

Endodontics I.

Healing potential of dental pulp.

Pulp capping.

Pathology and pathophysiology of dental pulp

Pulpal reactions

Classification of pulpal and periodontal diseases

Aim of endodontic treatment

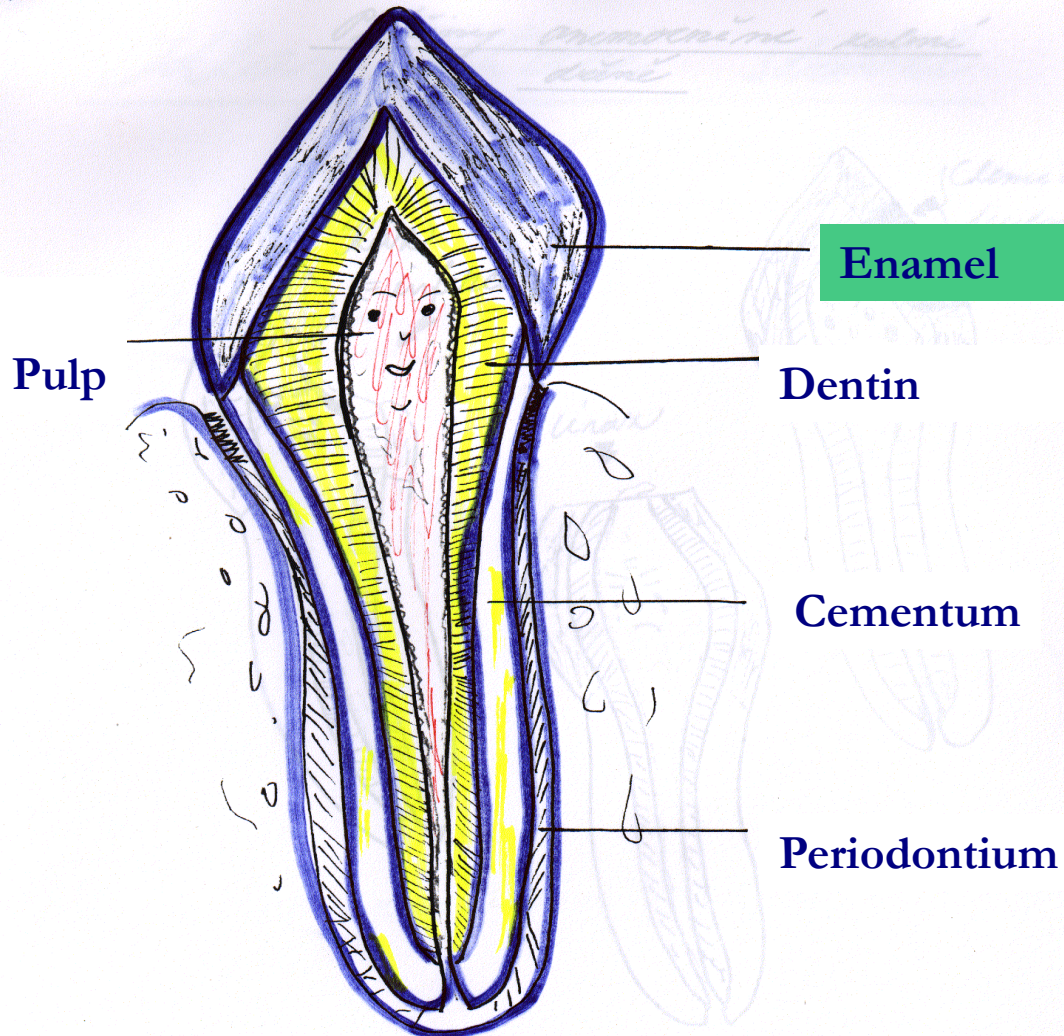
**Healing of pulp diseases or removal
bacteria from the root canal system
and regeneration of damaged periodontal
tissues. (Canal shaping, cleaning and filling)**

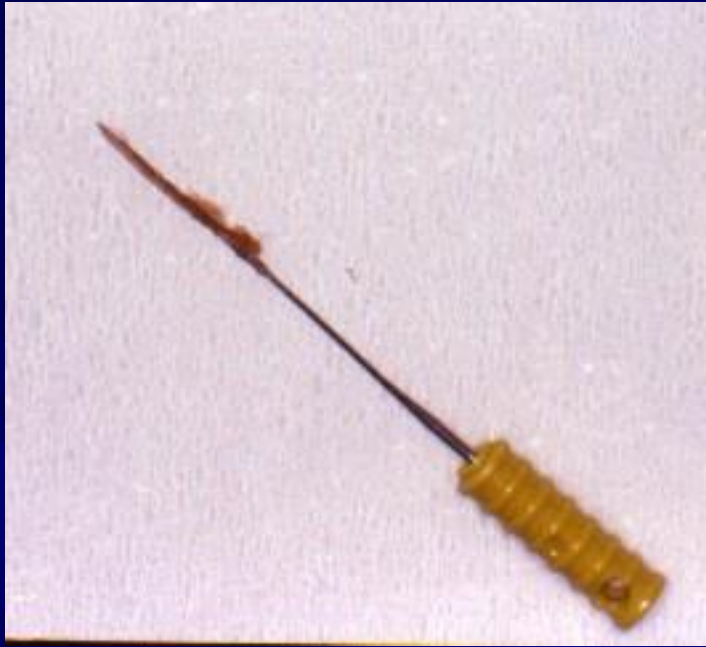
„ *Endodontist helps nature only* “

W.D.Miller

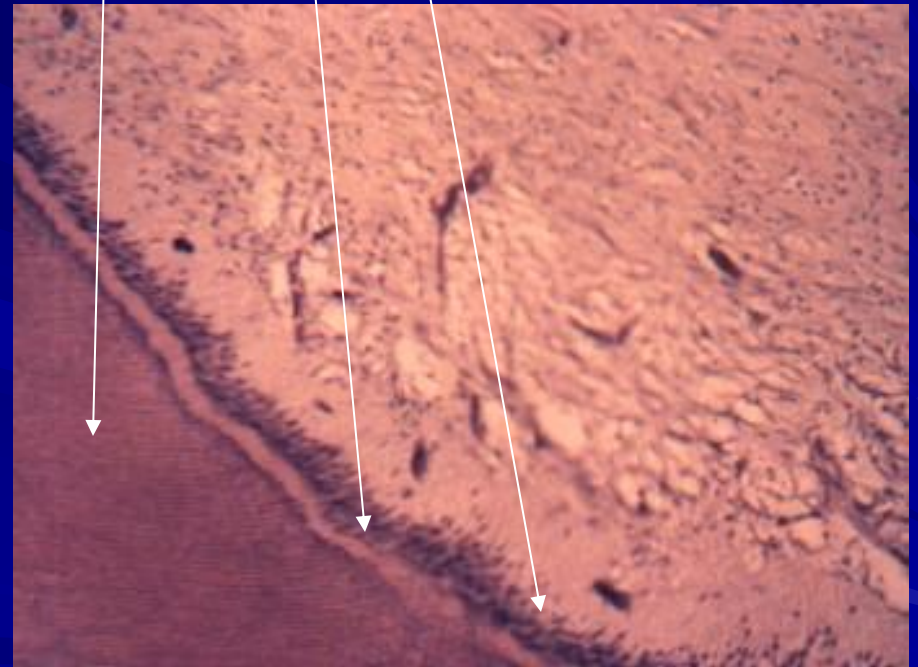
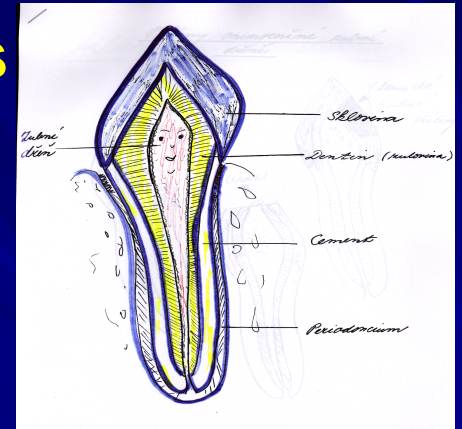
Endodont

Morphology





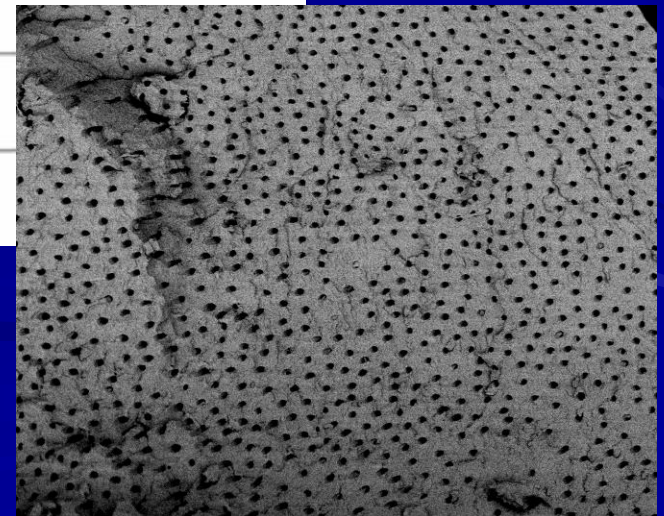
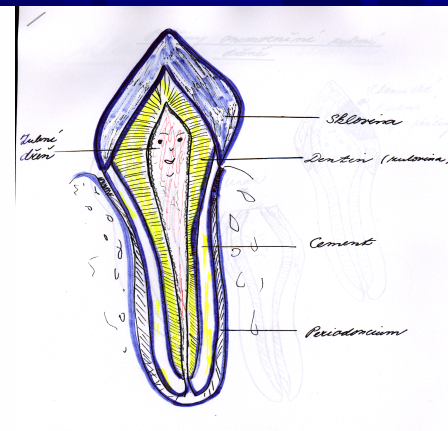
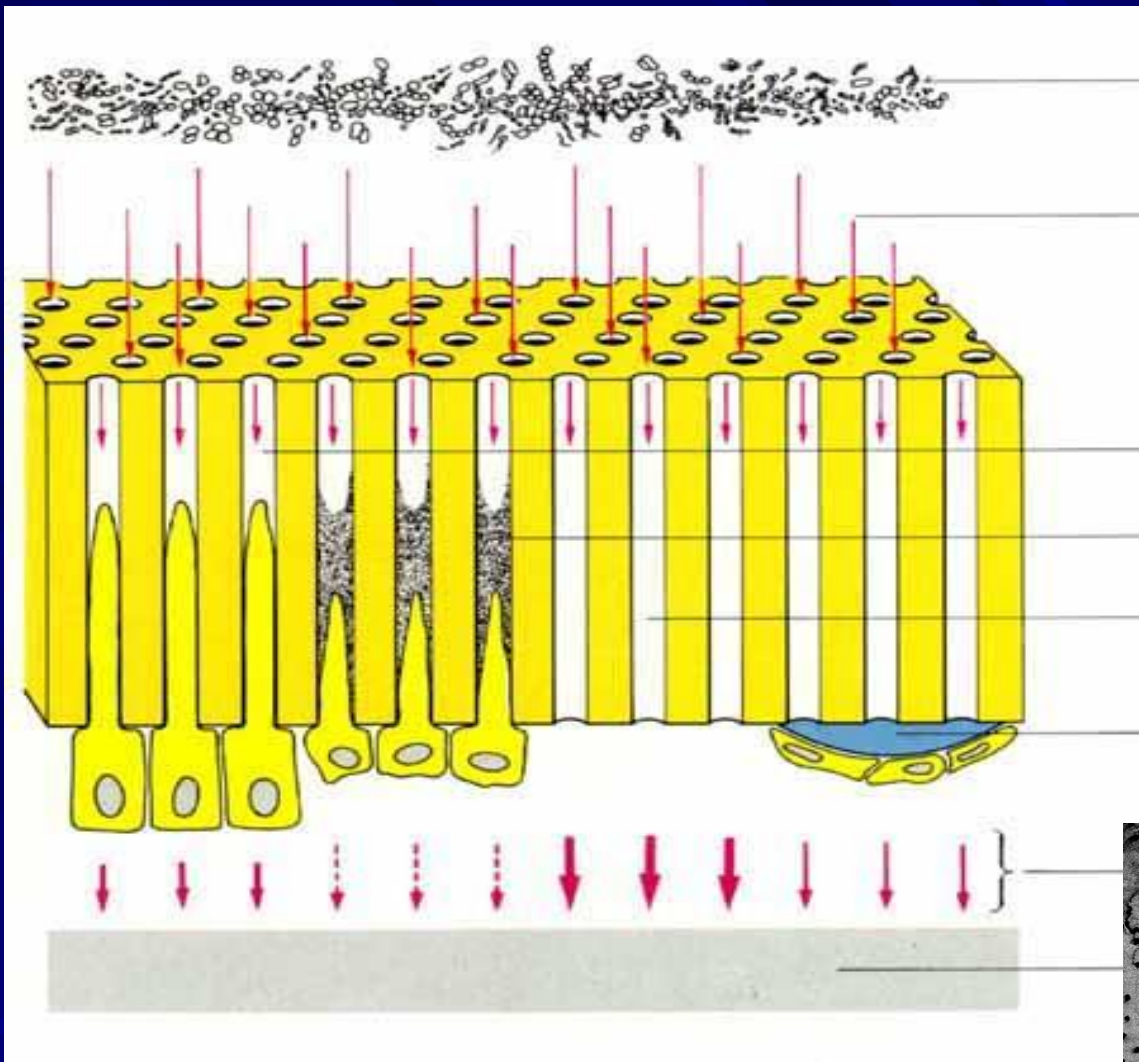
Odontoblasts
Predentin
Dentin



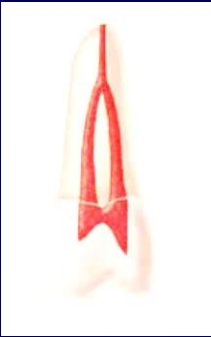
Dental pulp



Does the river freeze over?



**Endodont: dentin and pulp
(morphological and functional unit)**



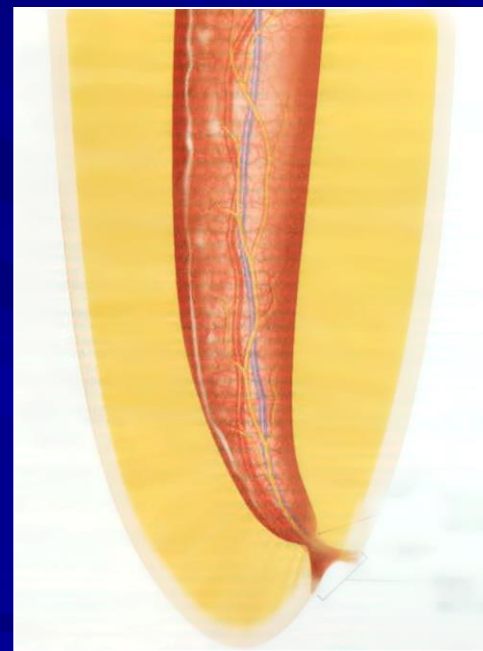
Vertucci
Gulabivala
Kartal a Yanikoglu....

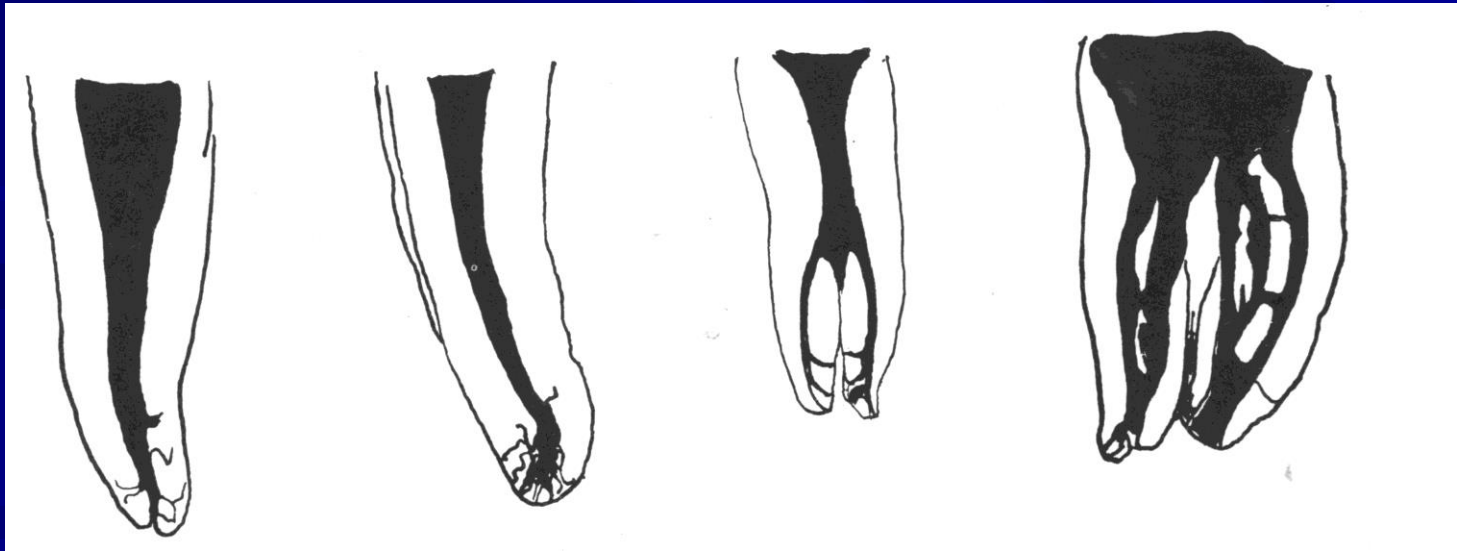
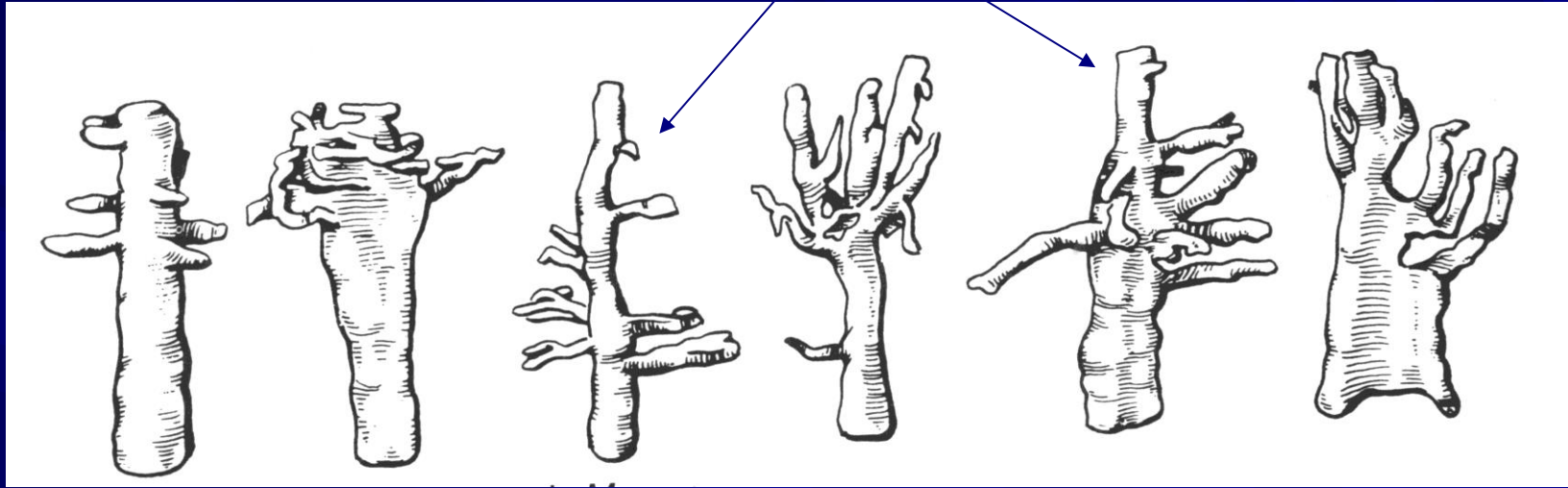
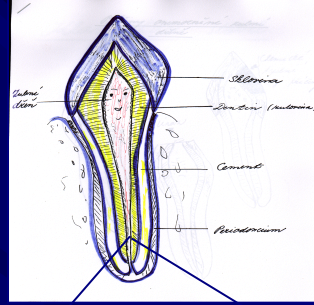


Anatomie isthmu



Apikální oblast







3D

Meyers conclusions

- The root canal is not round but oval (long axis mesiodistal)
- The root canal does not go straight but it deflects distal
- The outfall is not on the top of the root but below (distal or distooral)

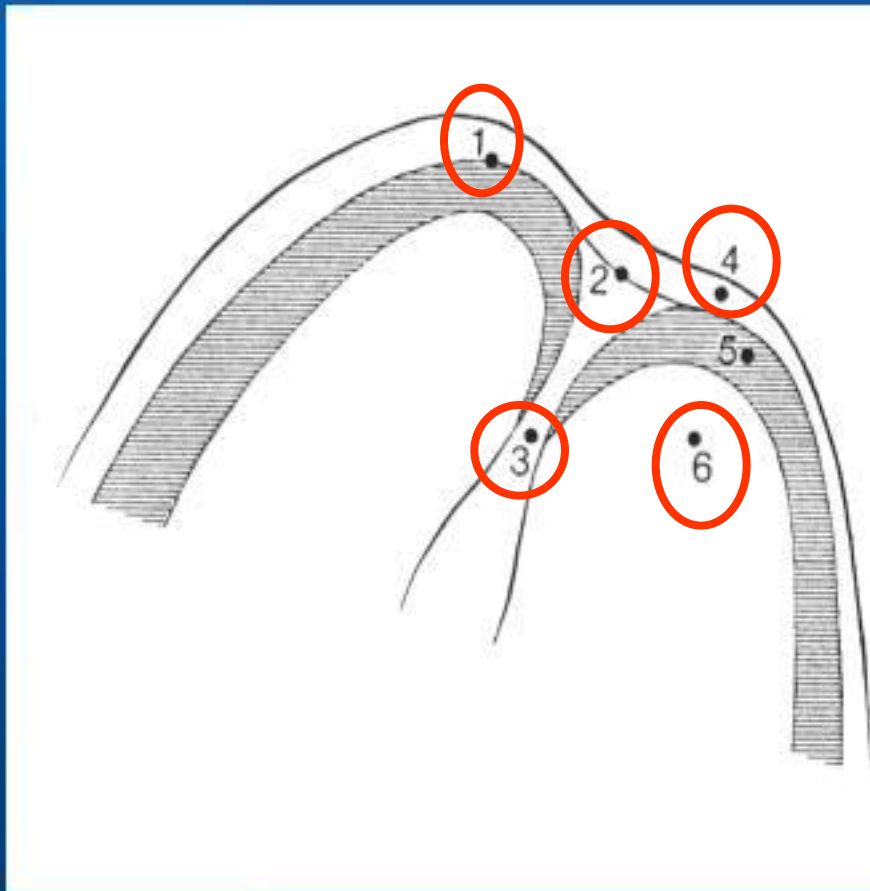
Meyer's conclusions

- The form of the outfall is funnel - shaped
- The root canal system has usually more outfalls (ramifications)
- The ramifications are situated mostly in apical area (first apical mm)
- All outfalls are situated in cementum

Basic forms of the root canal system (Weine)

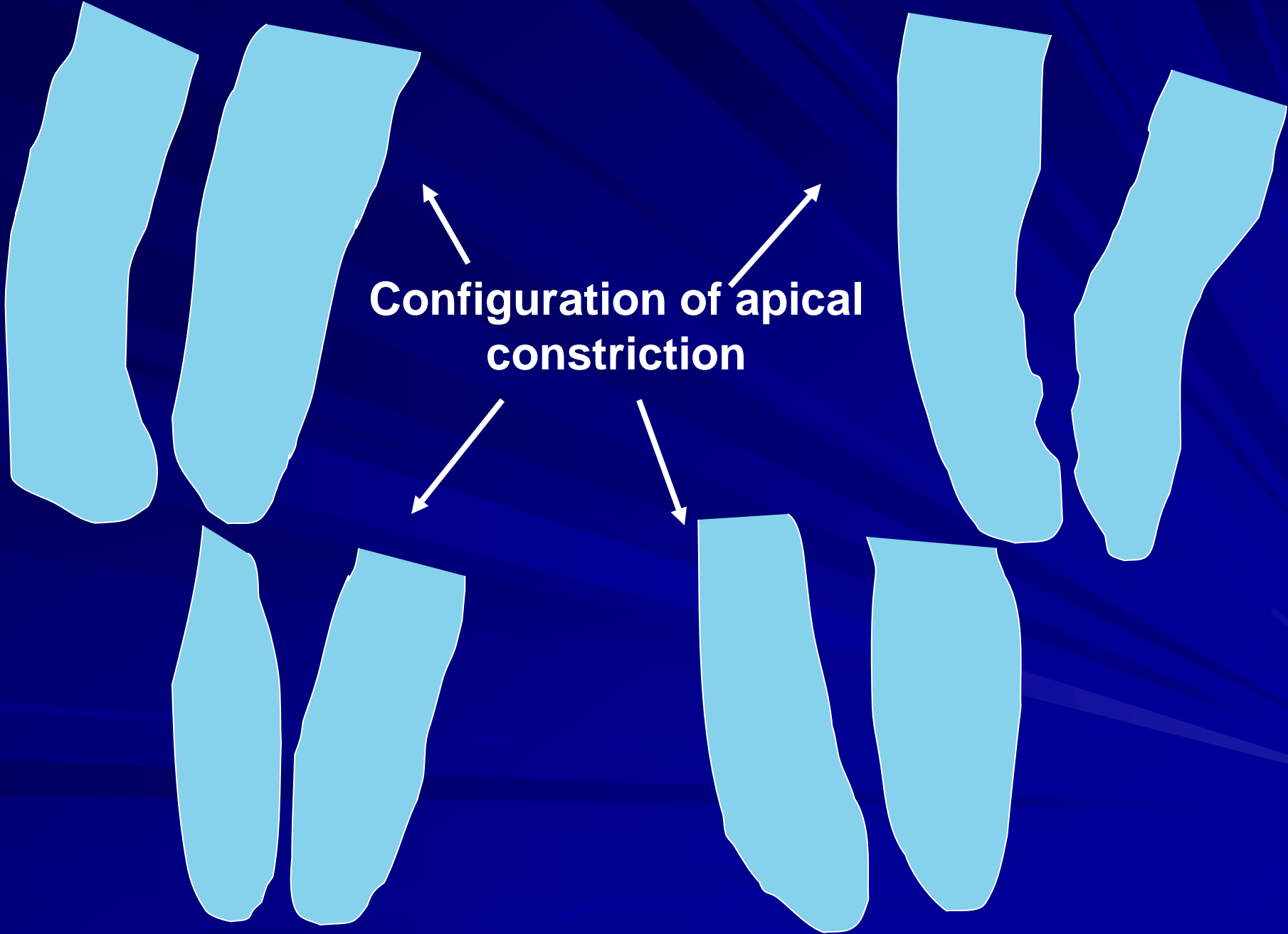


Apical morphology



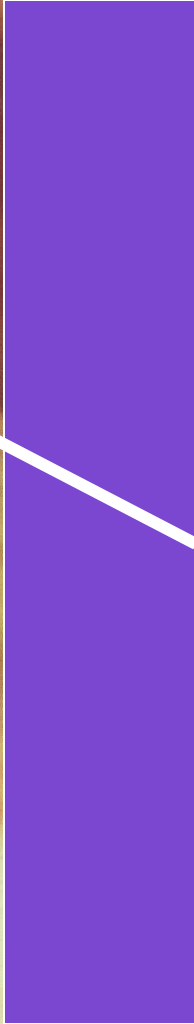
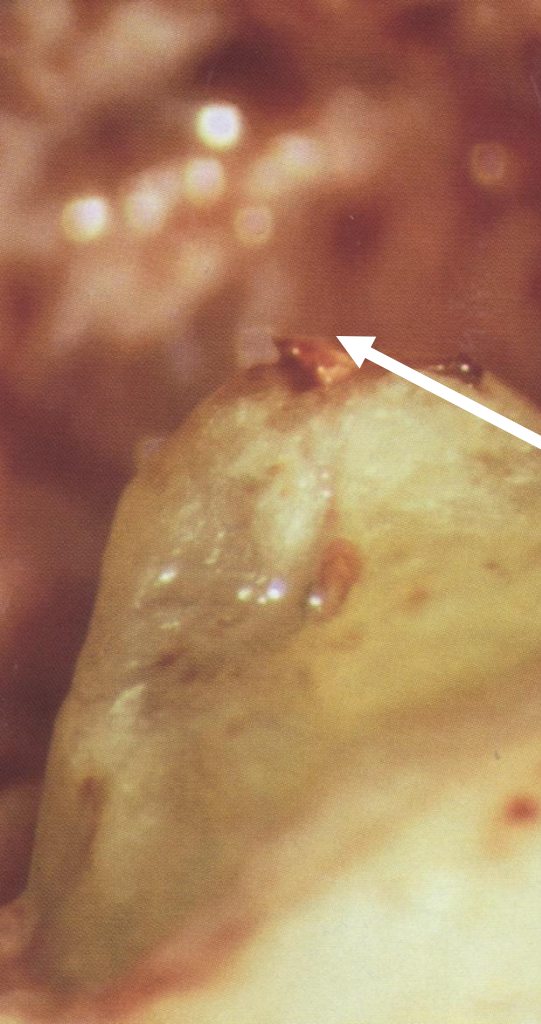
1. X – ray apex
2. Foramen apicale
3. Apical constriction
4. Periodontal ligament
5. Root cementum
6. Dentin

**Configuration of apical
constriction**



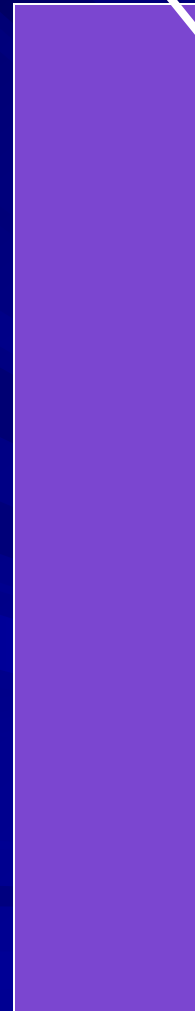
Canal shaping terminates in apical constriction

- Small communication
- Less risk of periodontal damage
- Prevention of overfilling
- Prevention of apical transport of infectious material
- Possibility of good bacterial decontamination
- Possibility of good condensation of the root filling

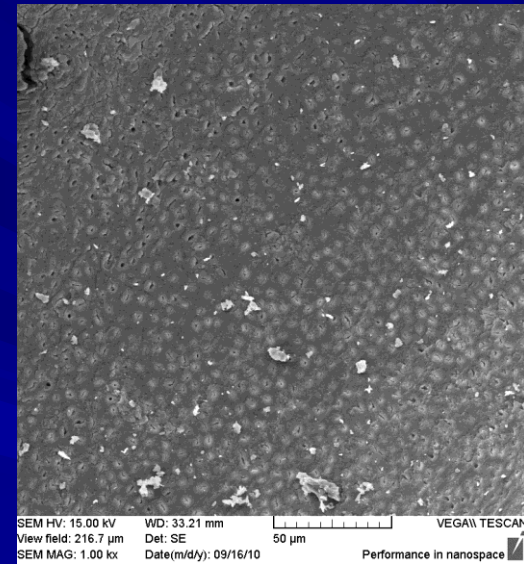
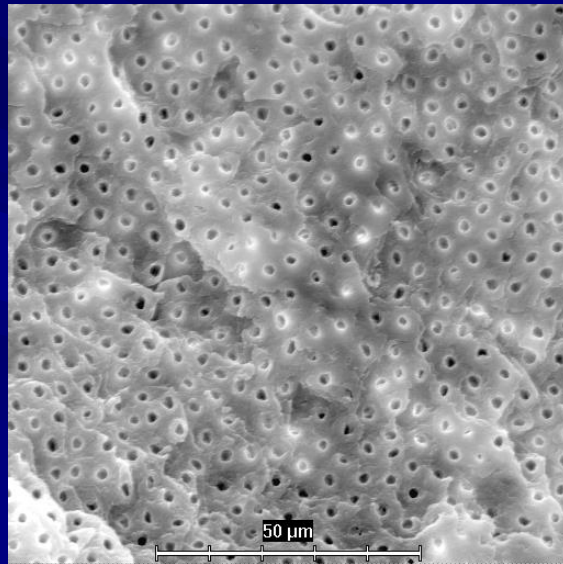


Real situation

X- ray apex



- Macrocanal systém
- Microcanal systém



Healing potential of dental pulp

■ Odontoblasts

- Secondary dentin
- Tertiary (reparative) dentin
- Intratubular dentin (sclerosis)
- -dentin bridge

■ Hyperaemia

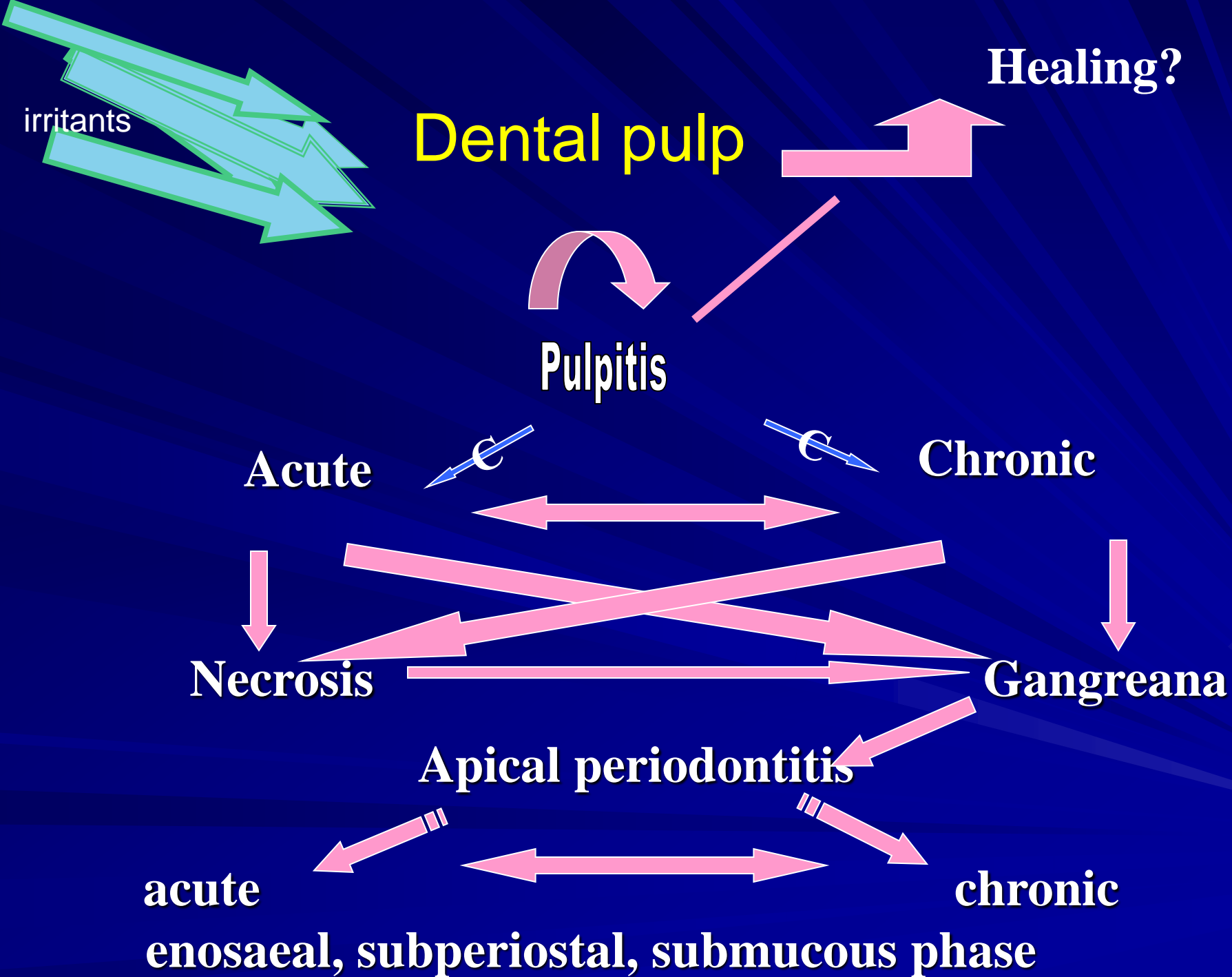
- active
- passive } infiltration, inflammation
- stasis

Pulp diseases

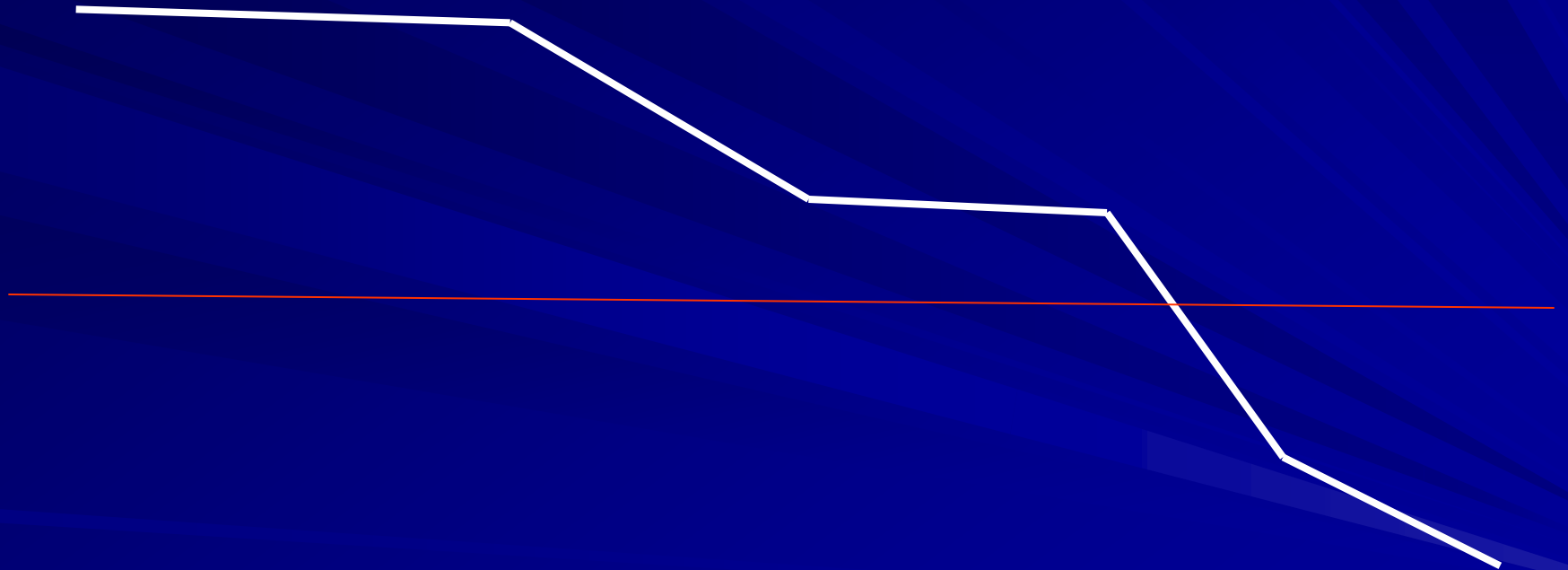
Inflammation - pulpitis

Consequences

- Necrosis
- Gangraena
- Apical periodontitis



Cumulative trauma of dental pulp



Reasons

- Bacteria
- Mechanical irritants (overinstrumentation, trauma)
- Chemical (esp. phenolic based intracanal medicaments, overfilling, irrigants)

Classification of pulp diseases

■ Histopathological

Hyperaemia

Acute pulpitis serose partial
total

Acute pulpitis purulent partial
total

Classification of pulp diseases

■ Histopathological

Chronic pulpitis closed

open

ulcerous

polypous

Classification of pulp diseases

Clinical

Reversible pulpitis

Pain does not persist after stimulus is removed

Pain is difficult to localize

Normal periradicular appearance

Teeth are not tender to percussion

Classification of pulp diseases

Clinical

Irreversible pulpitis

Pain may develop spontaneously or from stimuli

In later stages heat is more significant

Response lasts from minutes to hours

When the periodontal ligament is involved, the pain is localized

A widened periodontal ligament may be seen in later stages

Diagnosis

■ History

Presenting complaint

Medical history

Dental history

Pain history

Location

Type and intensity of pain

Duration

Stimulus

Relief (analgetics, antibiotics, sipping cold drinks)

Diagnosis

Clinical examination

Extraoral (swelling, redness, extraoral sinuses, lymph nodes, degree of mouth opening)

Intraoral examination

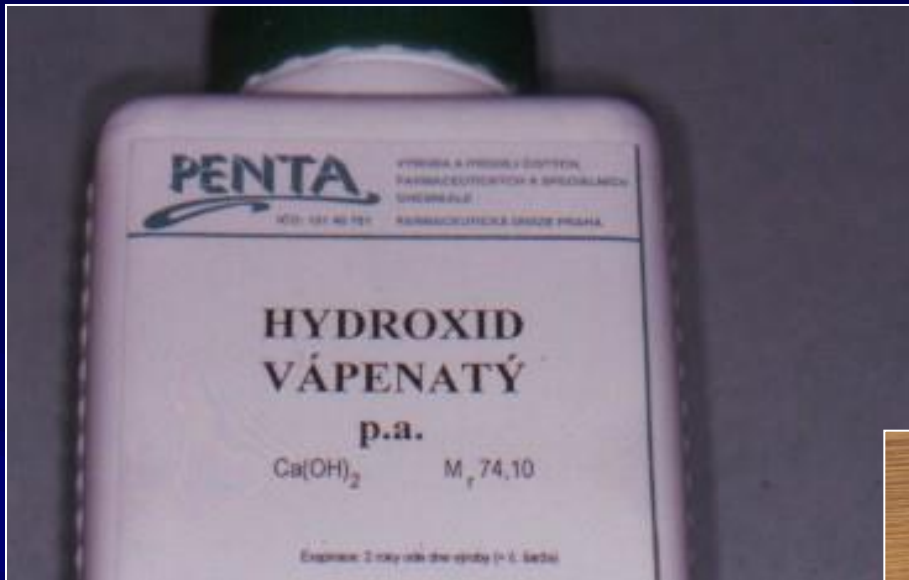
Swelling, redness, palpation, percussion, sinus

tract examination, teeth mobility, pockets

Diagnosis

Clinical examination

Pulp sensitivity tests, radiographic examination, transillumination.



Disociation – strong alkalinity

Low solubility

Suspension

Treatment of pulpal and periodontal diseases

Vital methods

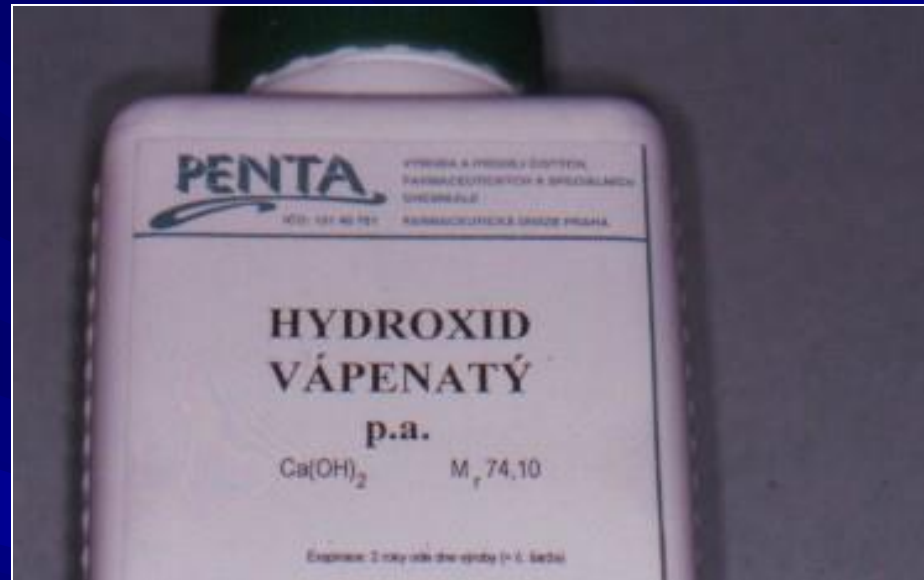
Dental pulp remains vital. Pulp capping, pulpotomy.

Non vital methods

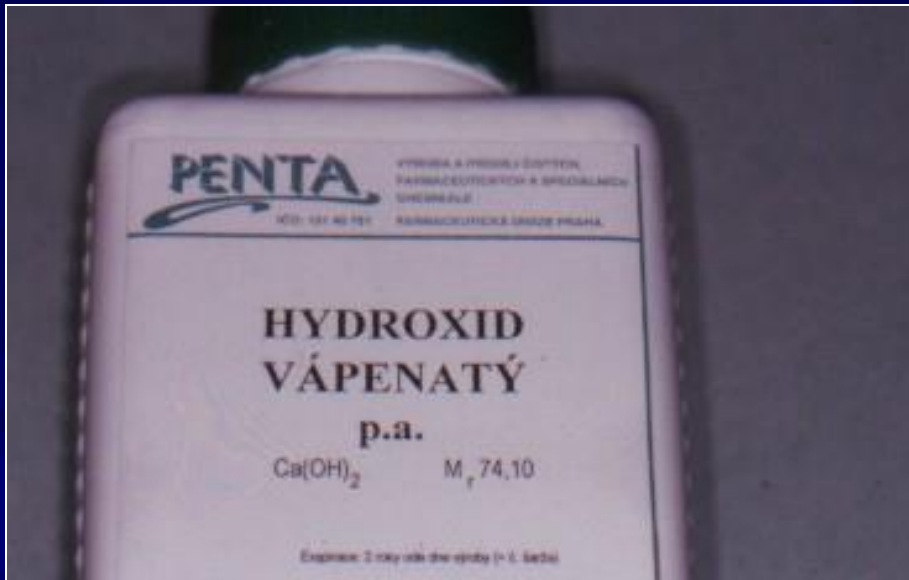
Dental pulp does not remain vital. Root canal treatment

Pulp capping

- Indirect
- Direct



Calcium hydroxide – influences the dental pulp **indirectly** – through dentin or **directly** on dental pulp



Antiphlogistic

Antimicrobial

Improves dentinogenesis

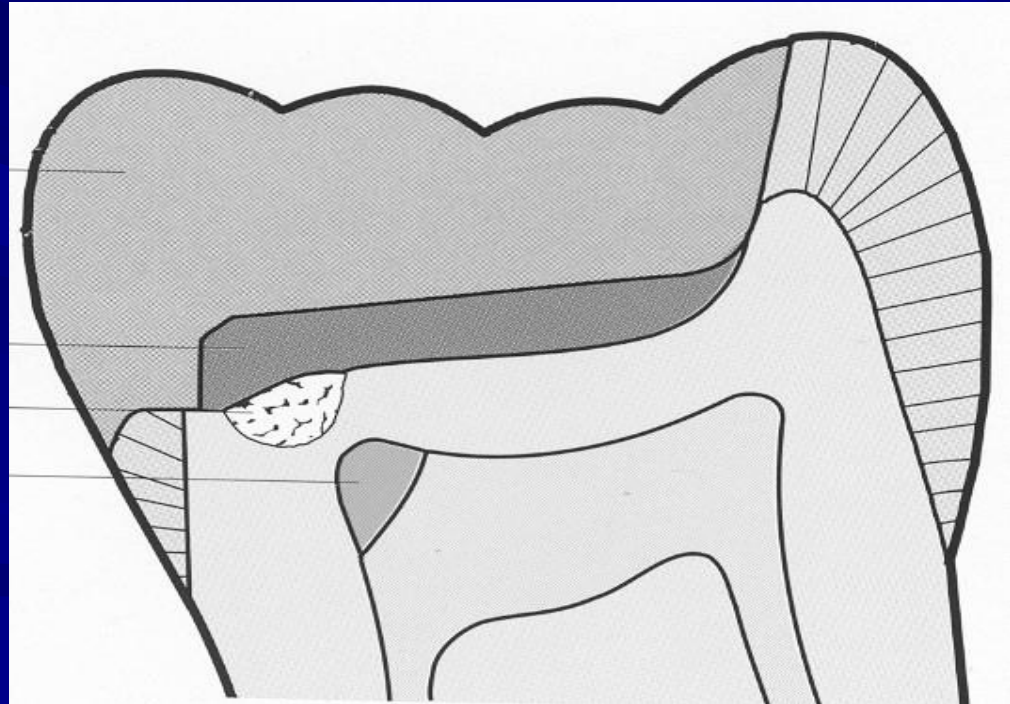
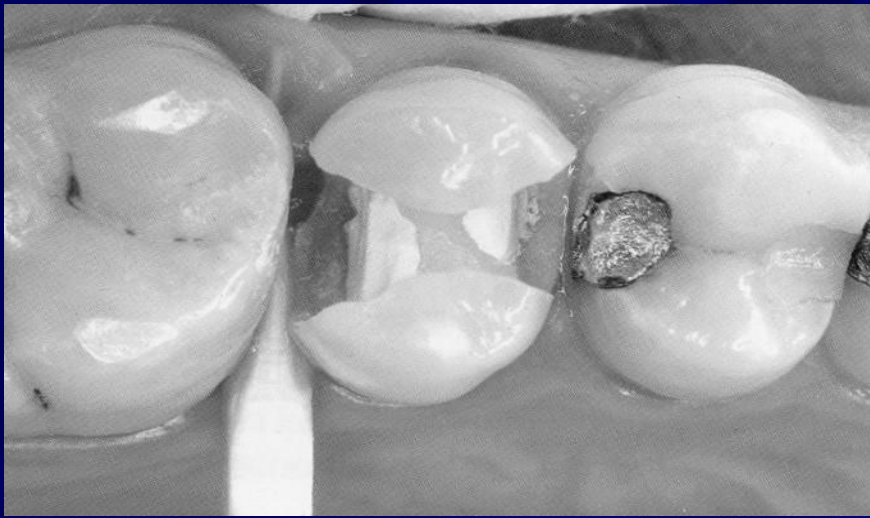
Suspension (mixed with water
Or ready made)

Cement

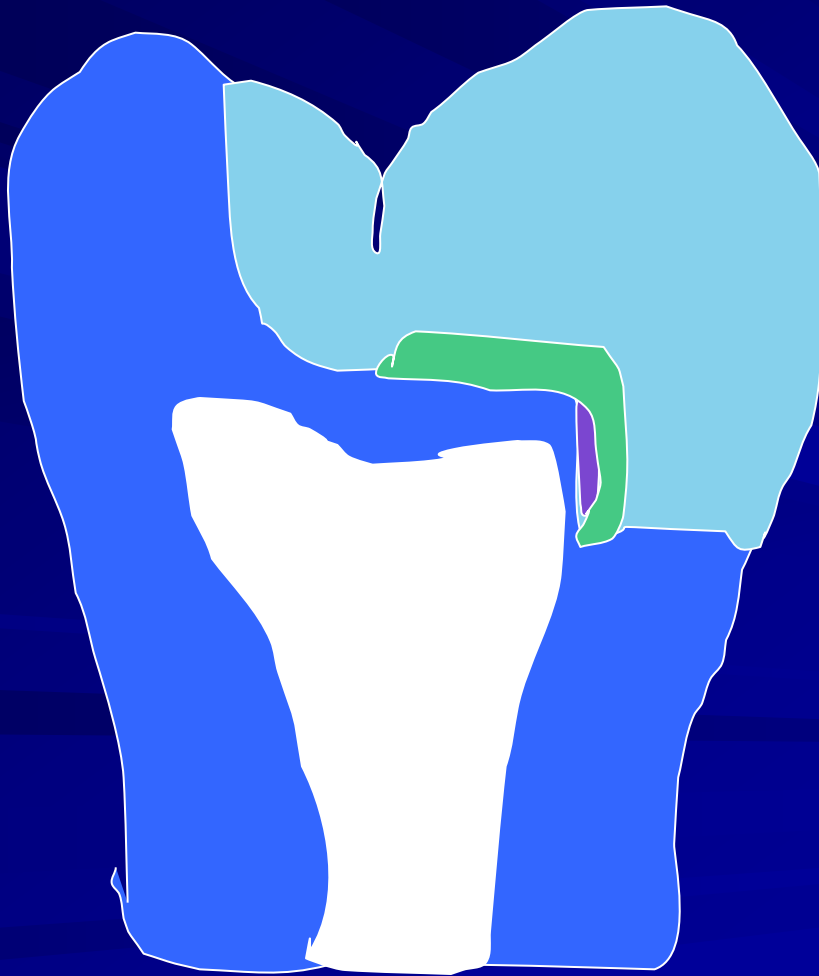
Temporary root canal filling

- short term
- middle term
- long term





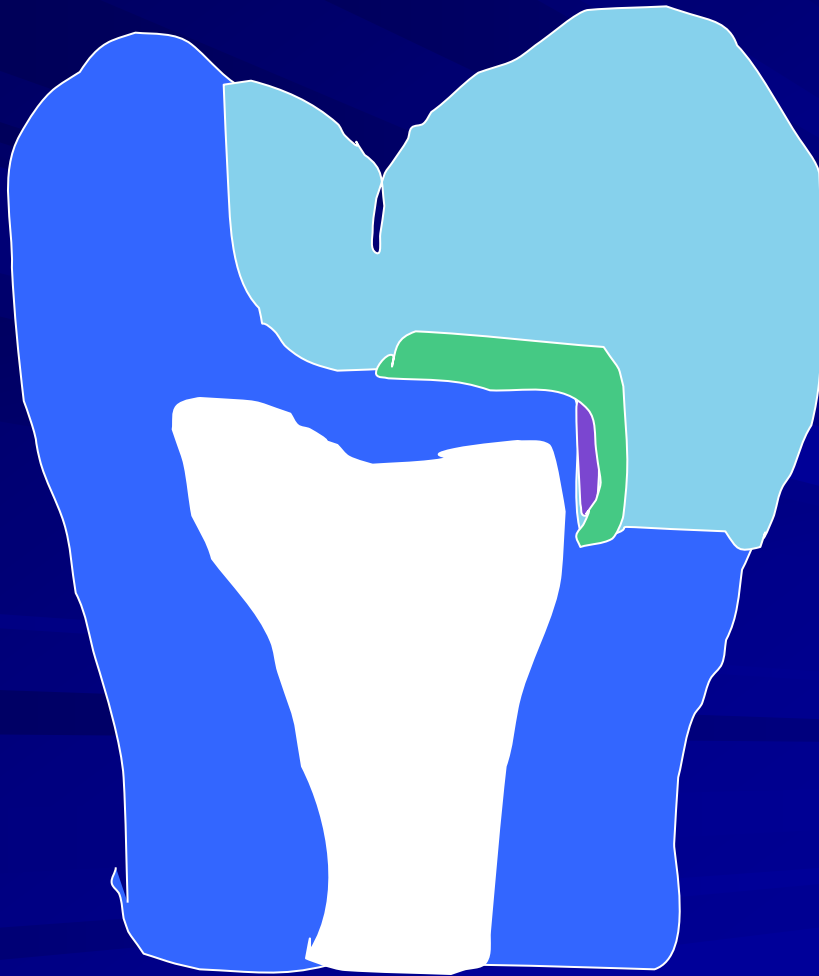
Indirect pulp capping



Caries close to dental pulp,
No pain

Subbase, base filling

Intermittent excavation



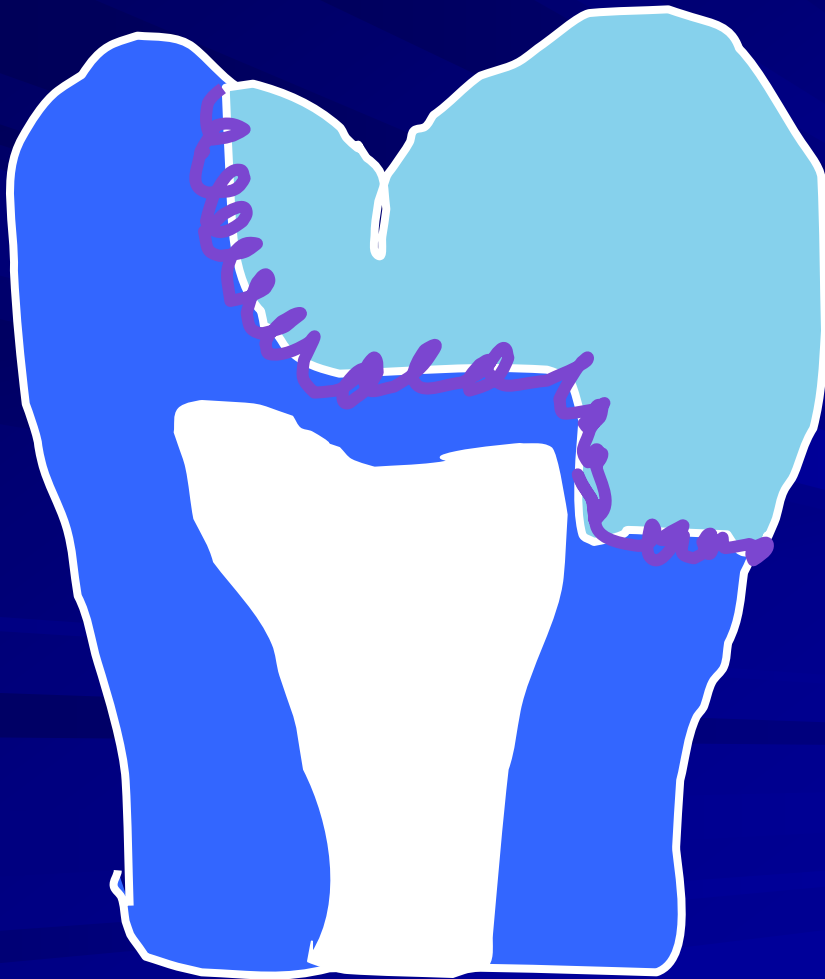
Large caries,
Slight pain

Calcium hydroxide
Base, temporary filling
for 6 months

Excavation

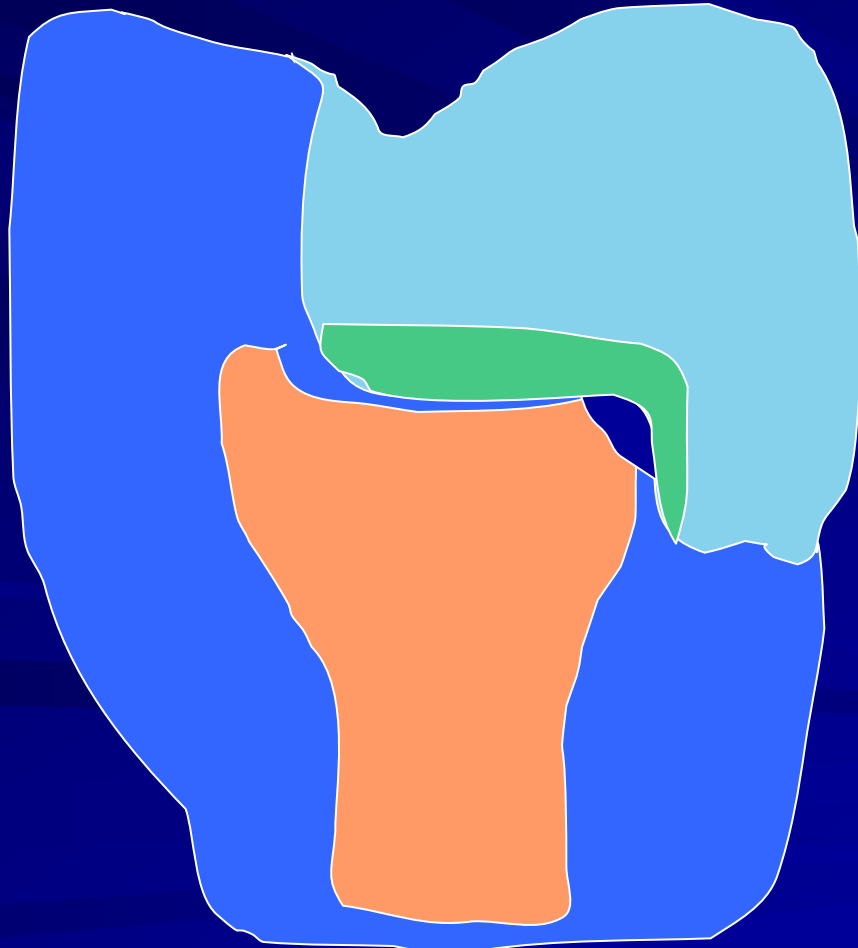
Expectation: formation
of reparative dentin

Glassionomer – its role in the treatment of deep caries



No pain
Clean border
– 1 mm around the cavity

Direct pulp capping



Open pulp chamber

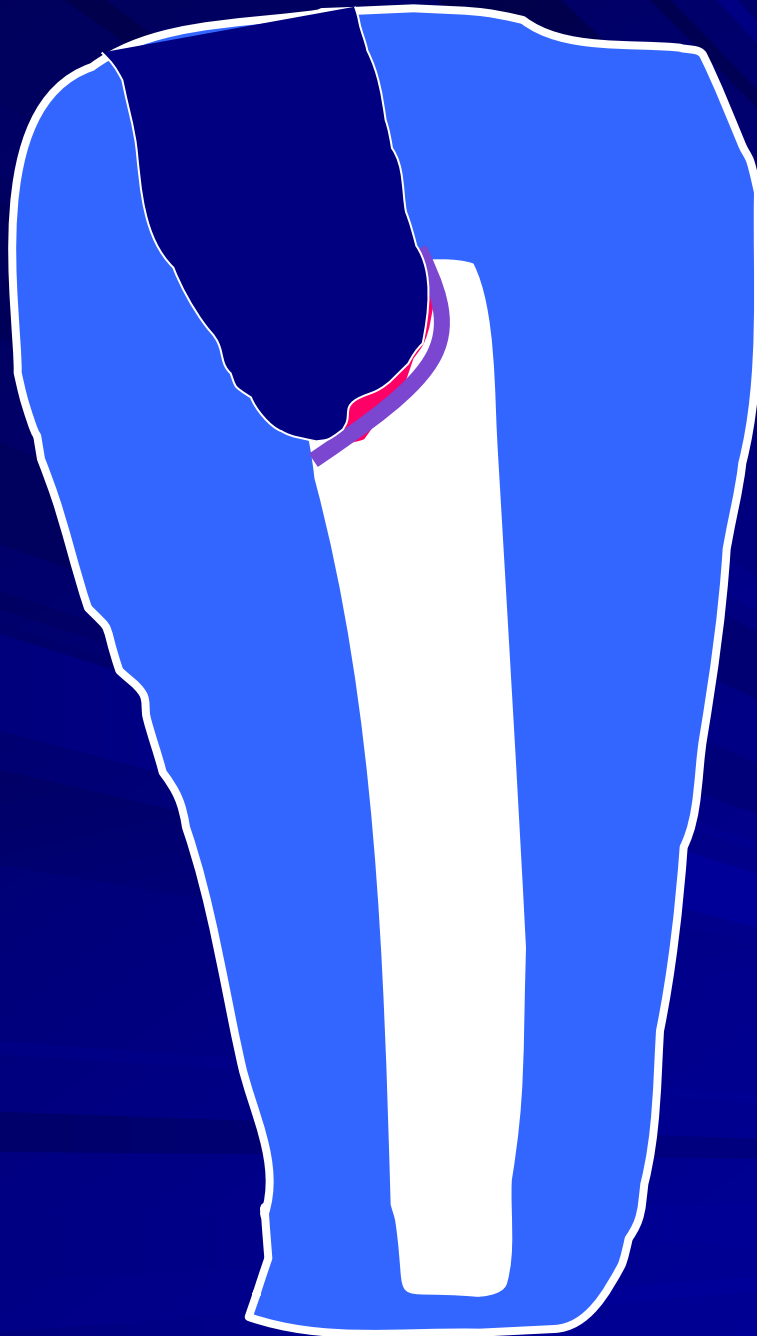
-preparation,
trauma

*Small perforation
Surrounded by
healthy dentin
Done immediately*

Dentin bridge

- Rests of calcium hydroxide
- Calcified connective tissue
- Dentin
- Predentin
- Odontoblasts



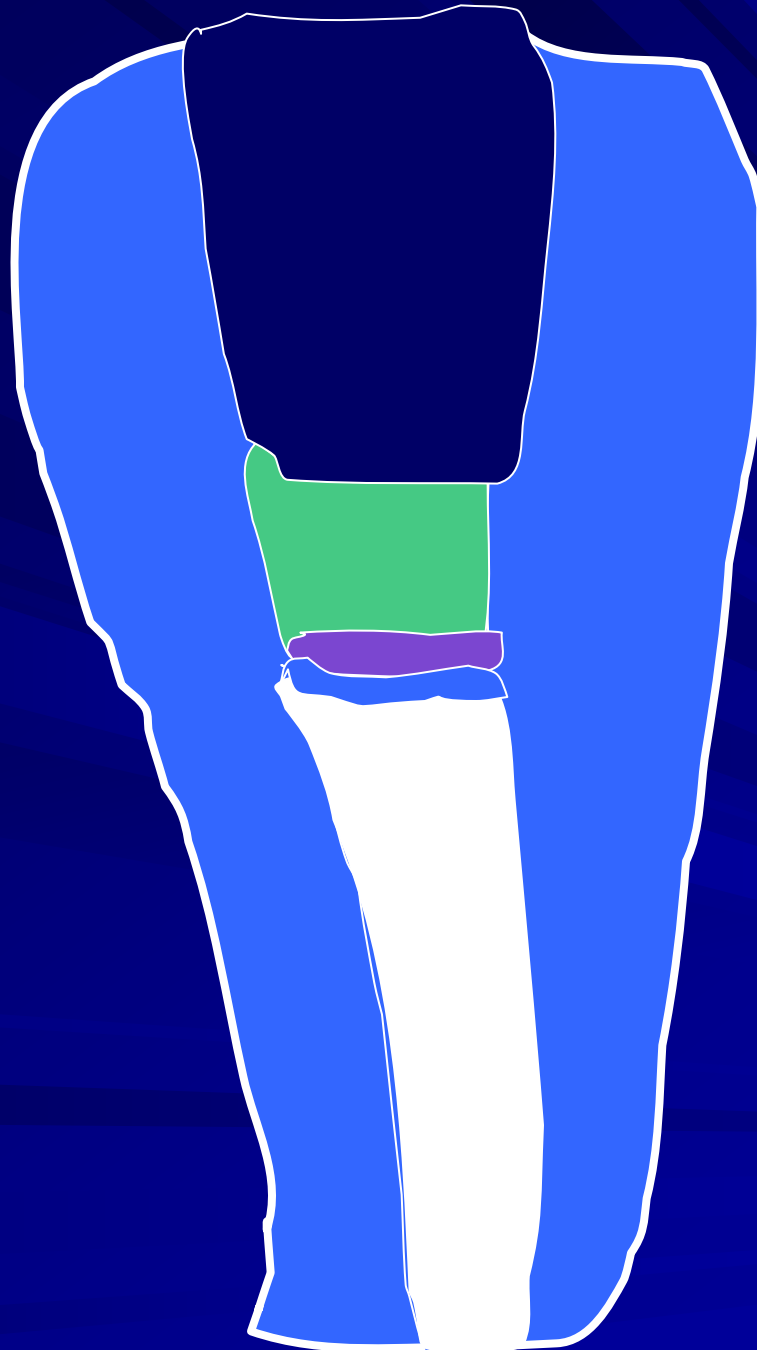


Pulpotomy

Partial

Injury of
permanent teeth where
apex is not completed.

Small perforation,
as soon as possible



Pulpotomy

Total

Injury of permanent teeth where apex is not completed.

Larger perforation, later than 2 hours

Suspension

Cementy



Pro root MTA

- Dicalcium silicate
 - Tricalcium silicate
 - Tricalcium aluminate
 - Tetracalcium aluminate
 - Copper sulphate
 - Bismuth trioxidate
- = portland cement





Active biosilicate technology tm

Septodont

Active Biosilicate Technology™ is a proprietary technology developed according to state-of-the-art pharmaceutical background applied to the high temperate ceramic mineral chemistry.



Biodentine - composition

■ Powder

Ca_3SiO_5 (tricalcium silicate C3S)

Main core material

Ca_2SiO_5 (dicalcium silicate C2S)

Second core material

CaCO_3 (calcium carbonate)

Filler

CaO (calcium oxide)

Filler

Fe_2O_3 (iron dioxide)

Shade

ZrO_2 (zirconium dioxide)

Radiopacifier

■ Liquid

$\text{CaCl}_2 \cdot 2\text{H}_2\text{O}$

Accelerator

Hydrosoluble polymer

Water reducing agent

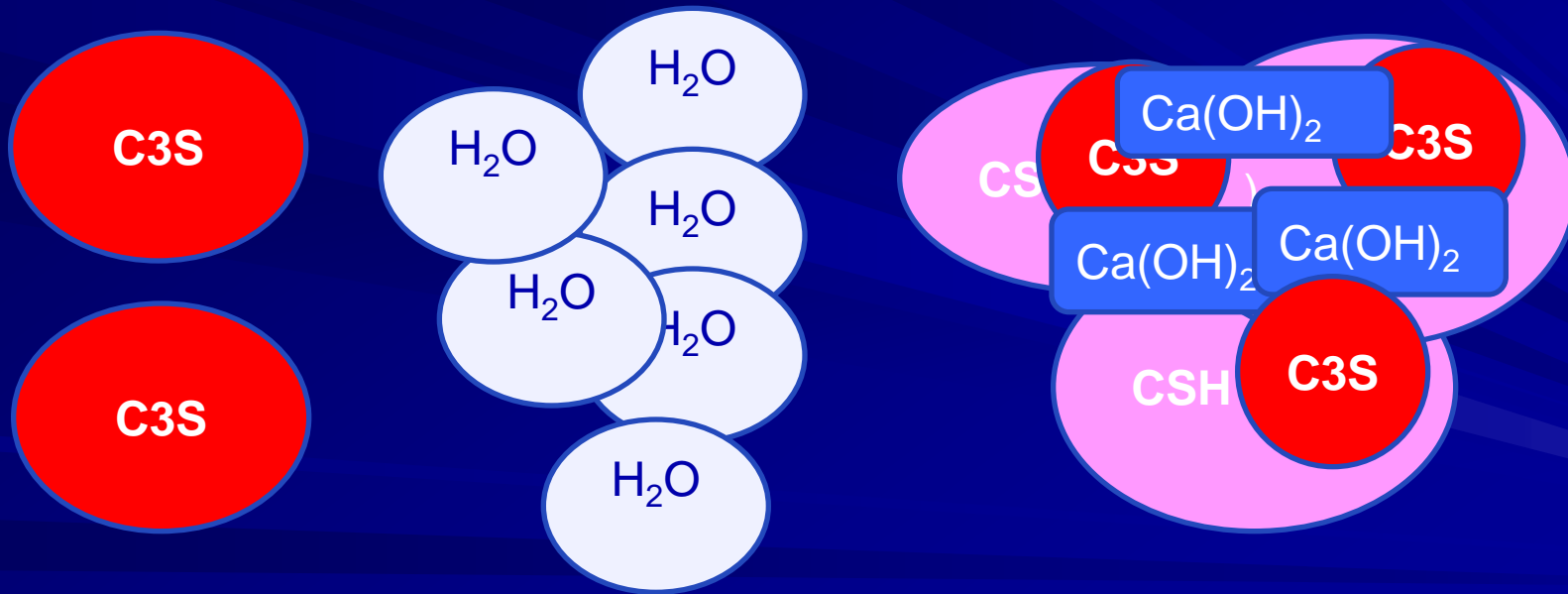
Water

Biodentine – setting reaction



C3S

CSH





The hardening process results from the formation of crystals that are deposited in a supersaturated solution.

Setting time: 9 -12 min.

Bioactive technology – bioactive materials

Indication a contraindication of the endodontic treatment

■ View - point

- Local
- Regional
- Systemic

Indication a contraindication of the endodontic treatment

■ View - point

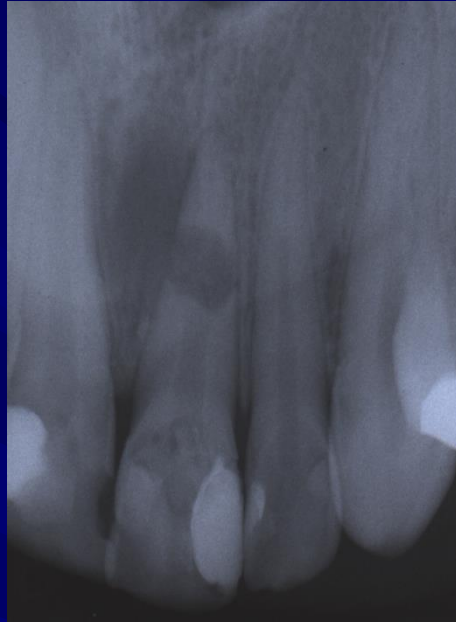
➤ Local

Root canal morphology

Severity of pulpal or periodontal disease

Periodontal status





Indication a contraindication of the endodontic treatment

- View - point

- Regional

Indikation a contraindication of the endodontic treatment

- Poin of view

- Regional

The value of the endodontic teeth

Indikation a contraindication of the endodontic treatment

- Poin of view

- Systemic

General health.

Taking decision

- Vital methods?
- Root canal treatment?
- Extraction?
- Other surgery?

Endodontic treatment

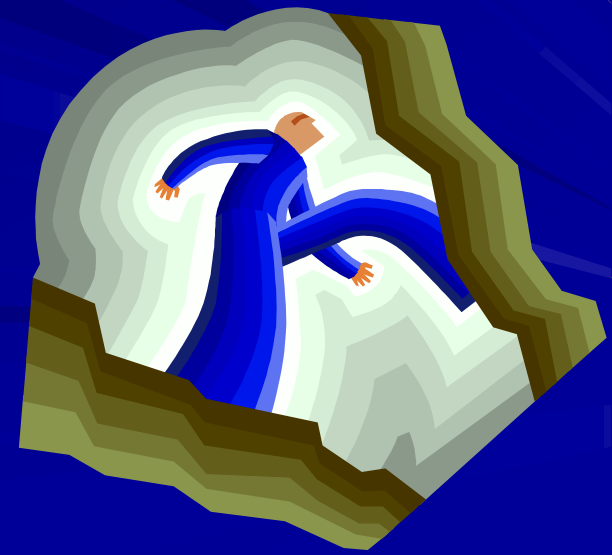
Root canal shaping

Root canal cleaning

Root canal filing

Phases of endodontic treatment

- **Diagnosis**
- **X –ray**
- **Indicated?**
- **Restoration of the tooth**



Phases of RCT

- Access to the pulp chamber
- Cathetrization
- Negotiation of the WL
- Root canal shaping
- Recapitulation
- Irrigation
- Drying
- Filing
- X-ray
- Resistance and retention – postendodontic treatment.