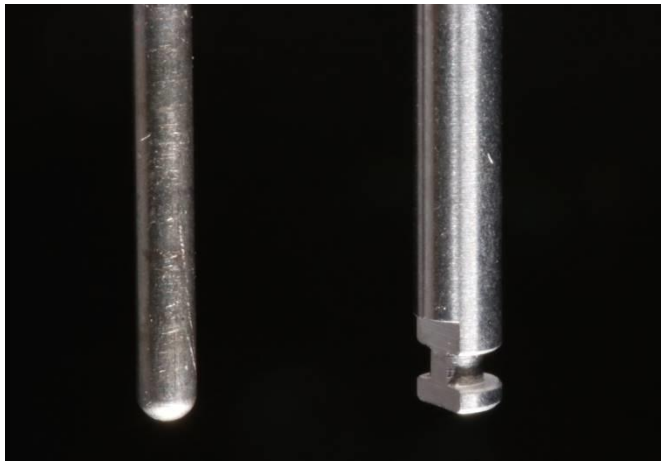
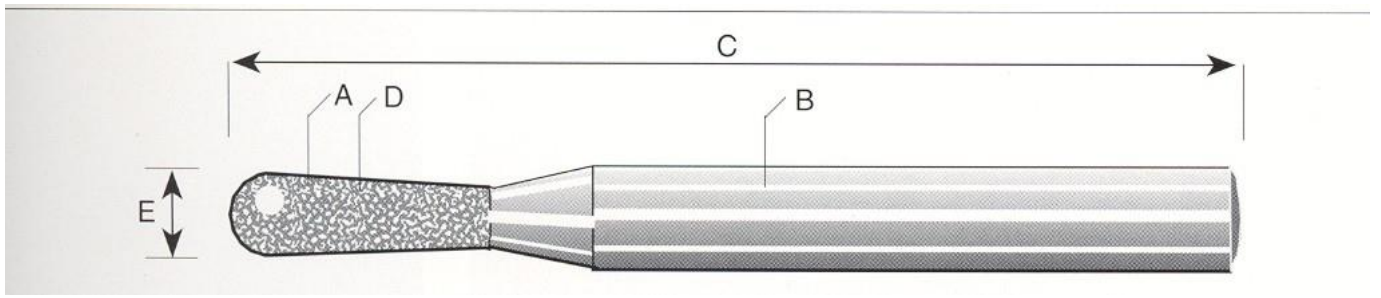
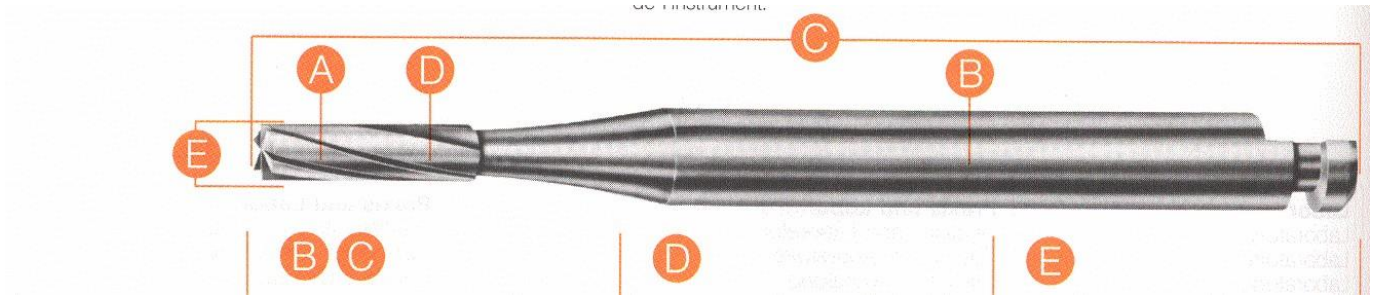


Head (cutting part) neck shank

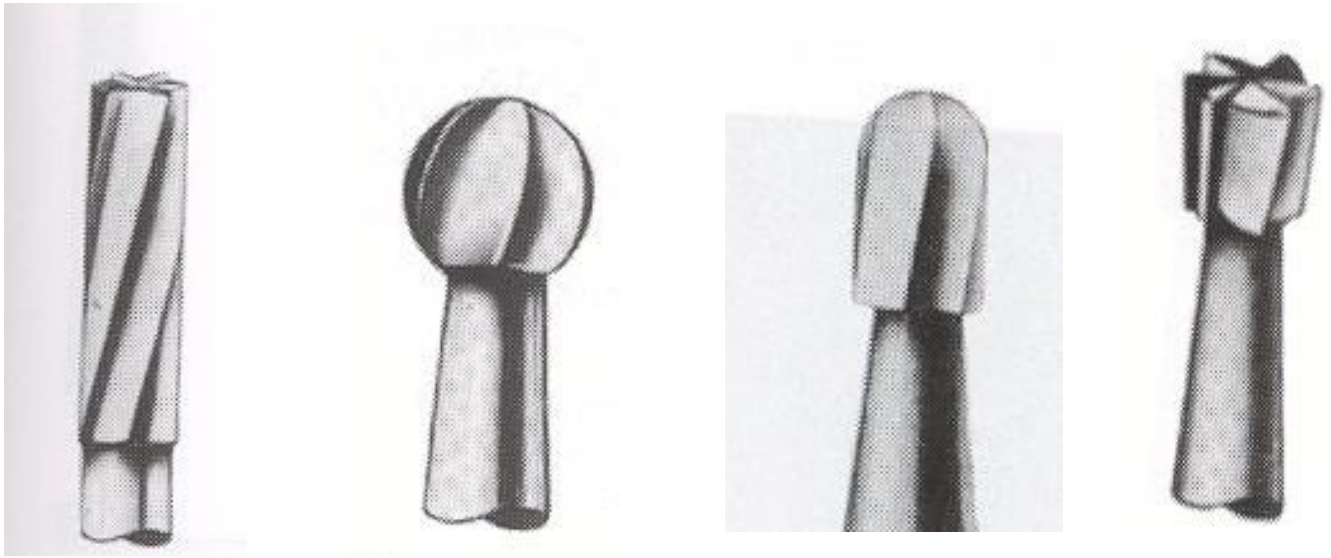





C
A
D
B
E


C
A
D
B
E
B
C
D
E

Burs



fissure bur , round (ball) bur pear formed bur,, inverted cone bur

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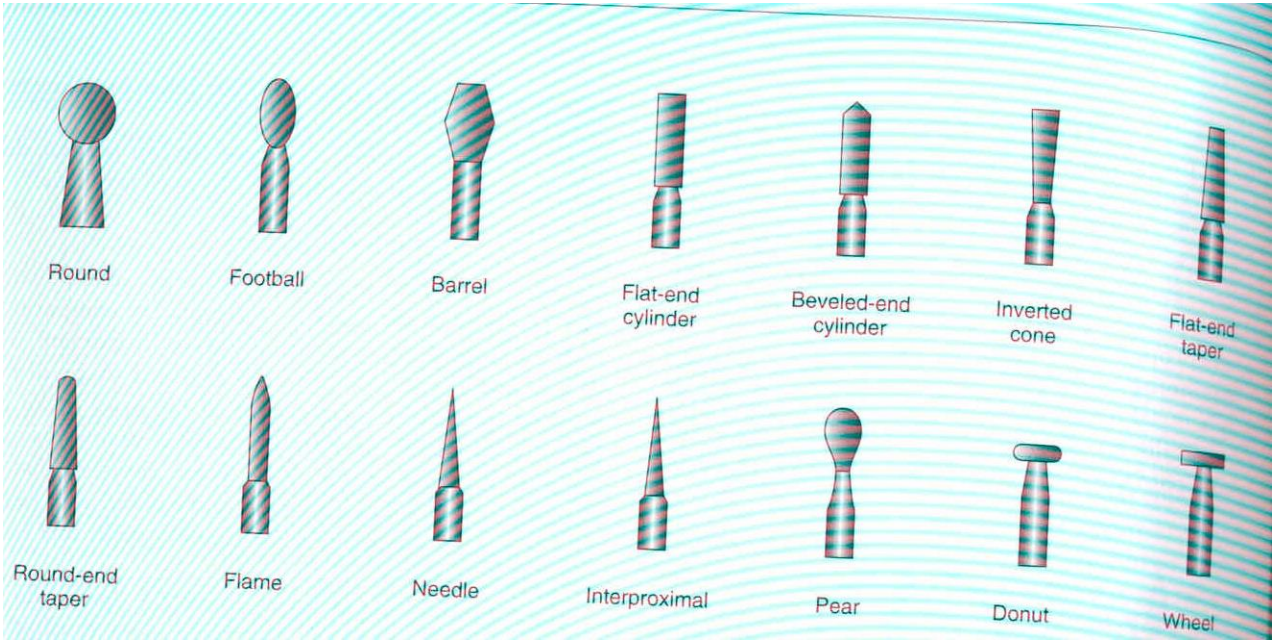
Cutting instruments – diamonds head shape

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



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Cutting instruments – diamonds

Extra coarse – black

Coarse – green

Standard – blue or without any marker

Fine - red

Extra fine - yellow

Ultrafine - white

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Diamonds

Blue –standard (90 – 120 μm) ISO 524
Universal

Diamonds

Extra coarse (150 – 180 μm) ISO 544

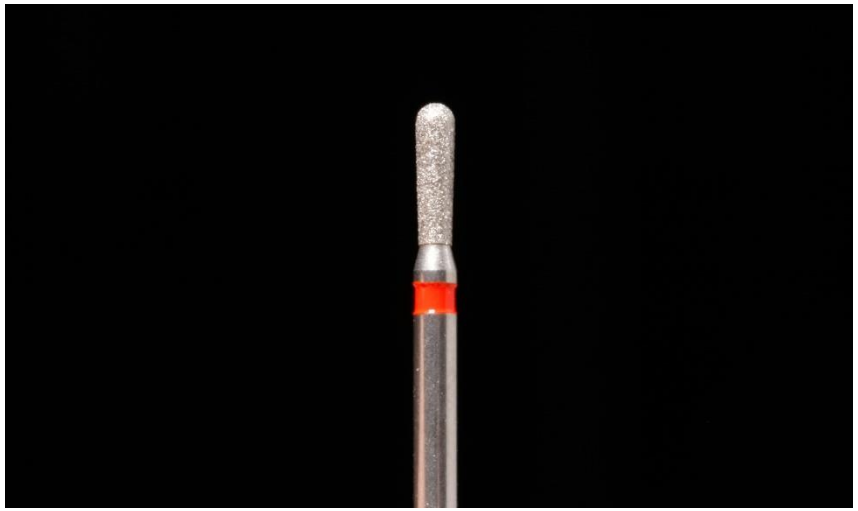
Cutting of crowns, old fillings

Diamonds

Removal of old fillings, some preparations in prosthetic

Diamanonds

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



Diamanonds

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

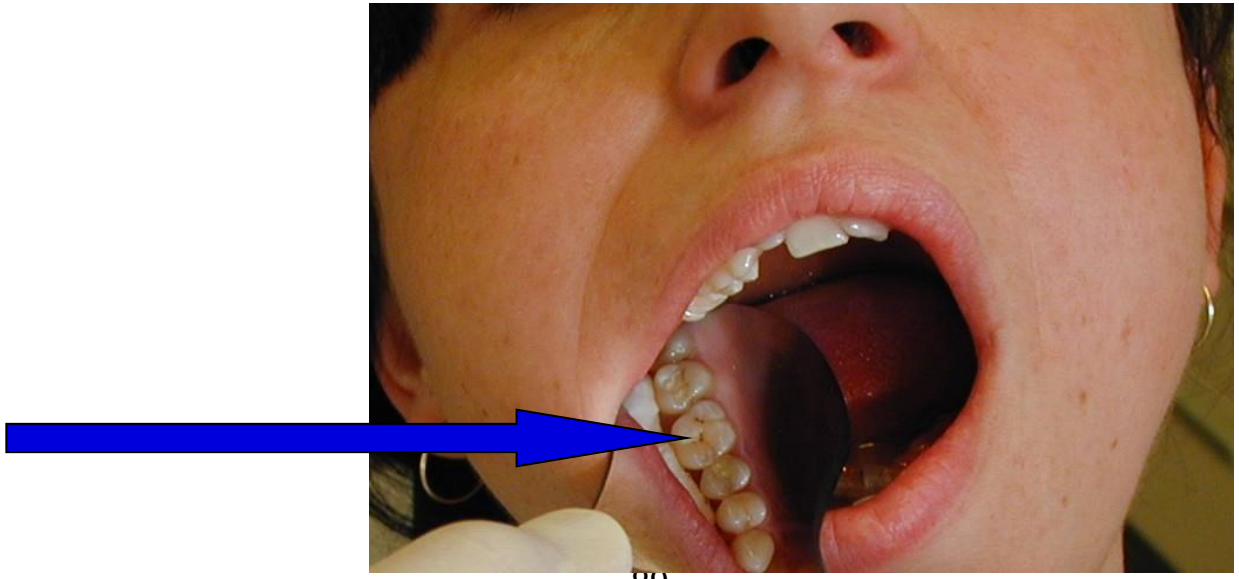
Diamonds

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

Classification acc. to Black

- Class I.

Pit and fissure caries



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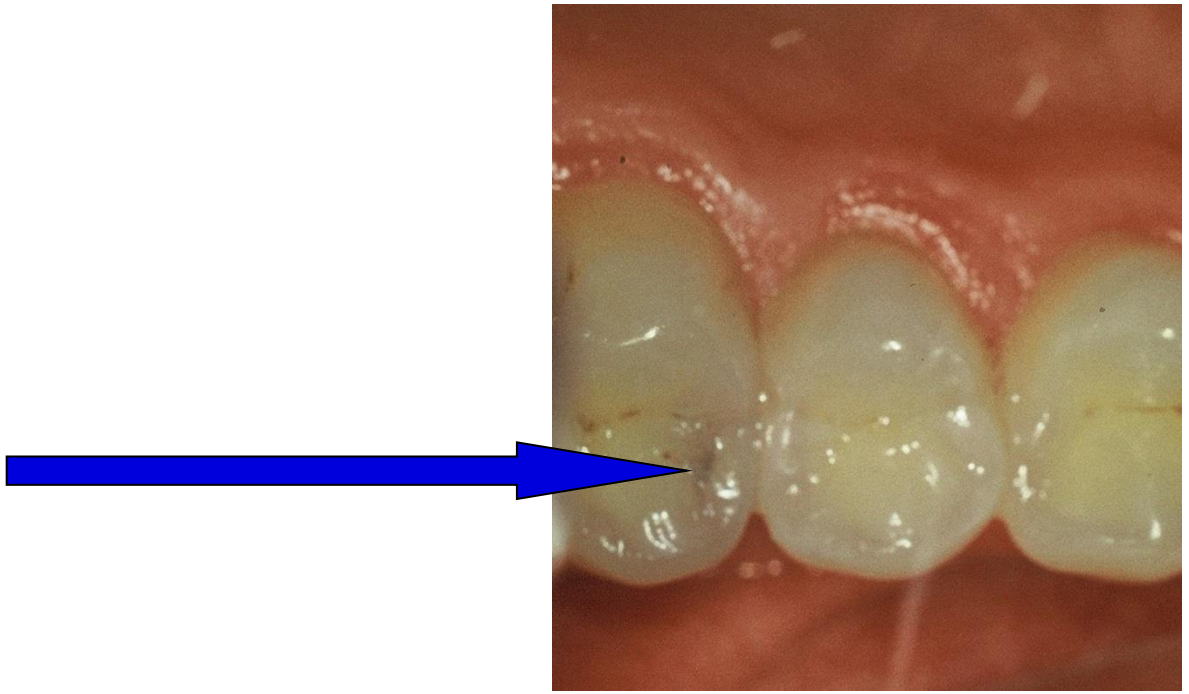
Classification acc. to Black

– Class II.

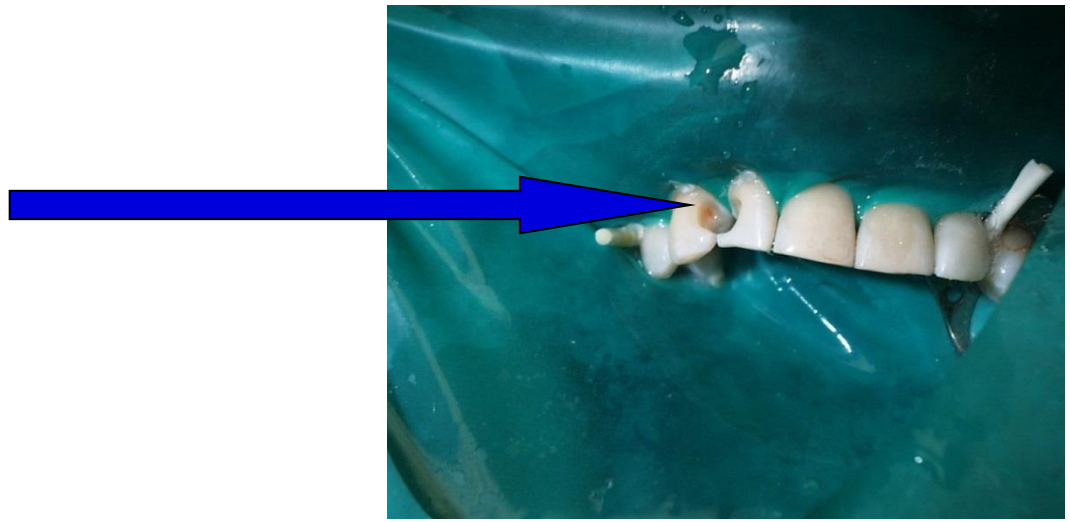
Proximal surfaces in premolars and molars



Classification acc. to Black

- Class III.

Proximal surfaces of incisors and canines without lost any part if incisal edge

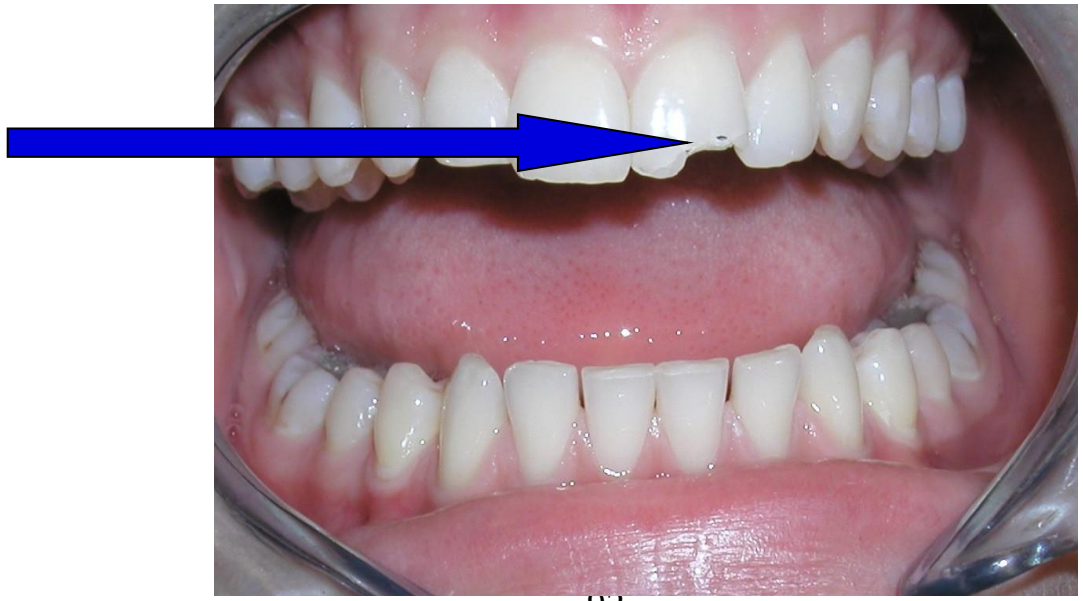


Classification acc. to Black

– Class IV.

Proximal surfaces of incisors and canines with

lost an incisal ridge



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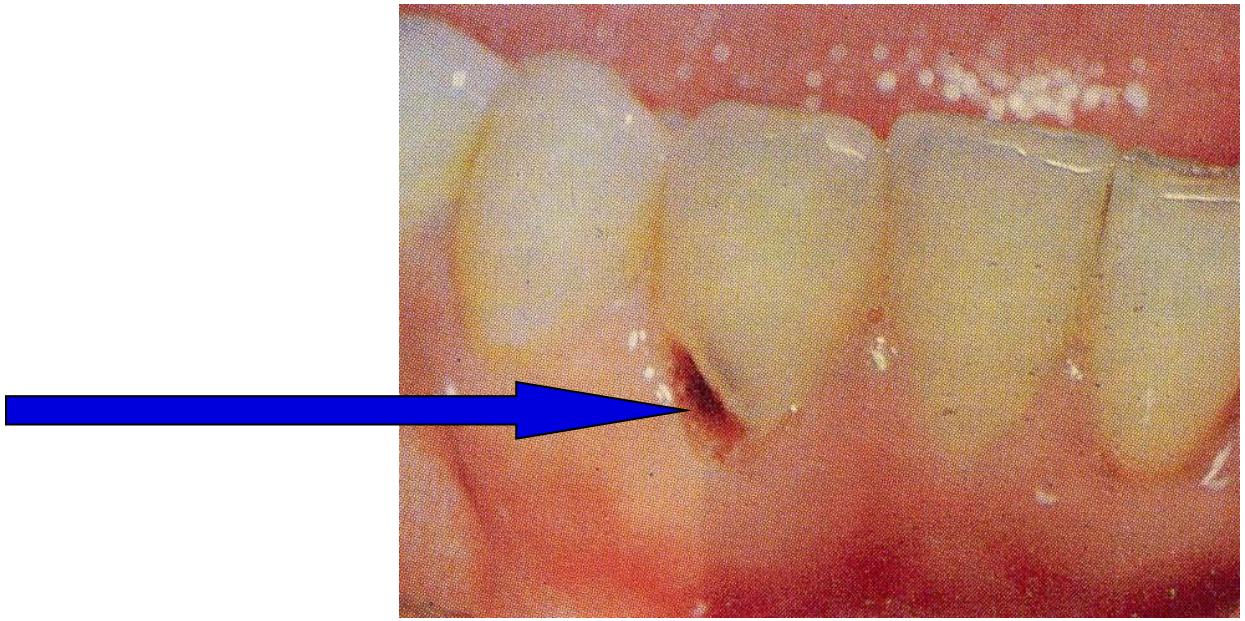
Classification acc. to Black

– Class V. cervical lesions



MUNI MED

Preparation of cavities

Access to the cavity

Outlines – cavosurface margin (extention for prevention)

Principles of retention

Principles of resistance

Excavation of carious dentin

Preparation of borders – finishing

Control

Protection of dentin wound

- Dentin wound should be covered – protection of dental pulp against irritation

Physical

-thermal

-osmotic

Chemical

Combination

Protection of dentin wound

Isolation
Filling (small cavities)

Base (moderate – large cavities- depth 2mm and more approx.)

Adhesive systems (composite materials)

Filling

- Filling replaces lost hard dental tissue anatomically and functionally

- Always different properties in comparison to hard dental tissues.

Preparation of the cavity I.st class acc. to Black

- Cavities in fissures and pits
- (Occlusal surfaces of premolars and molars and in f. caeca)

F. Caeca: buccal surfaces of lower molars,

Palatal surfaces of lower molars, palatal surfaces of upper incisors

(mostly lateral)

MUNI MED

All pit and fissure restorations (fillings)

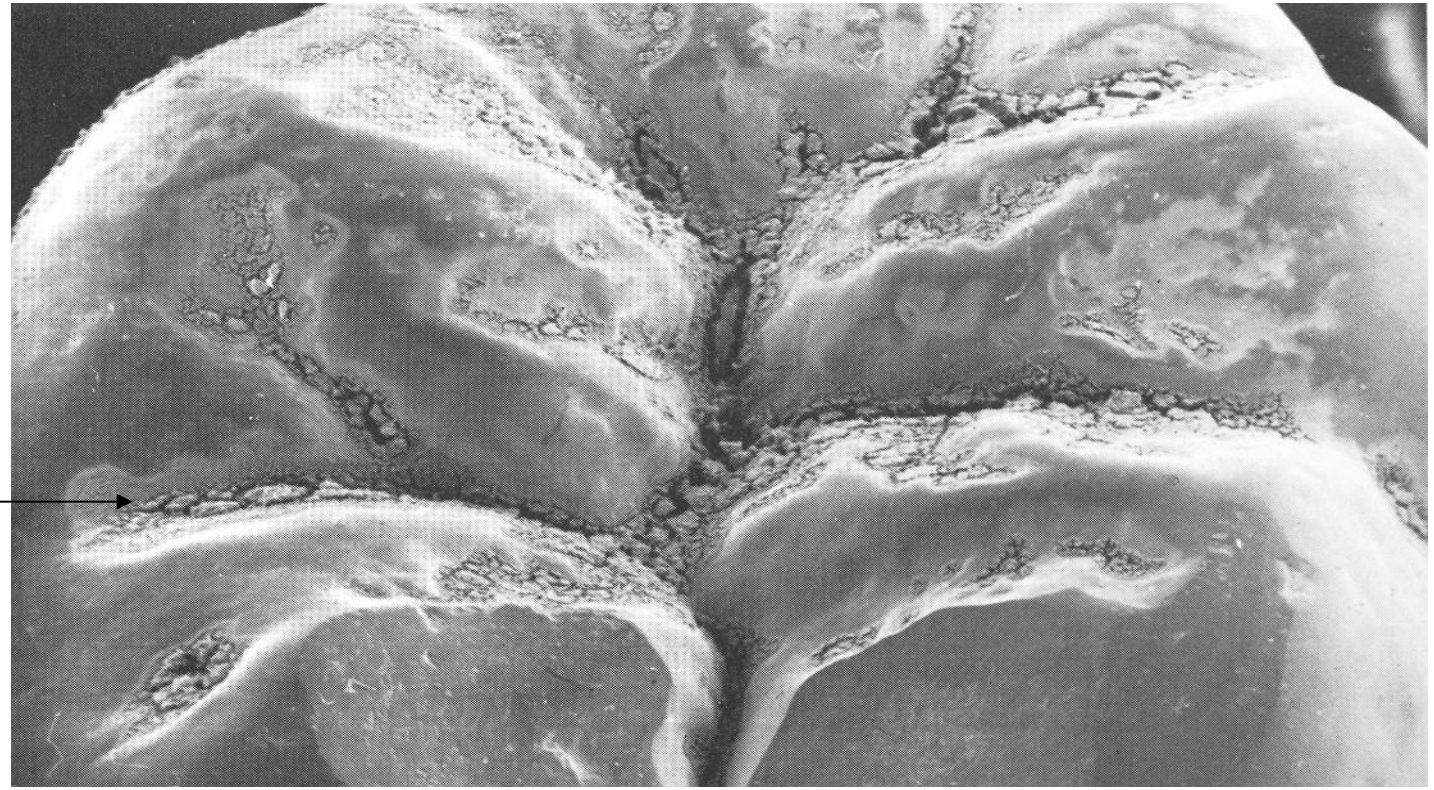
They are assigned in to three groups.
R. on occlusal surface of premolars and molars

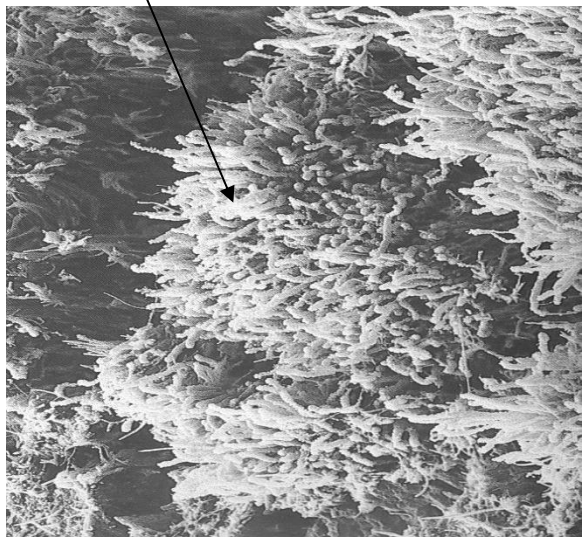
R. in foramina caeca – usually on occlusal two thirds of the facial and lingual surfaces of molars.

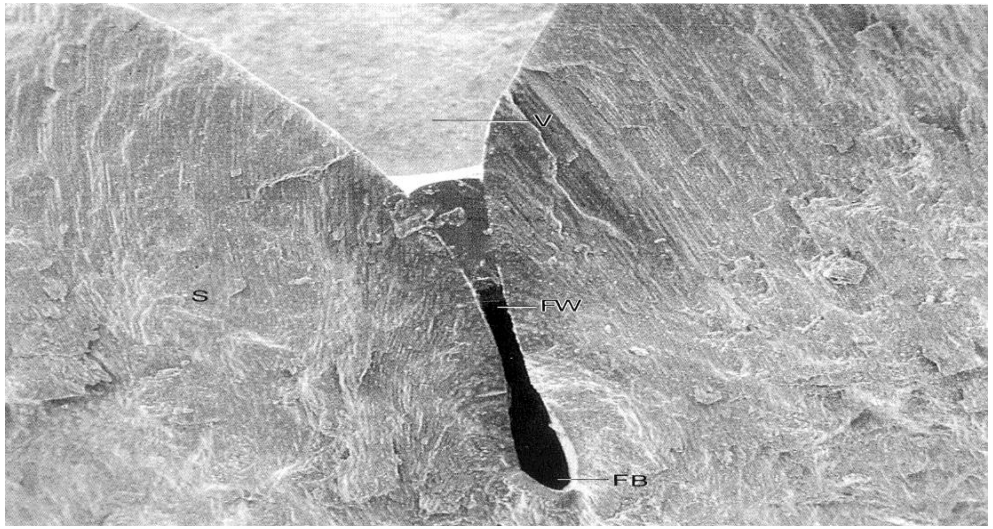
R.on lingual surface of maxillary incisors.

Morphology of fissures

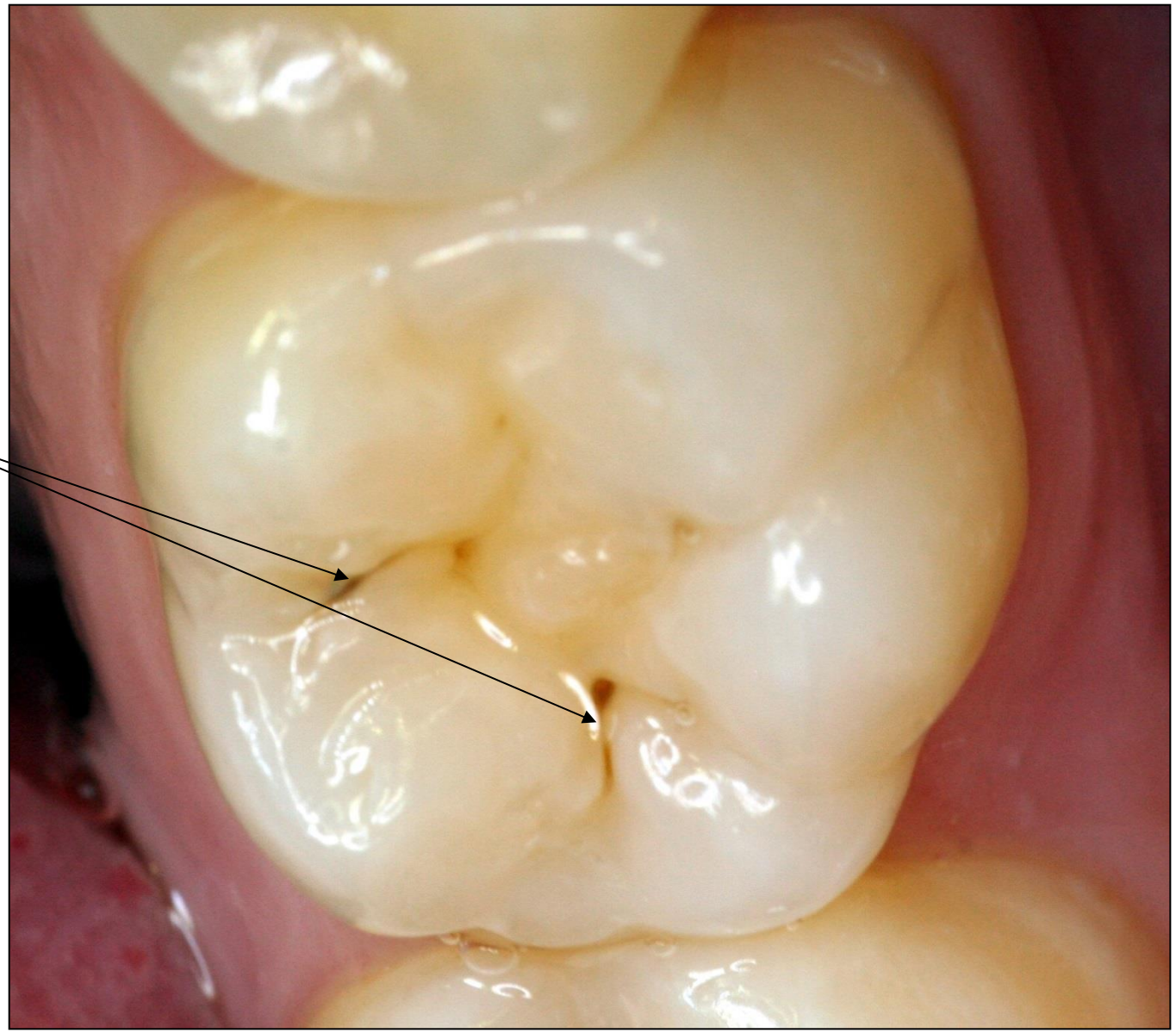
Biofilm







Caries



Materials: Amalgam, composite.

Amalgam:

Pertinent material qualities and propeties

Strength

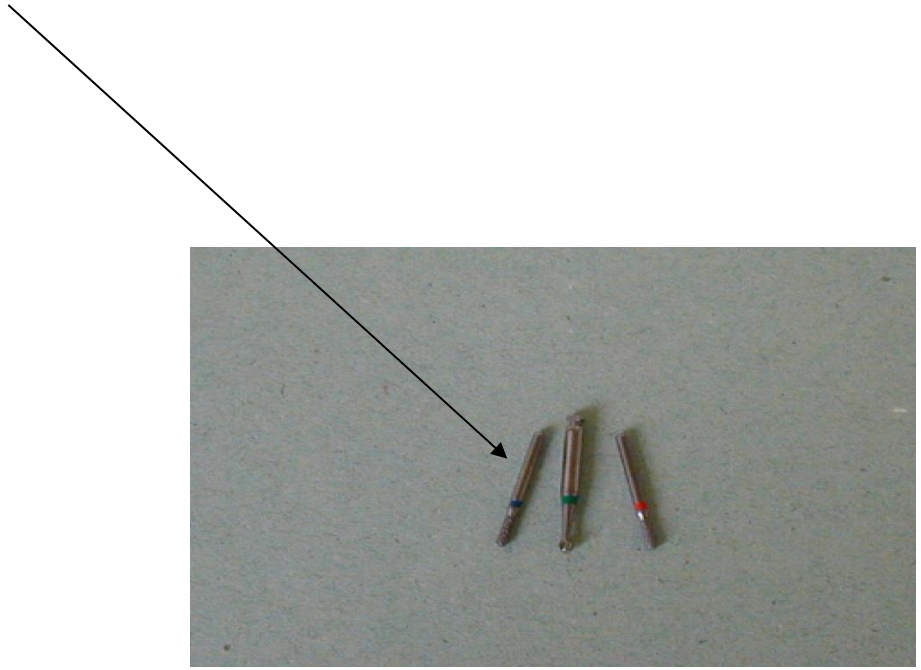
Longevity

Easy of use

Clinically proven sucess

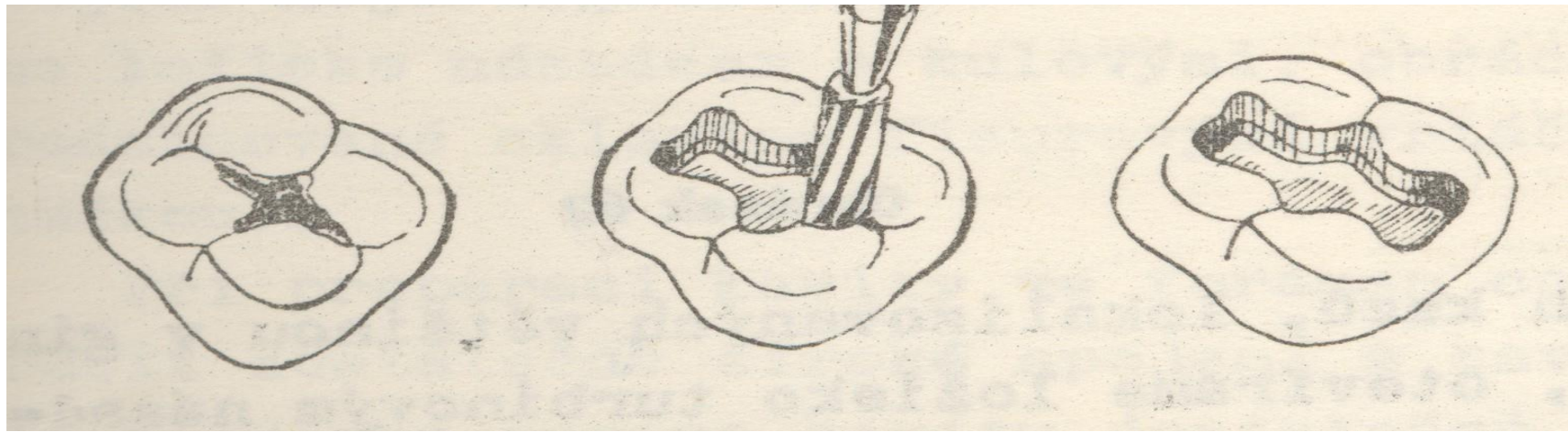
Access to the cavity

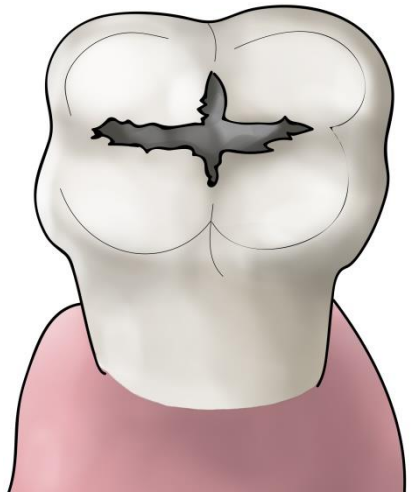
- From the occlusal surface using the fissure bur (or diamond burs, see below).

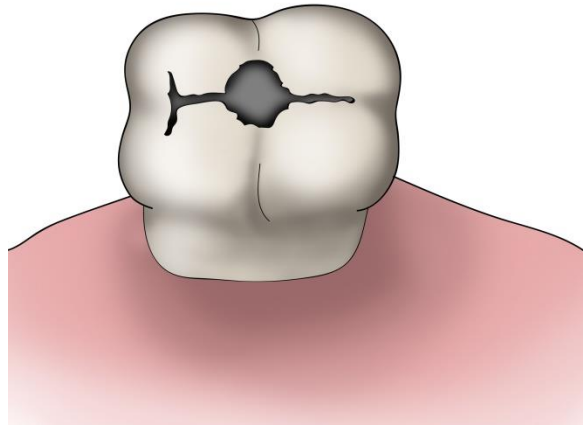


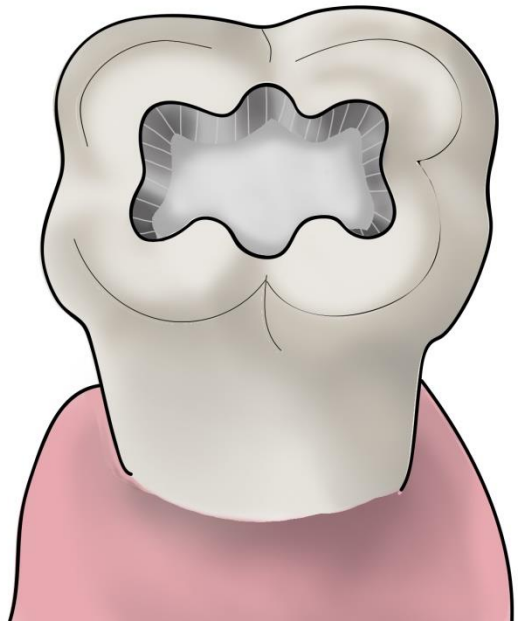
Cavosurface margin

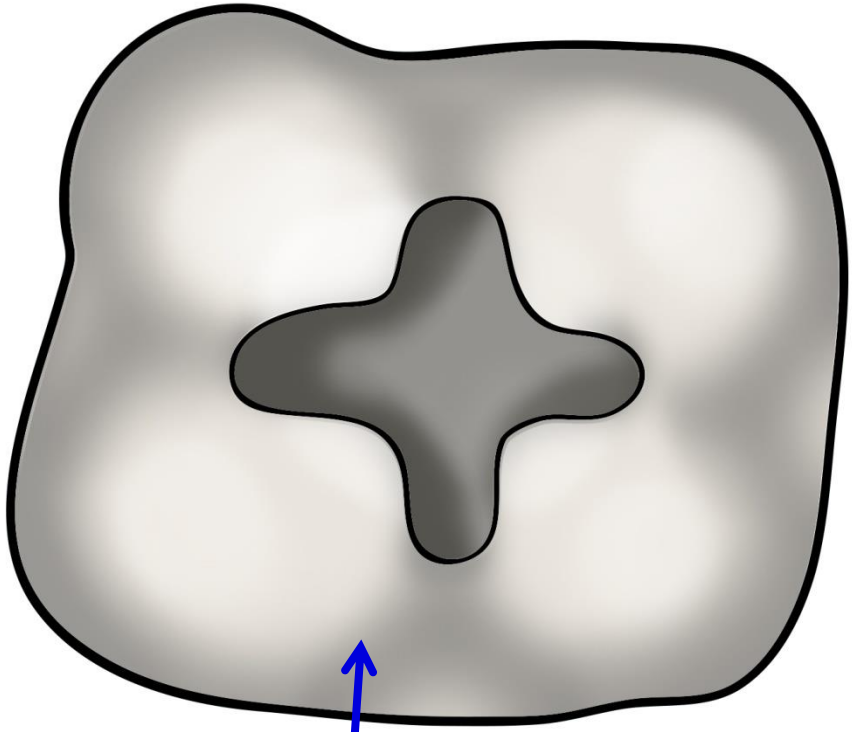
- Ideal outline includes all occlusal pits and fissures. If transvers ridge (1st lower premolar) or oblique ridge (1st and 2nd upper molar) are not affected, it is strongly recommended not to prepare them.







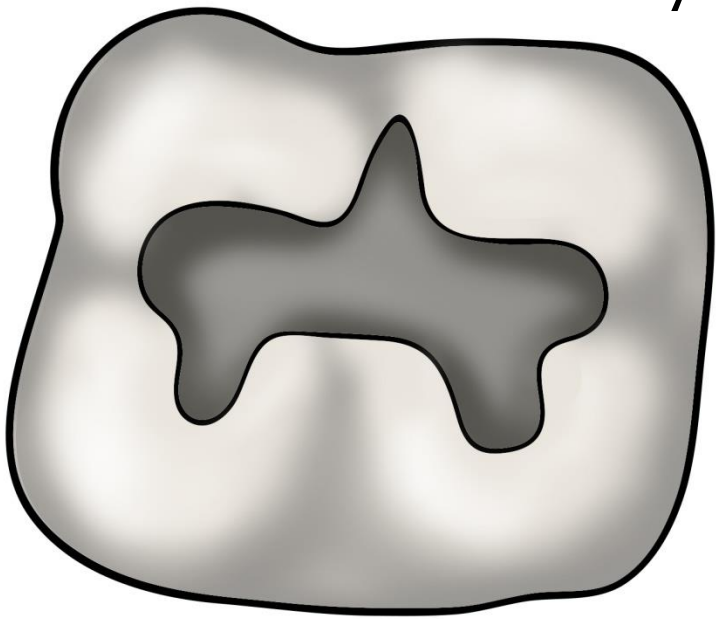




Mandibulary 7

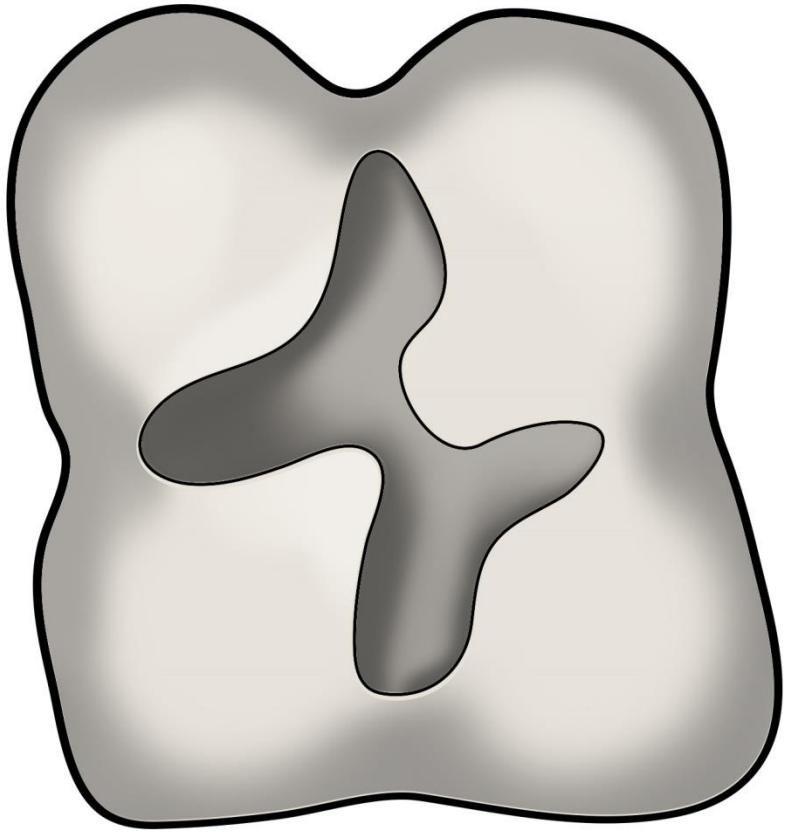
Mandibulary 6

orally

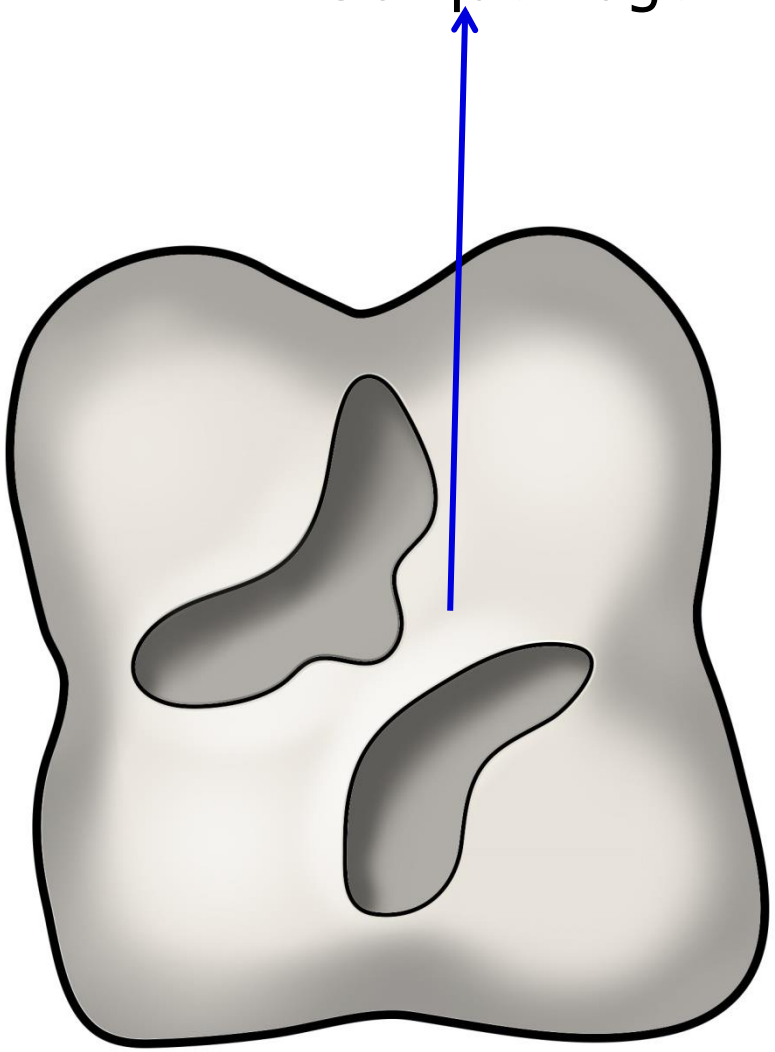


vestibulary

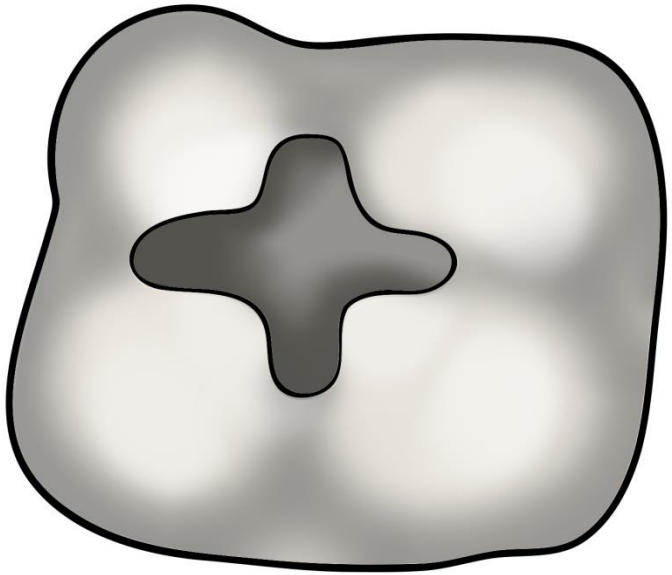
First upper molar

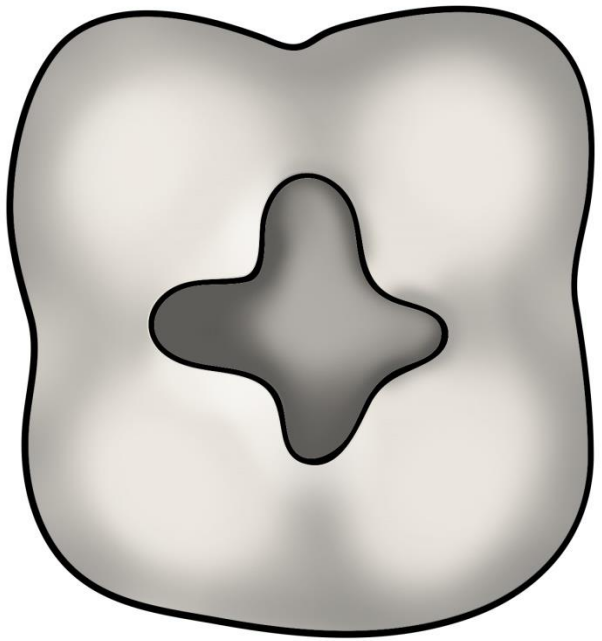


Oblique ridge

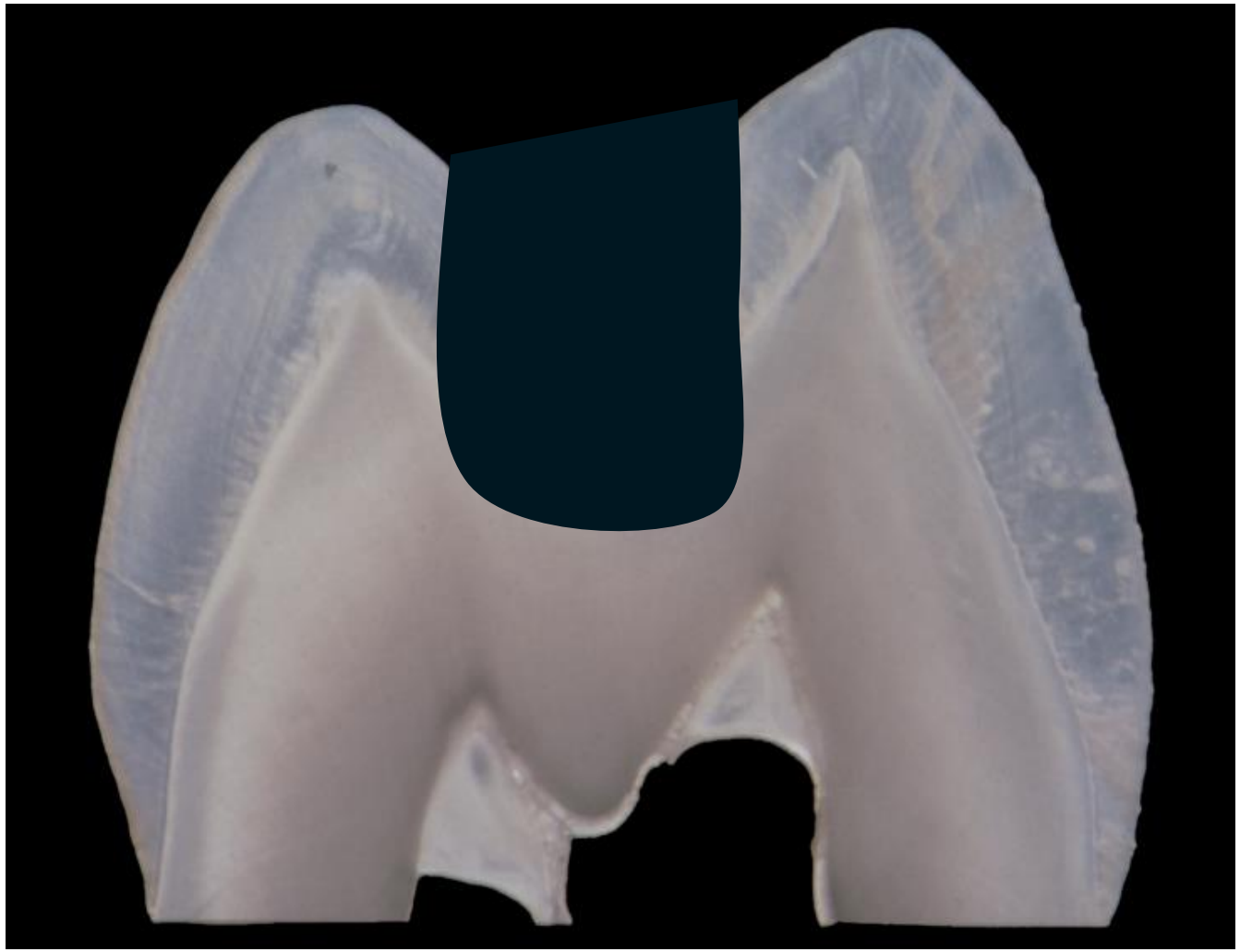


Third molars - variable





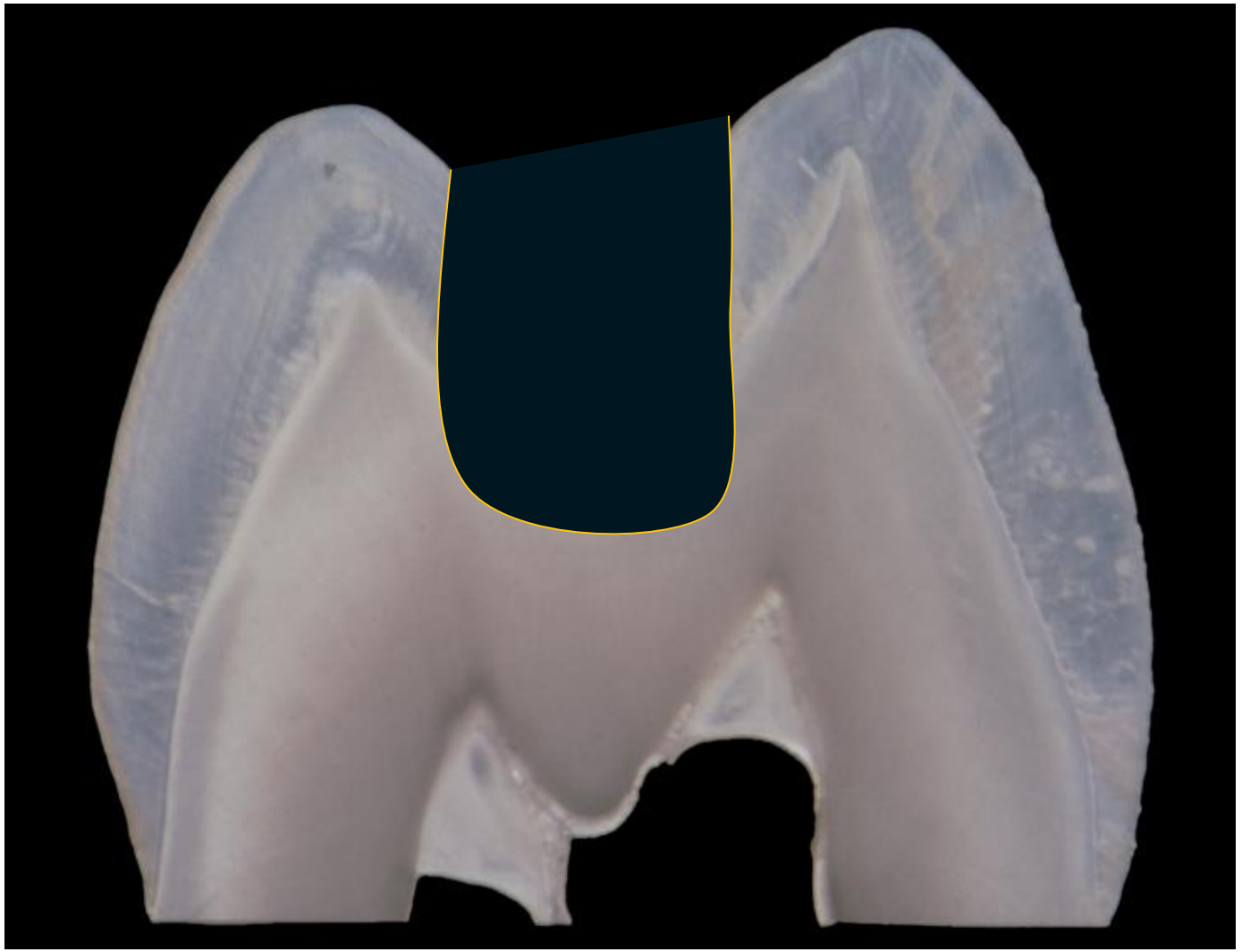
½ distance between the botom of the fissure and the cusp



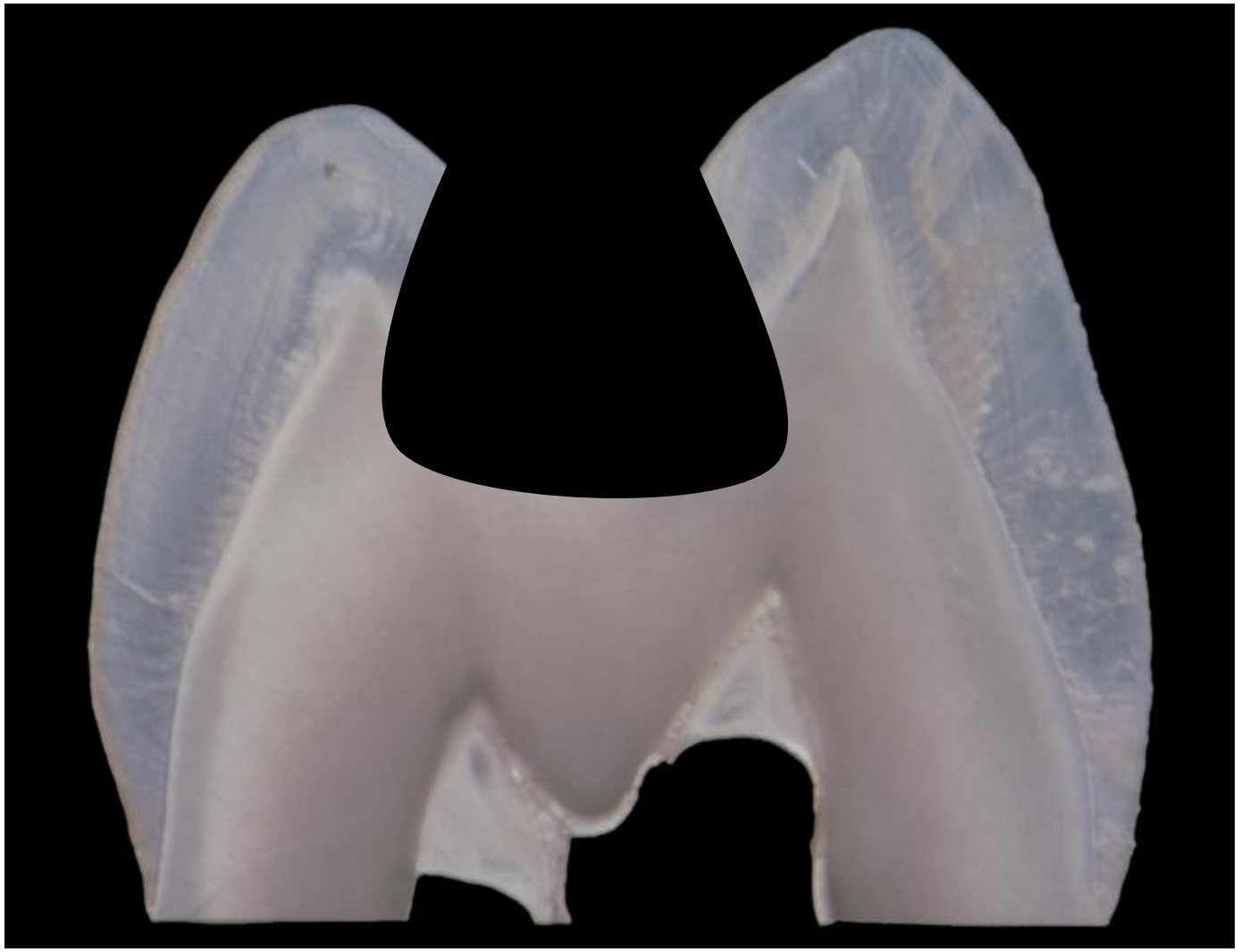
Retention

- Box – undercut (1,5 – 2 mm deep).

Box



Undercut



Resistance

Depth 1,5 – 2 mm

The enamel is always supported with dentin

The cavosurface margin till ½ distance of the bottom of the fissure and the cusp

No sharp edges

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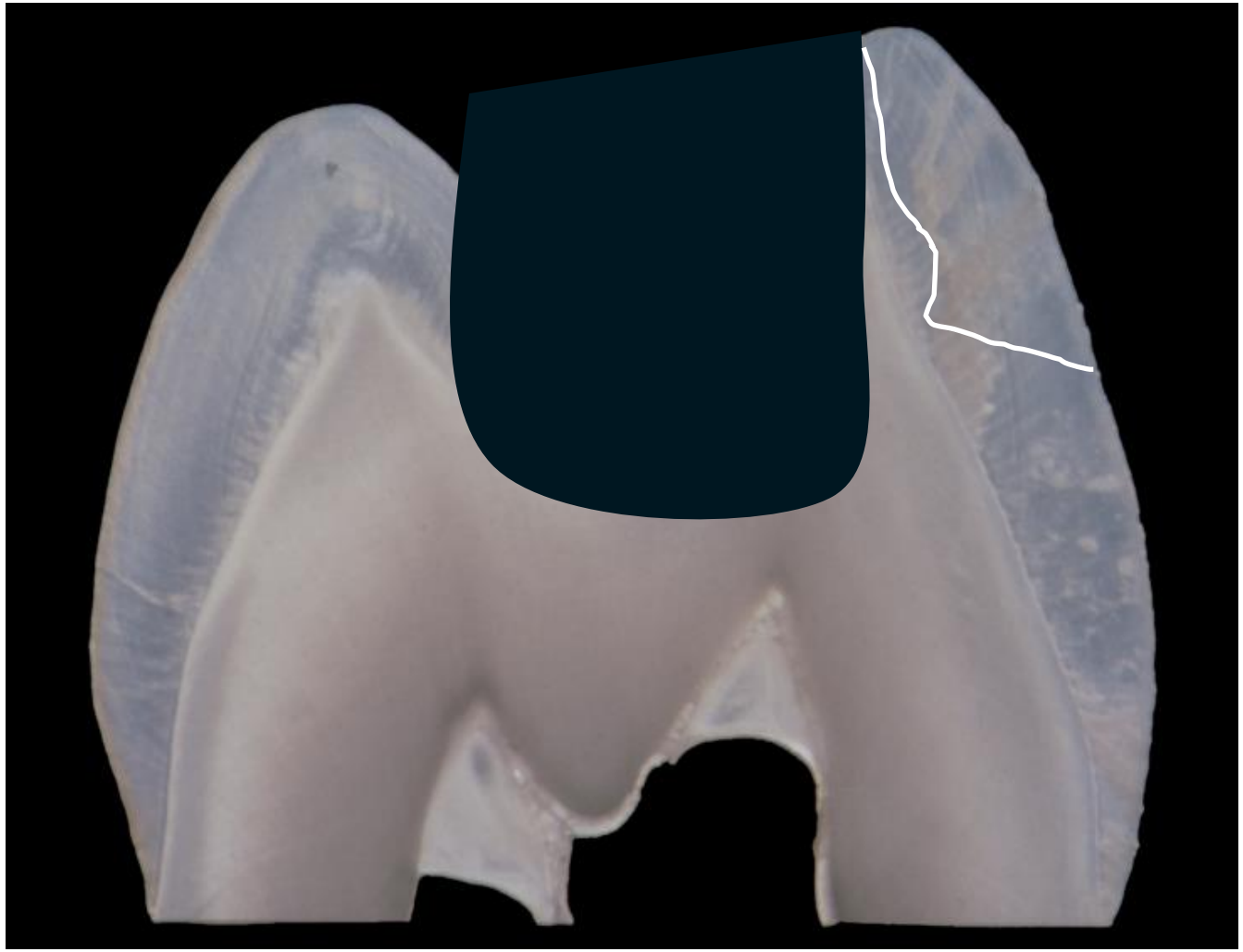
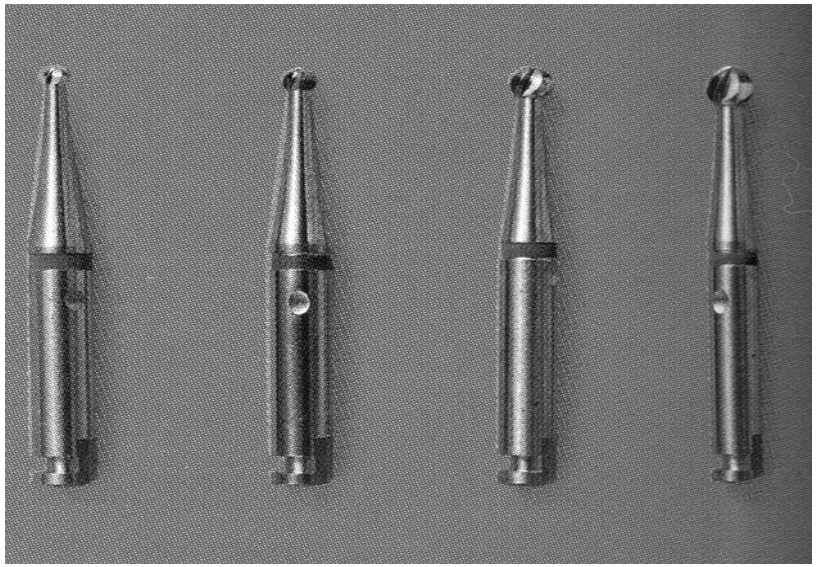
Resistance

- Proximal ridges must not be undermined!

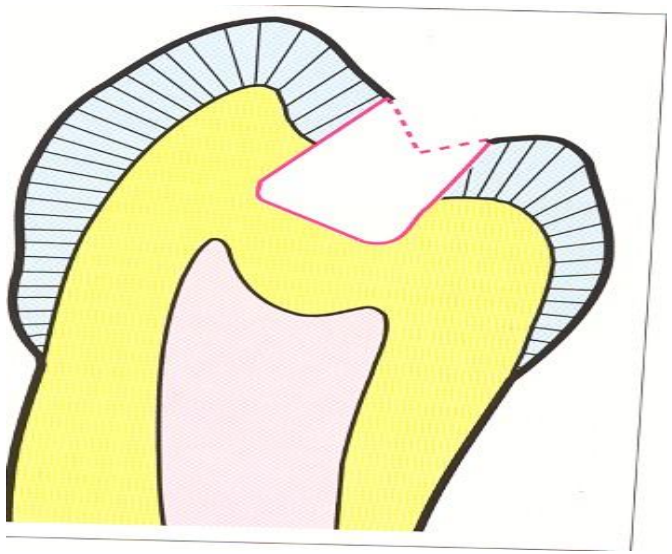


Excavation of carious dentin

- Round burs : 3000/min
- Excavators



Orientation of the pulpal wall



Finishing

Fine diamonds

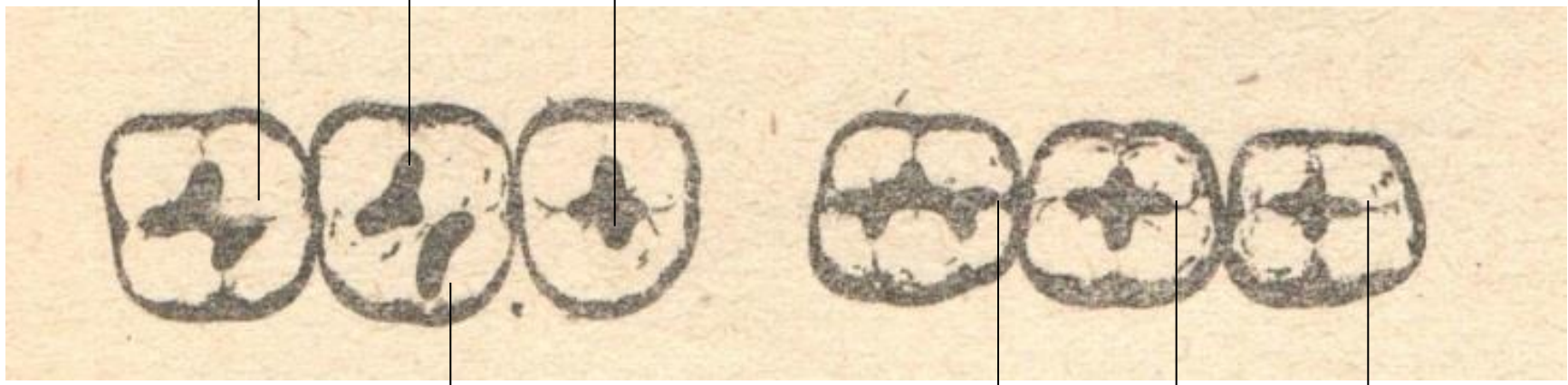
Final check

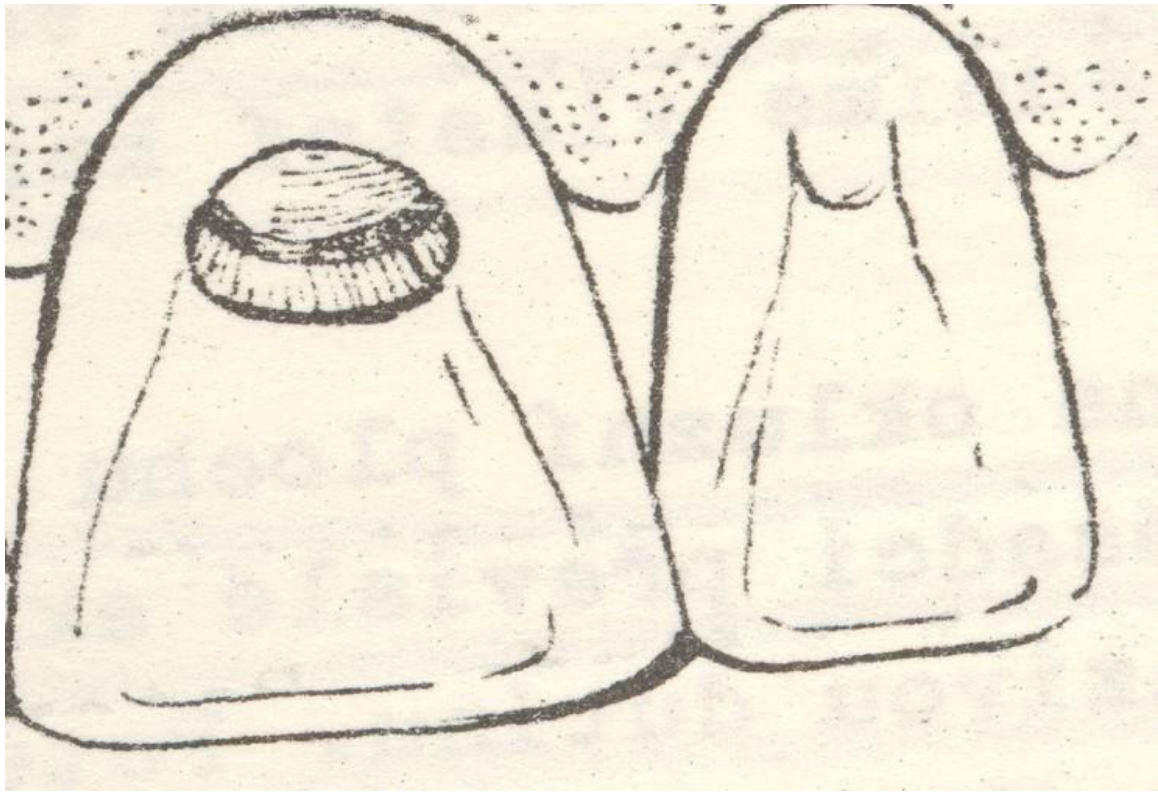
Good illumination, dry field, magnification.

Direct and /or indirect view

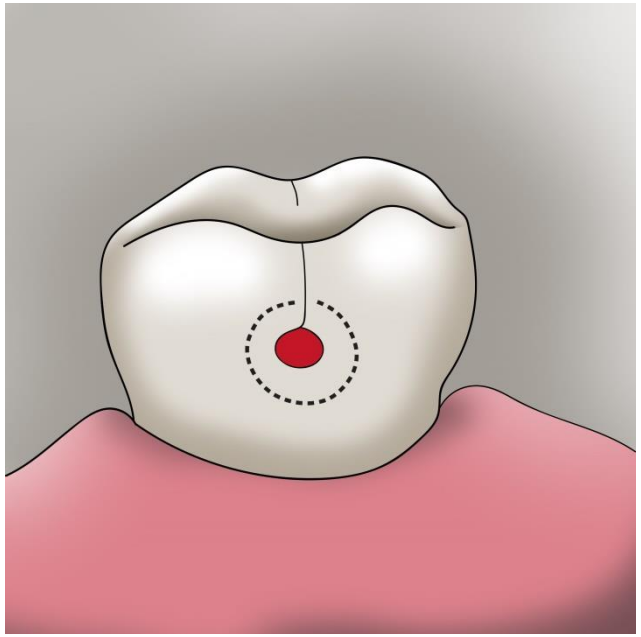
Probe

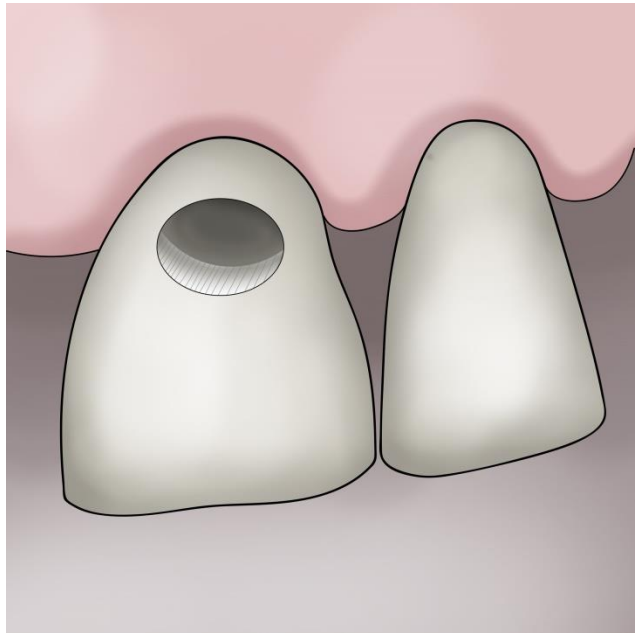
Molars

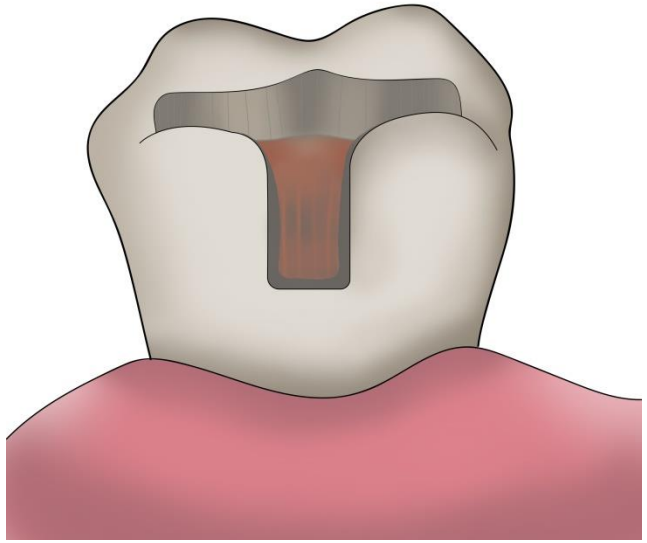




Foramen caecum:
Preparation is limited on carious lesion
The bottom is located in dentin
Undercuts
Finishing of cavity borders



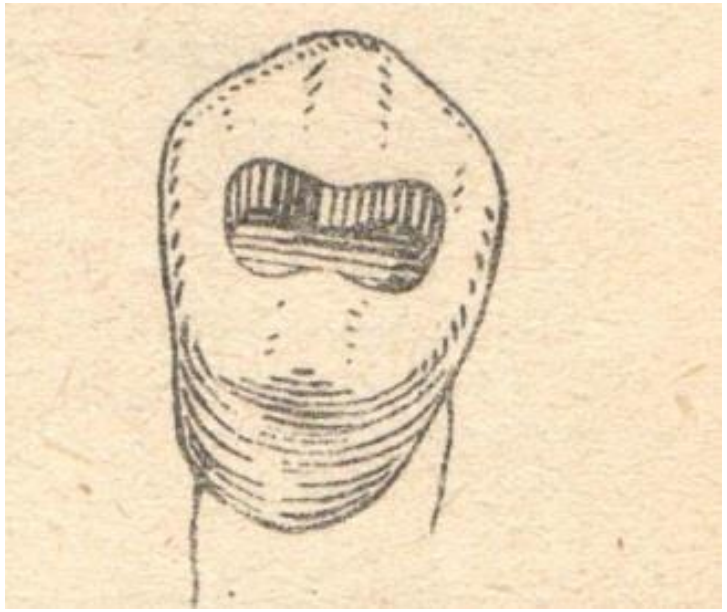




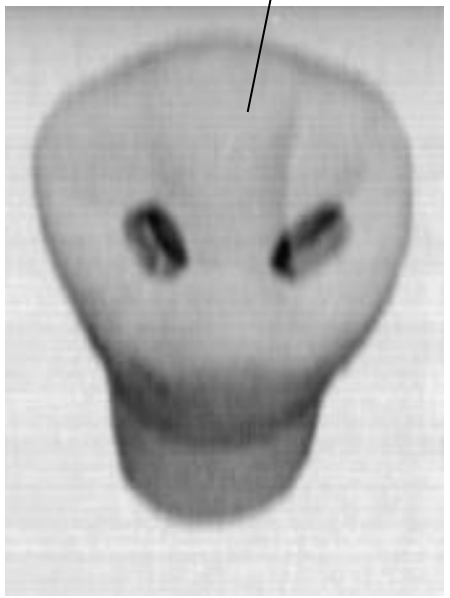
If the enamel is undermined occlusally – extention on occlusal surface

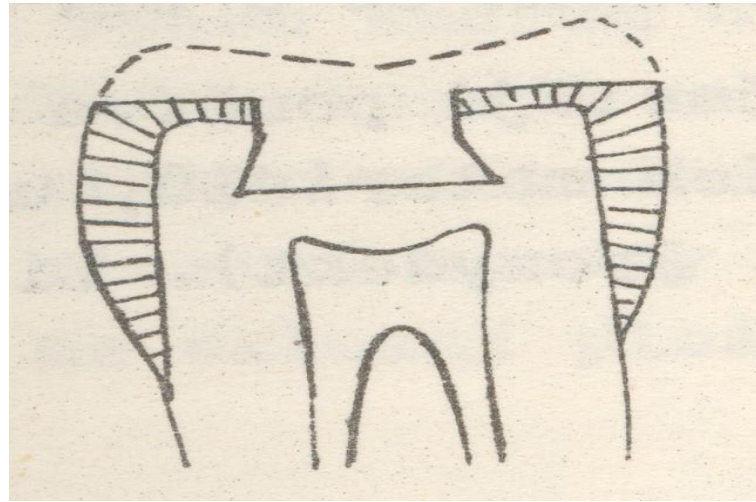
Preparation with preservation of the transverse ridge

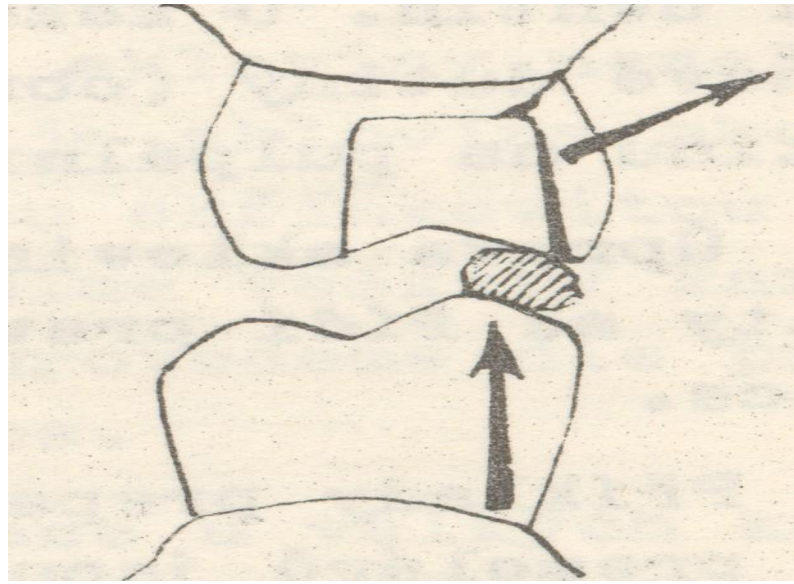
Premolars



Crista transversa (transvers ridge)
Lower P1







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Base is made usually of zinkoxidphosphate cement It is placed only on pulpal wall