



# Primum non nocere !

**Minimal intervention**

=

*Non invasive*

**Approach**

*Minimally invasive*

# Minimally invasive treatment

## Preparation techniques

- Mechanical
- Chemo – mechanical
- Kinetic
- Hydrokinetic (Laser)

*Peters MC, Mc Lean ME: Minimally invasive operative care II.  
Contemporary techniques and materials: An overview.  
J Adhes Dent 2001; 3:17-31.*



# □ Mechanical preparation

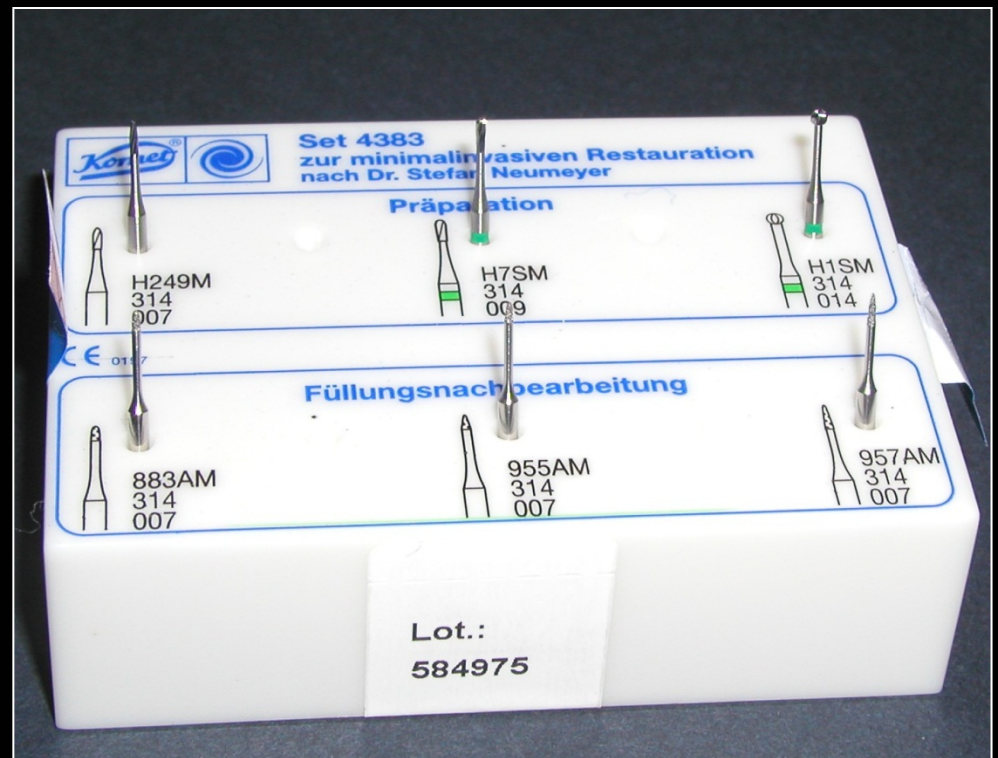
➤ *Rotary*

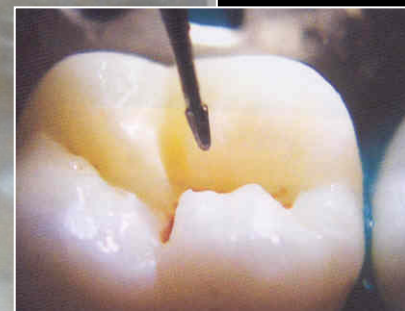
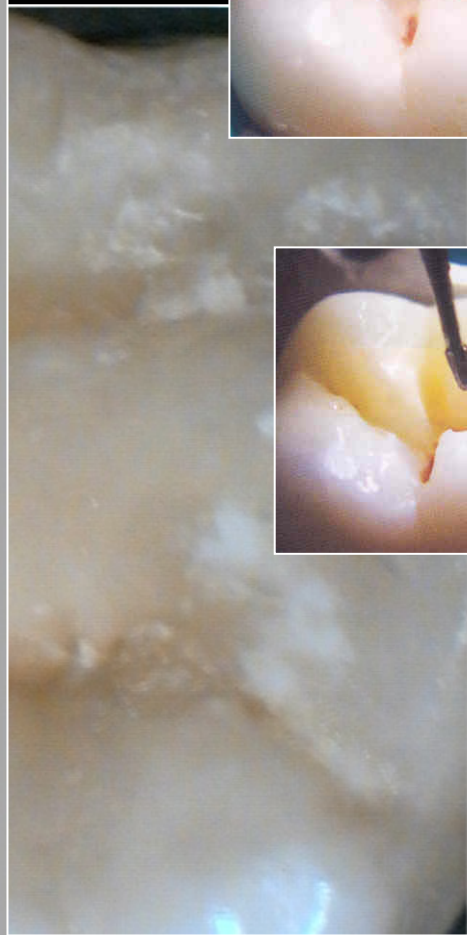
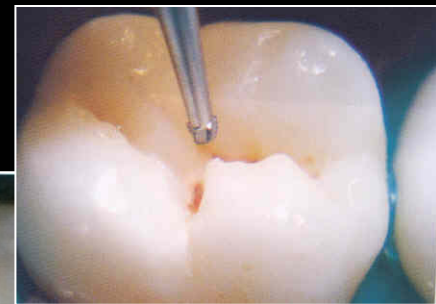
➤ *Sonic and ultrasonic*

➤ *ART*



# ➤ Rotary – special burs and diamonds

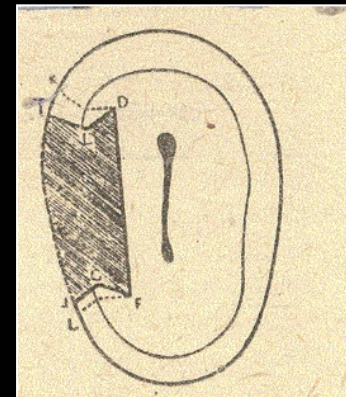
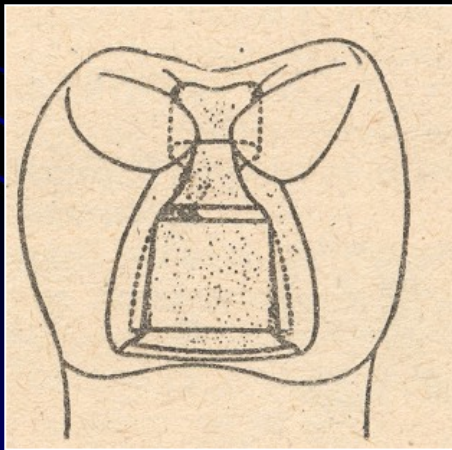
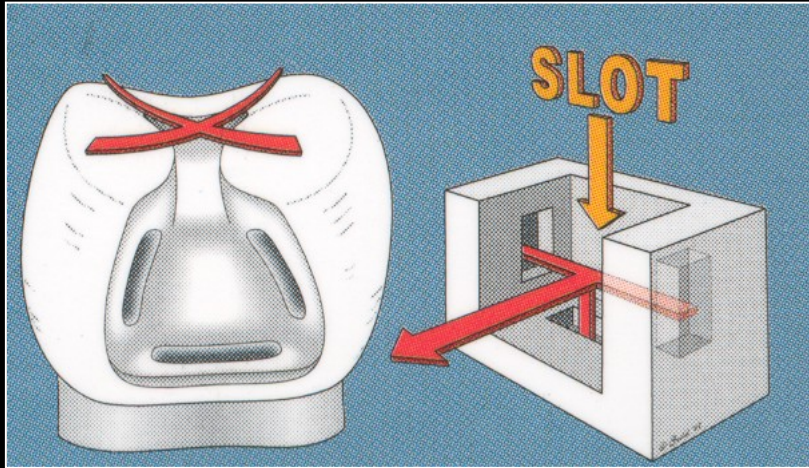






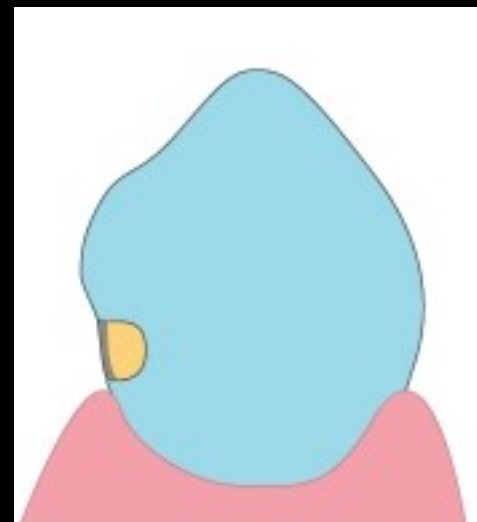
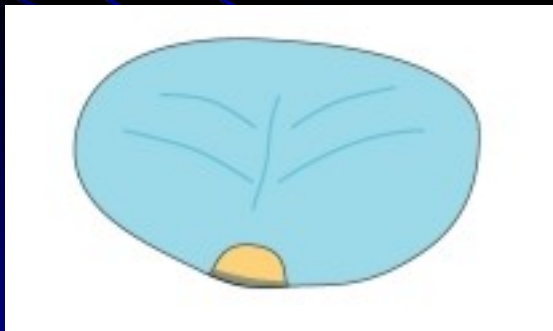
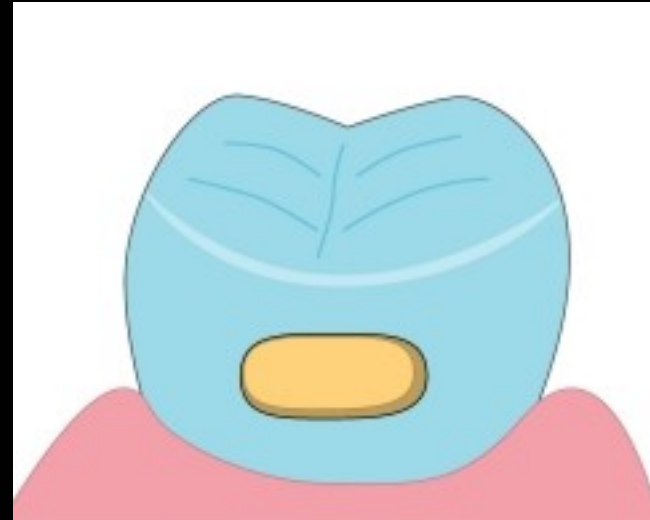
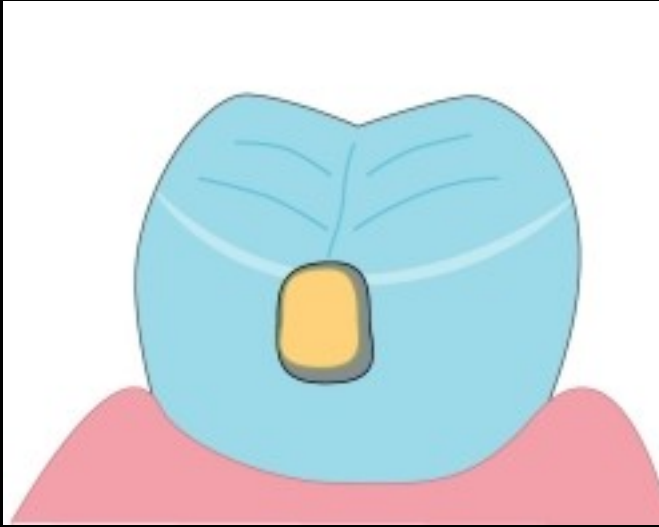


# Slot preparation

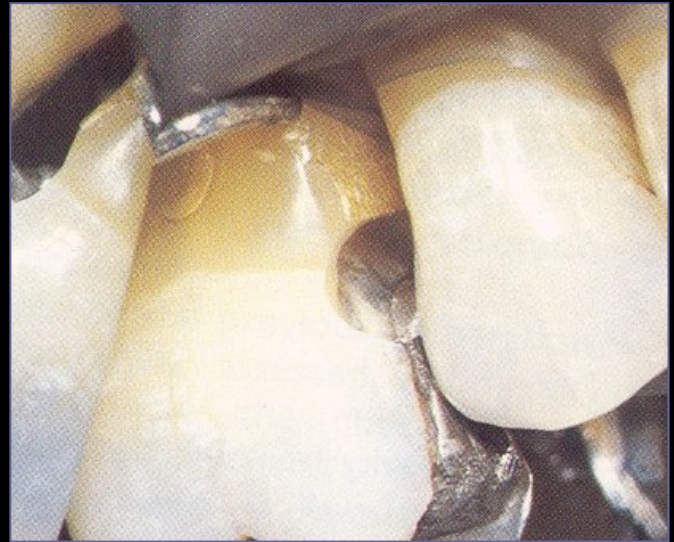




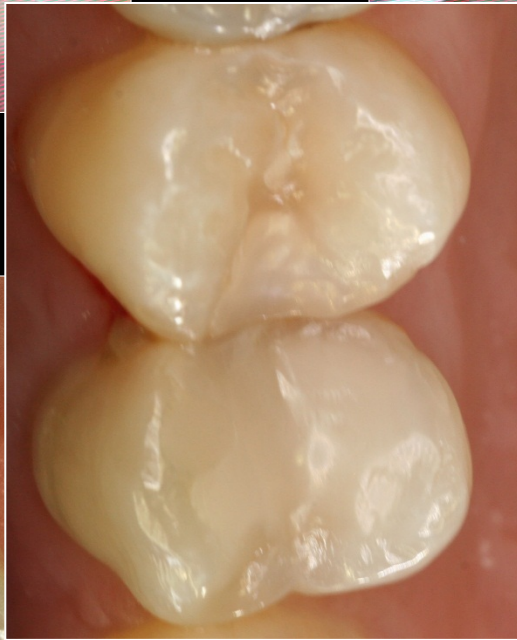
# Adhesive slot preparation



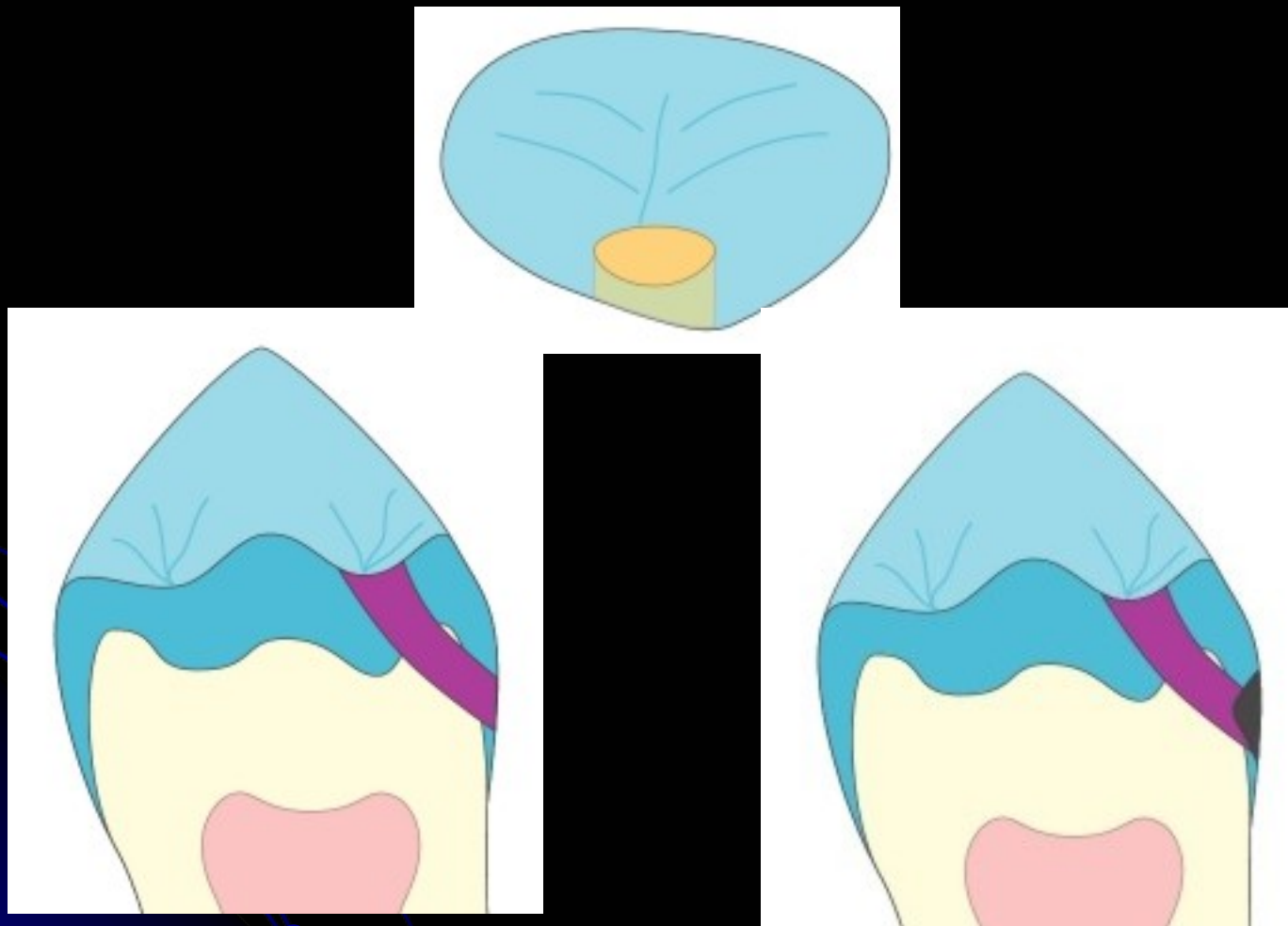


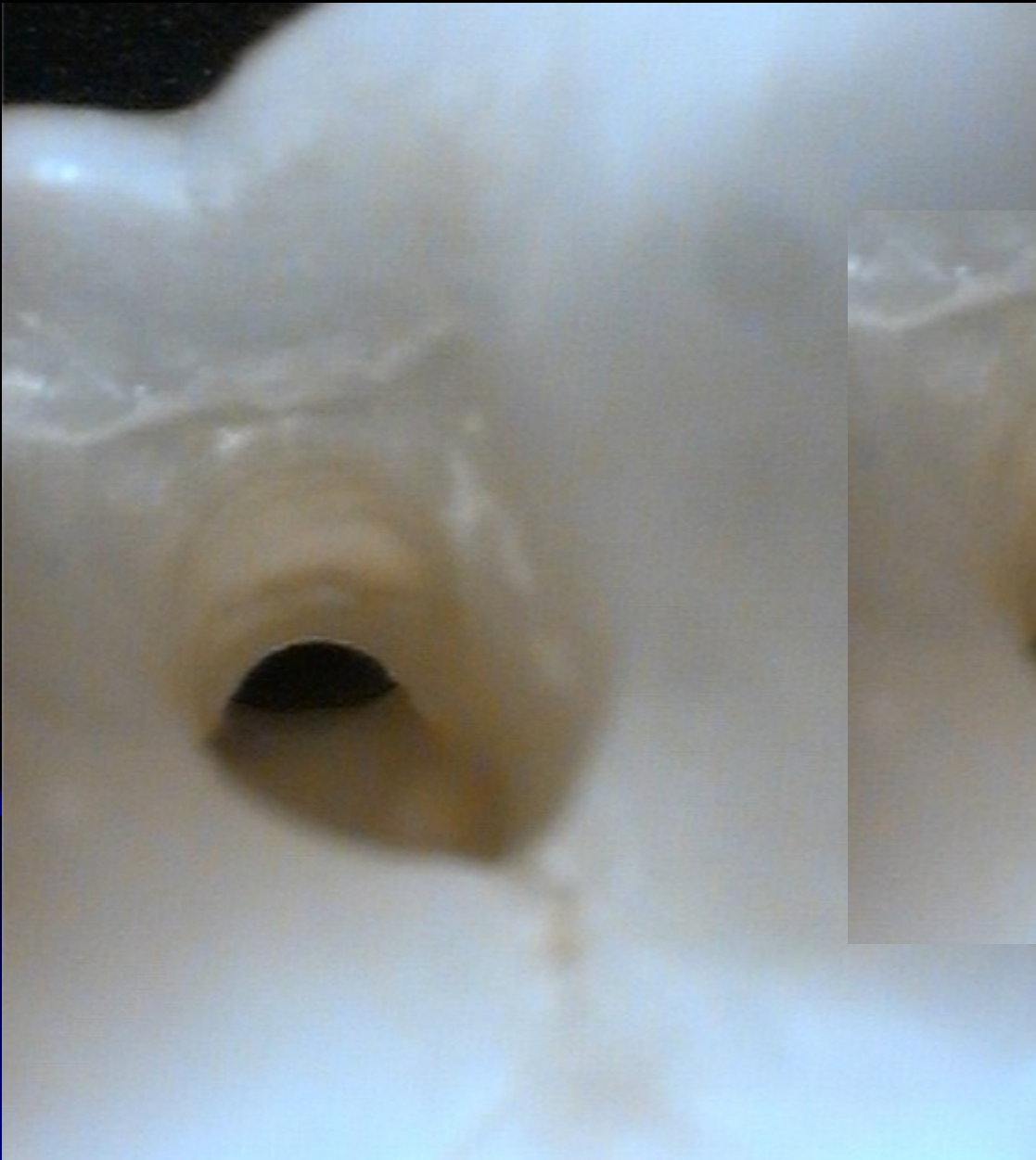






# Tunnel preparation

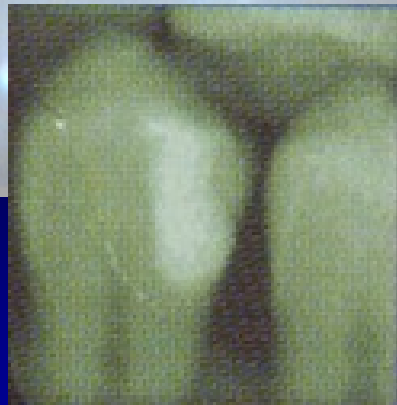
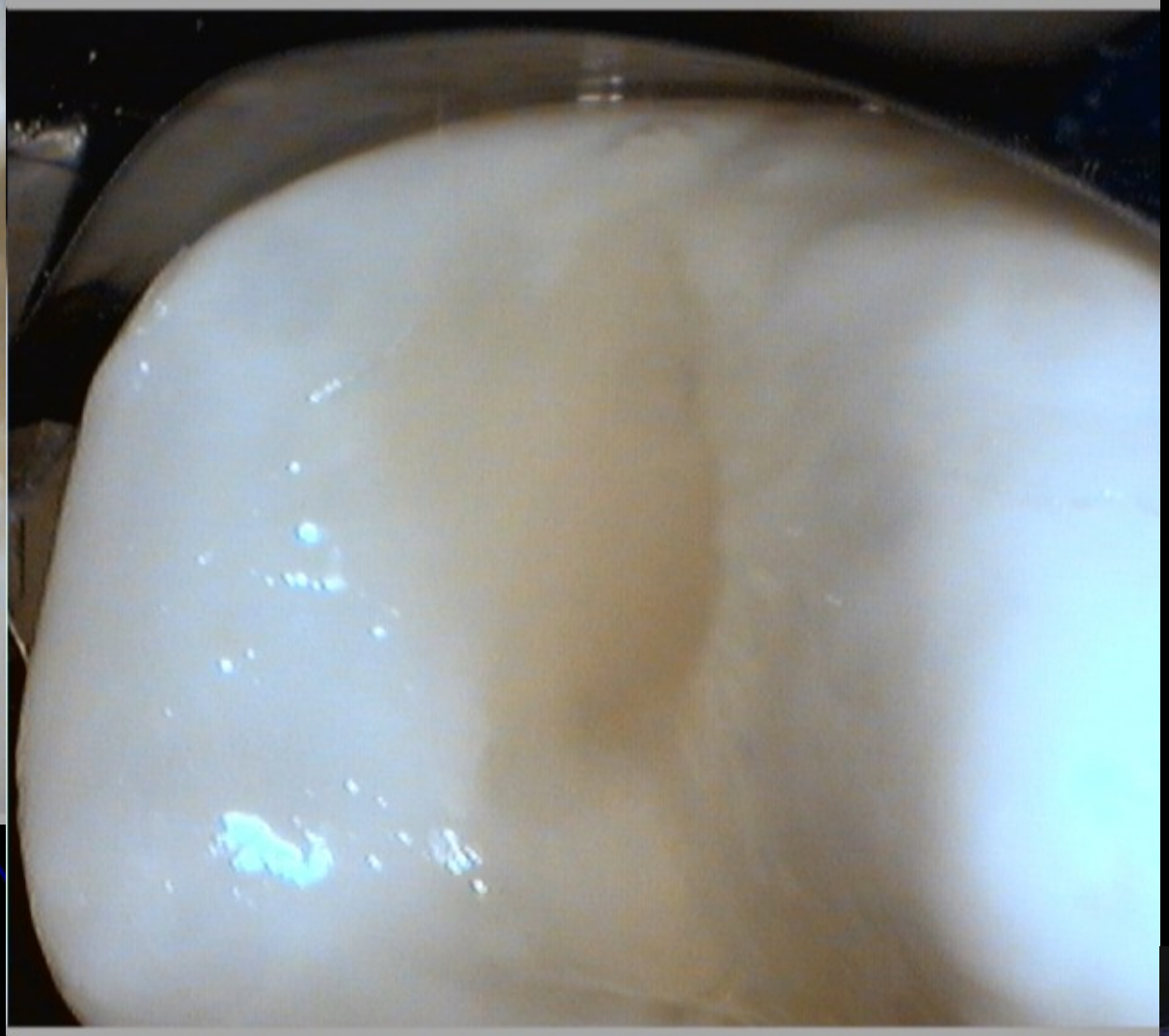
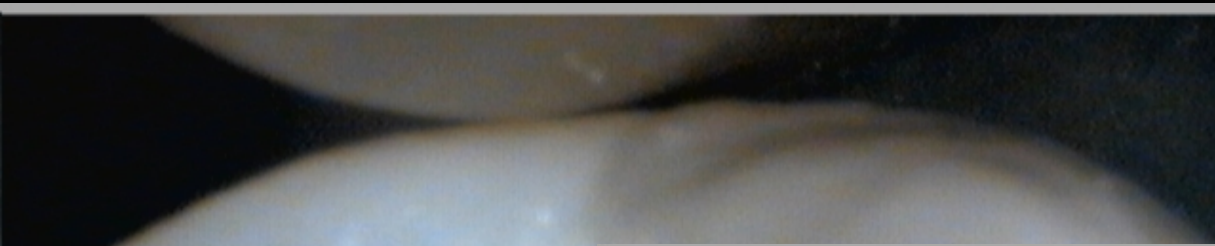




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## Success?

1. Low caries risk
2. Cooperation of the patient
3. Intact proximal ridge
4. D2

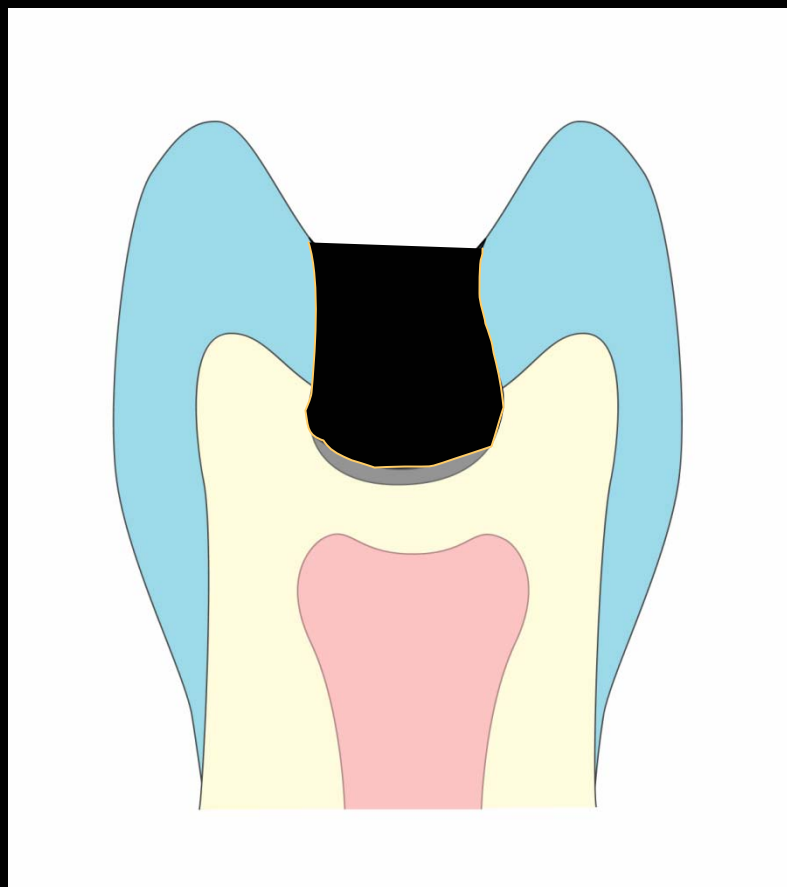


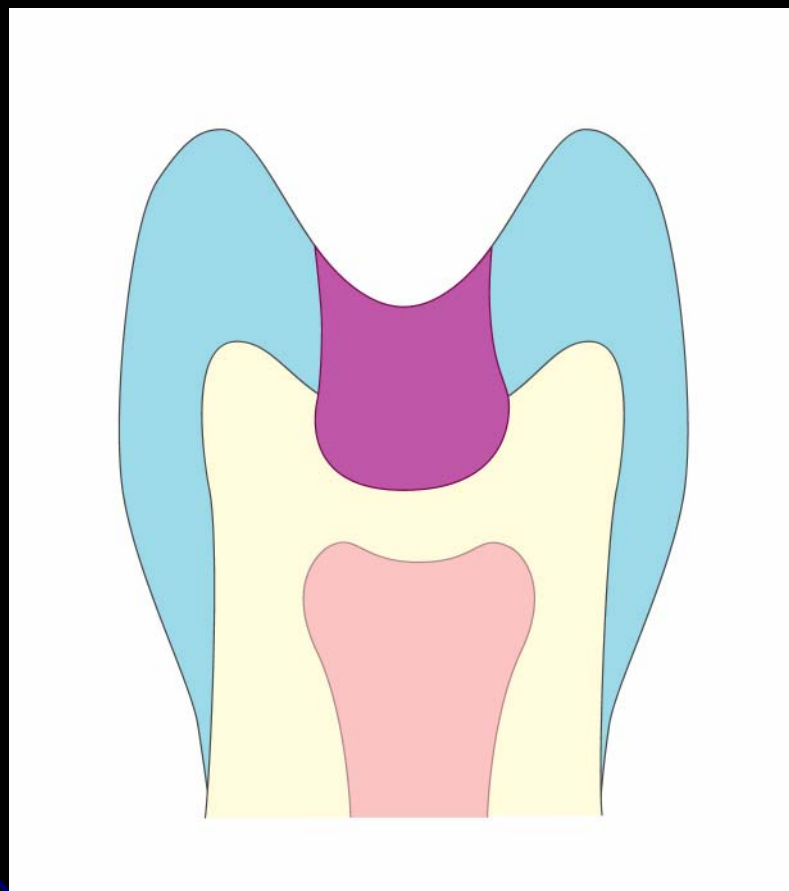
## Success?

1. Loupes or microscope
2. Mini instruments
3. Capsulated GIC
5. BW post op

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# ➤ ART





# ART

Excavation of carious dentin

Clean borders

GIC

Recall





# Caries detector

Can differentiate carious dentin with destroyed and intact collagen network



# Chemomechanical preparation



# Chemomechanical preparation

✓ *Sodium hypochlorite + triaminoacids*

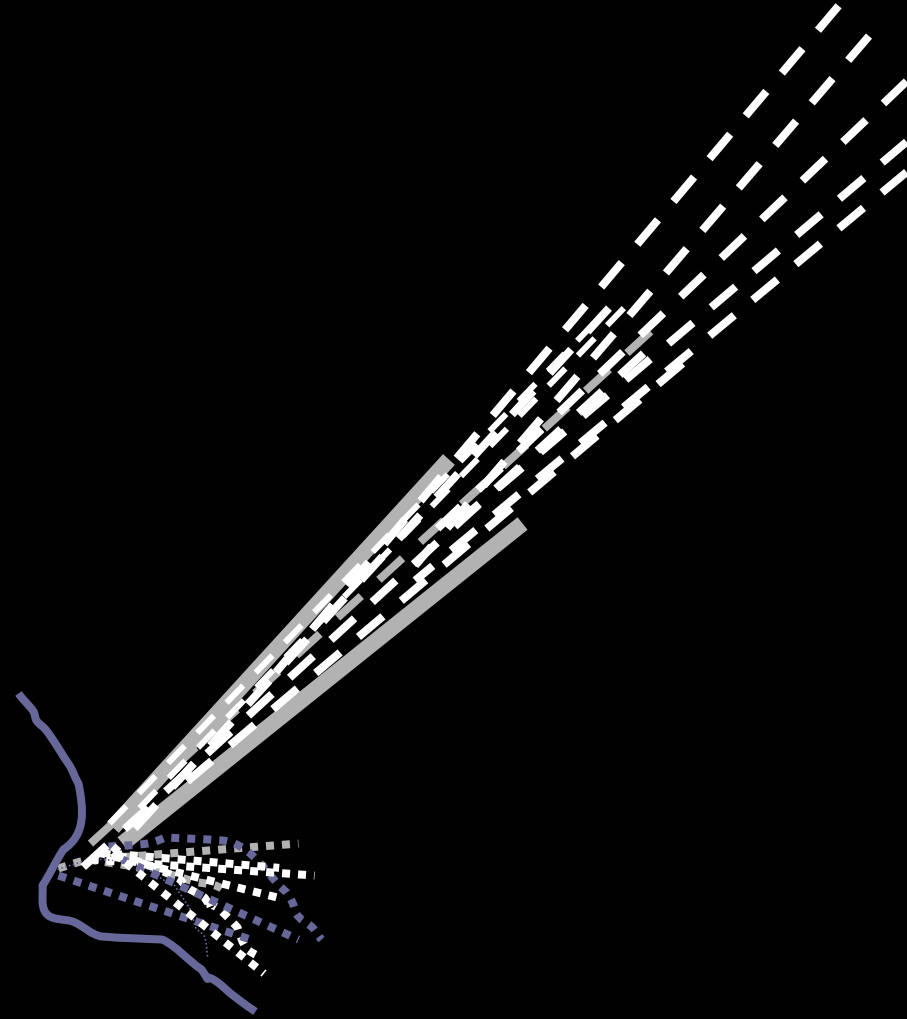
*Removal of carious dentin, non active in enamel*

*GIC is the suitable material*

*Rafique S, Banerjee A, Fiske J.  
Clinical trial of an air-abrasion/Carisolv gel regimen  
for restorative treatment for dentally anxious patients.  
Caries Res 2002; 186 (Suppl.3)36:39.*



## ➤ Kinetic preparation



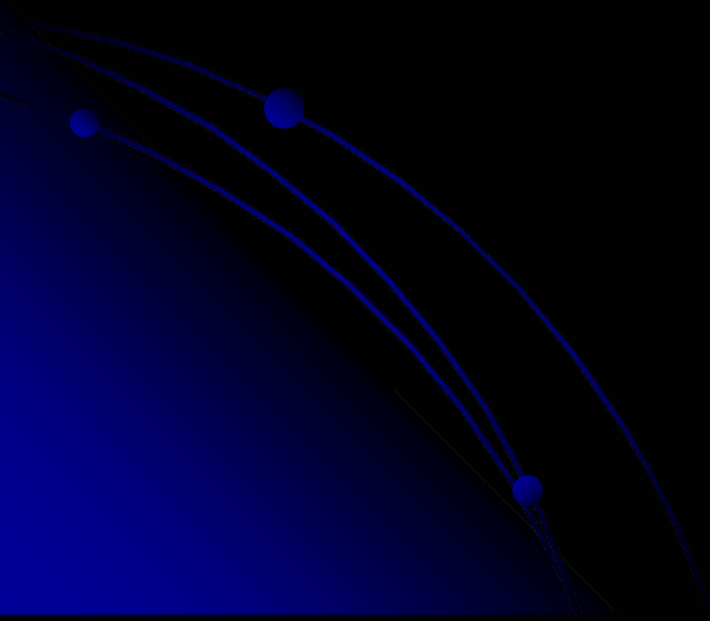
# Kinetic preparation

- Principally sandblasting
- Irregular cavosurface margin
- No excavation of carious dentin
- Suitable for composite materials





# Ultrasound









# Ultrasound in dentistry

- Piezoelectric generators
- 10 W/cm<sup>2</sup>



# Ultrazvuk v zubním lékařství

- Oral hygiene - prophylaxis
- Subgingival treatment
- Preparation of cavities
- Endodontics
- Prosthetics
- Surgery

# Ultrazvuk v zubním lékařství

- Odstranění biofilmu a zubního kamene – profesionální hygiena

Robustní koncovky pracovní řady streamline.

Orientace:

Magnetostrikční: Delší osa elipsy(osmičky) směřuje tangenciálně k povrchu zubu

Piezoelektrické: Dráha pohybu koncovky je tangenciální k povrchu zubu

# Preparation

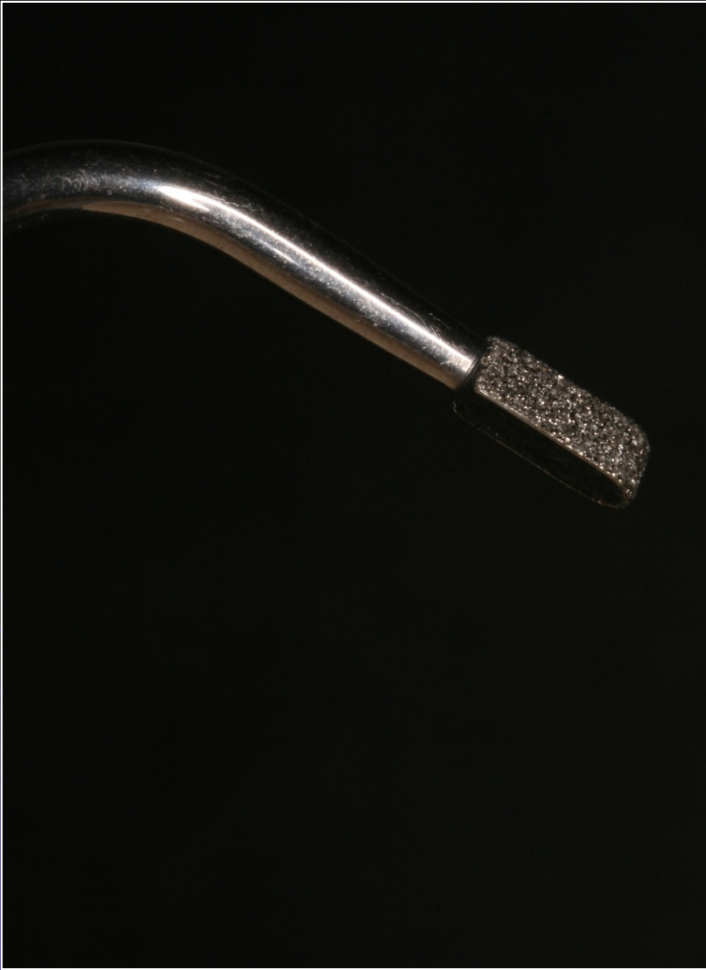
Oscillation of the instrument

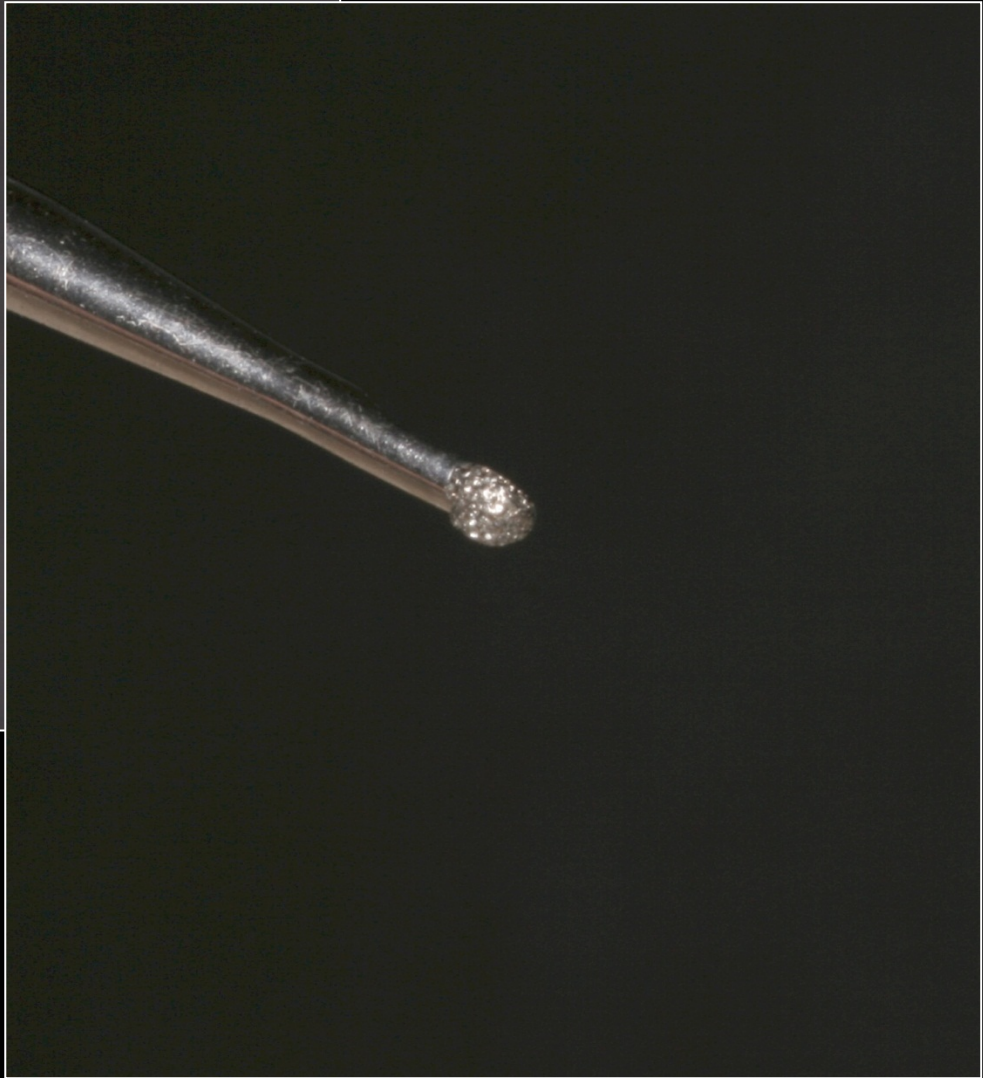
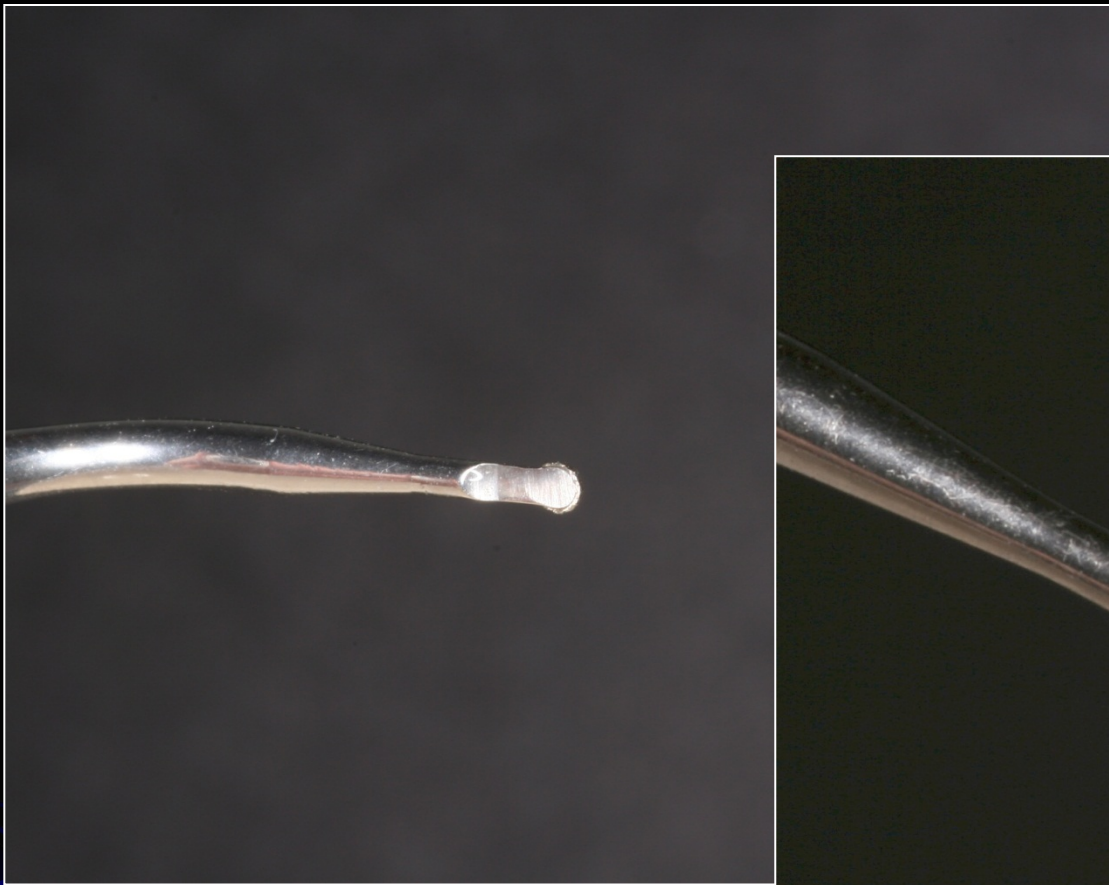
No risk of the damage of the neighborhood tooth

Mini and microcavities, slots and tunnels,  
preparation of cavosurface margins

# Preparace kavit

Iní kleštiny









# Preparation in enamel



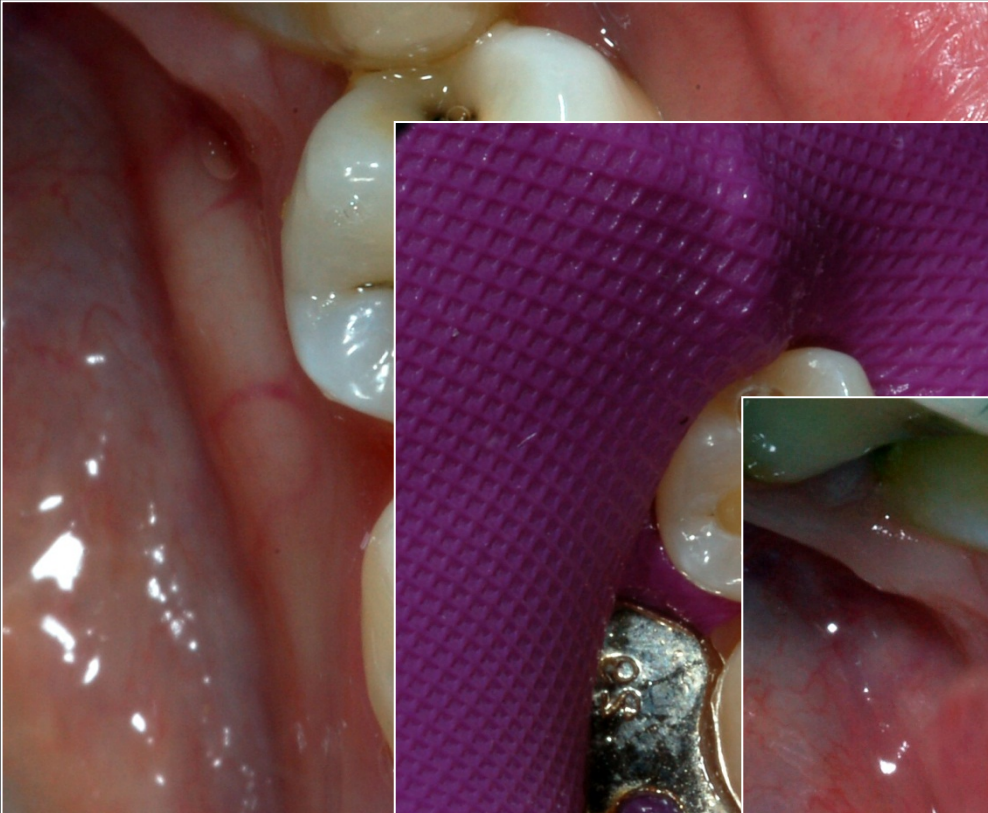
Preparation in enamel

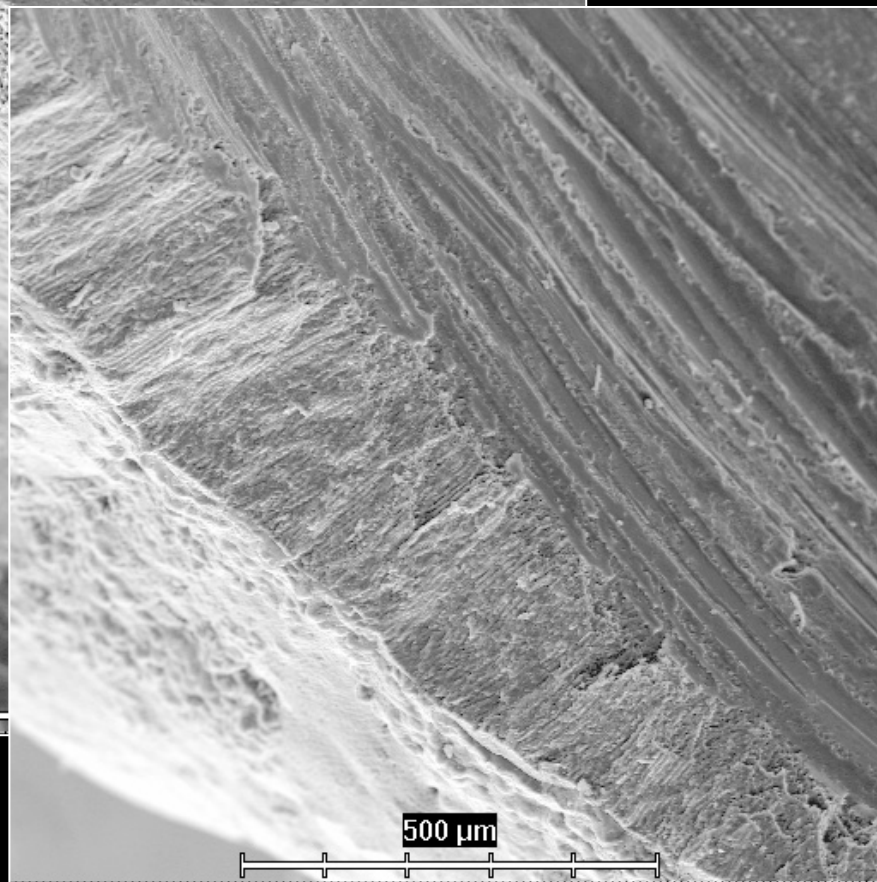
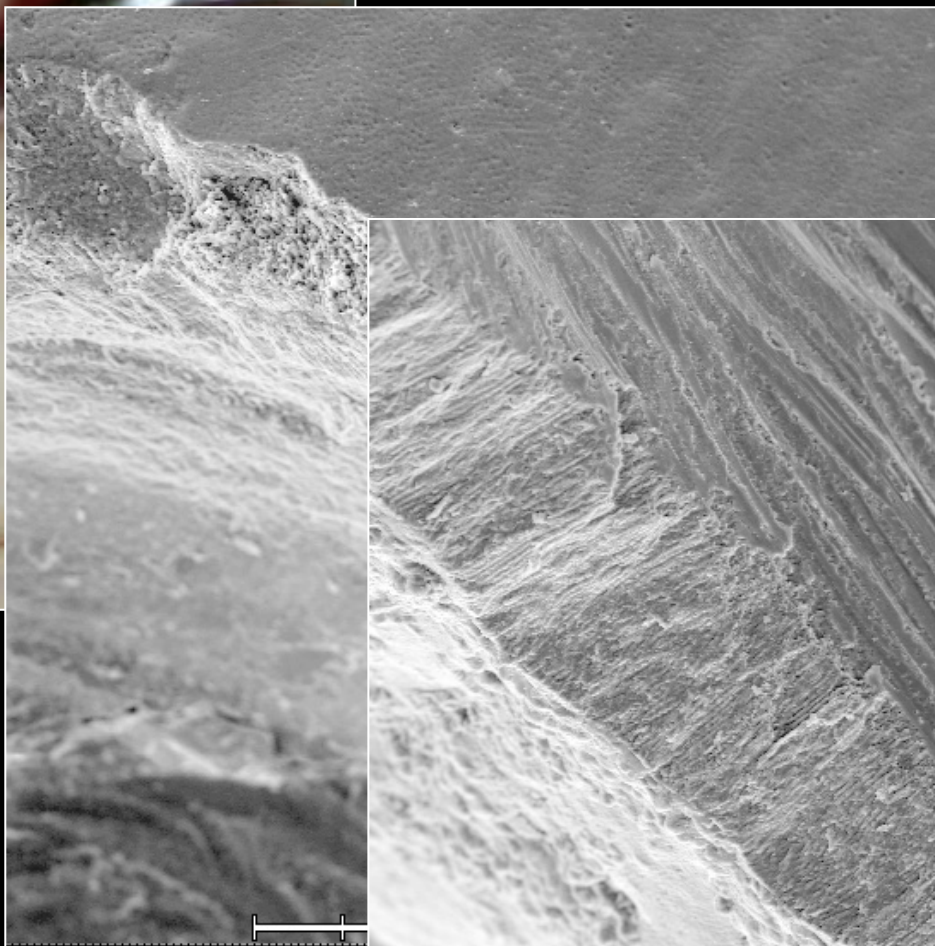


Preparation in dentin

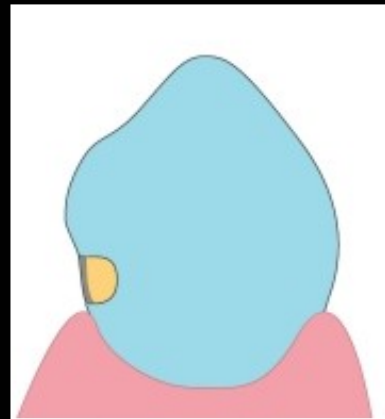
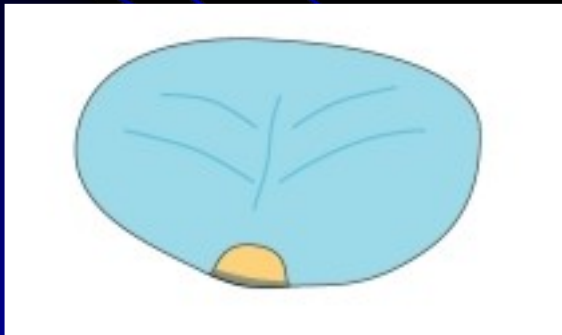
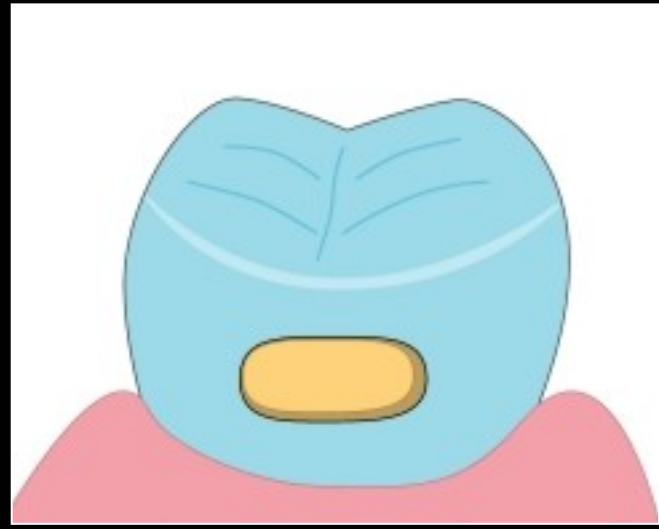
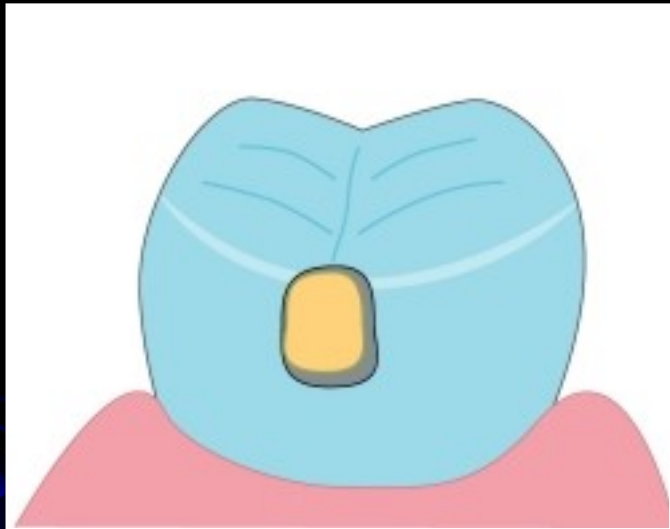
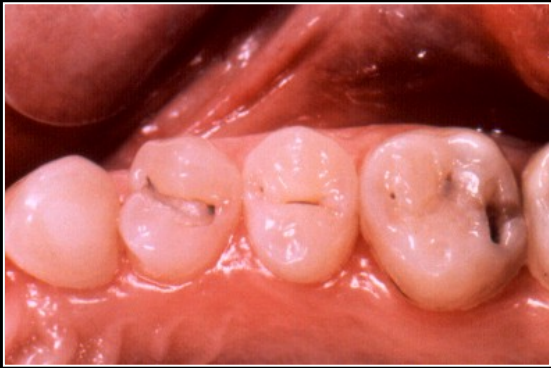














# Proximal caries



# Sonická aproximální preparace



# LASER

- **L**IGHT **A**MPLIFICATION BY **S**TIMULATED **E**MISSION OF **R**ADIATION

Maiman 1960

Basov, Prokhorov, Townes.

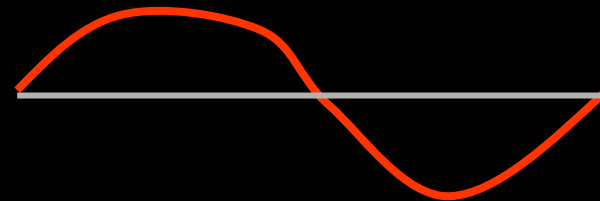
# Light

- **Elektromagnetic wave**

*- Wavelength*

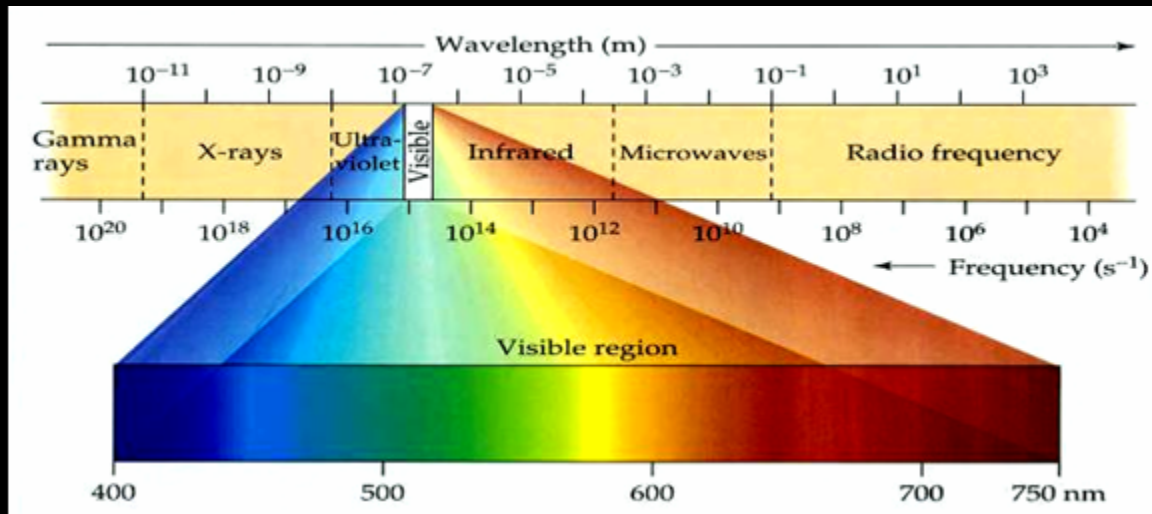
*- Amplitude*

*- Photons*



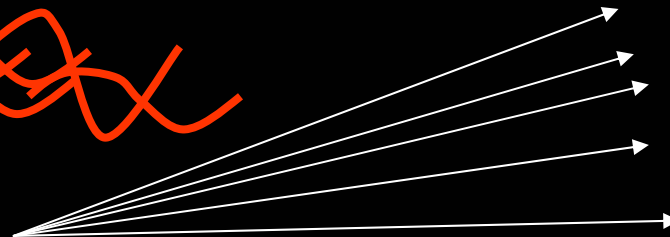


# Natural light

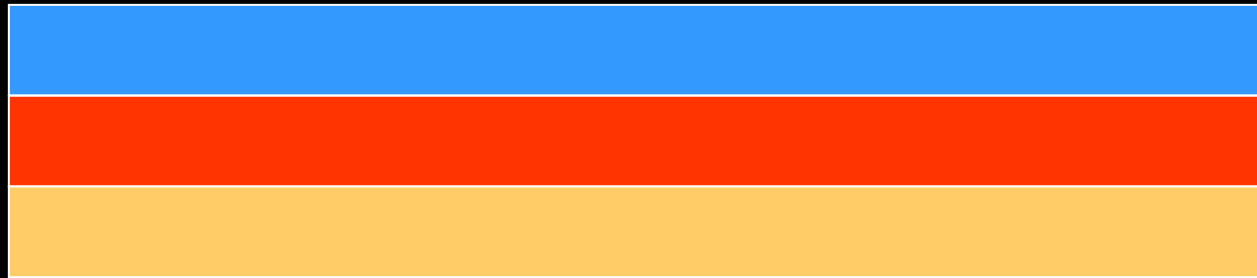


*Hickel, 2004*

- Polychromatic
- Divergent
- Incoherent



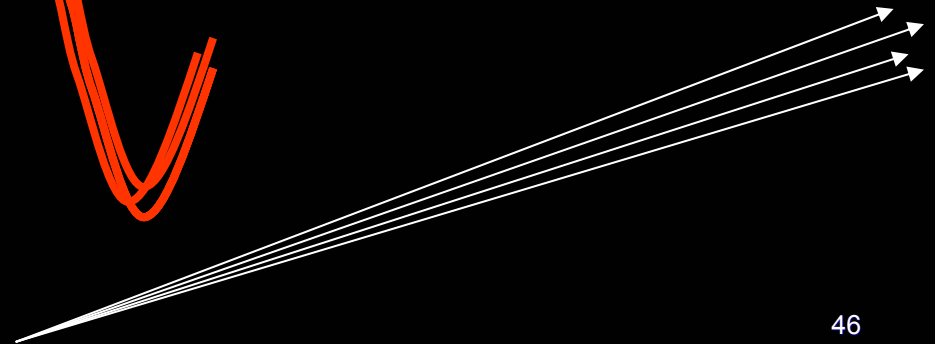
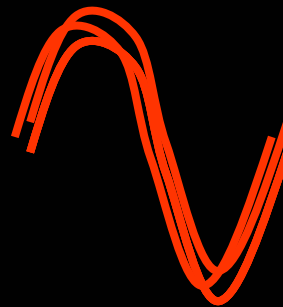
# Laser light



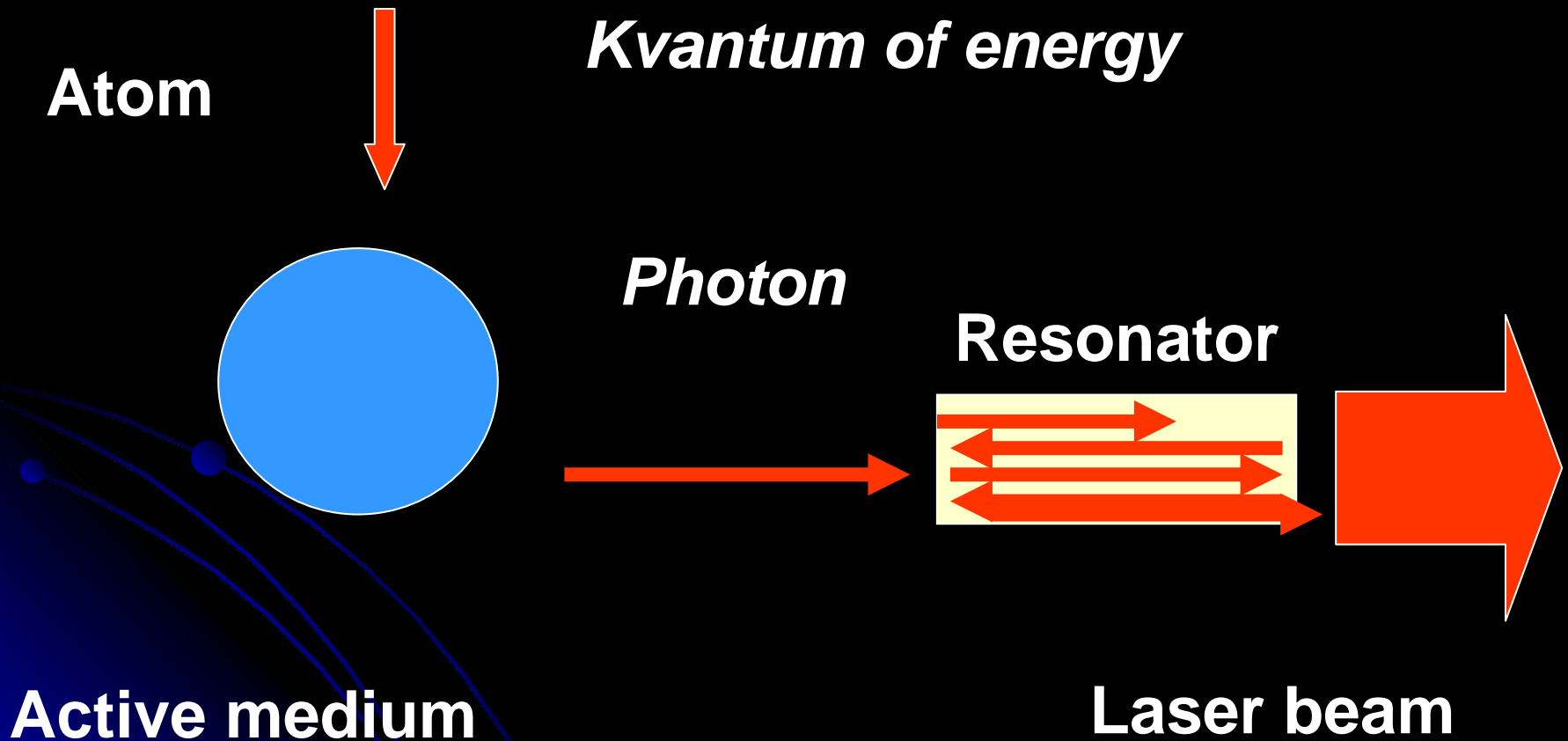
***Monochromatic***

***Coherent***

***Colimated***



# Principle



**Active medium**



**Wavelength**



**Energy**



# Active medium

- Argon – Fluor UV
- Krypton- Fluor UV
- Helium – Kadmiu UV, VIS
- Argon VIS
- Rubín VIS
- Nd:YAG VIS,IR
- Helium – Neon VIS, IR
- Diode lasers VIS, IR
- Erbium IR (Er:YAG, Er,Cr:YSGG)
- Oxid uhličitý IR

# Er:YAG laser

**Active medium: Erbium Yttrium -  
Aluminium - Garnet**

**Wavelength: 2940 nm**



# Er,Cr:YSGG laser

**Active medium: Erbium a Chromium  
Yttrium - Scandium - Gallium - Garnet**

**Wavelength: 2780 nm**



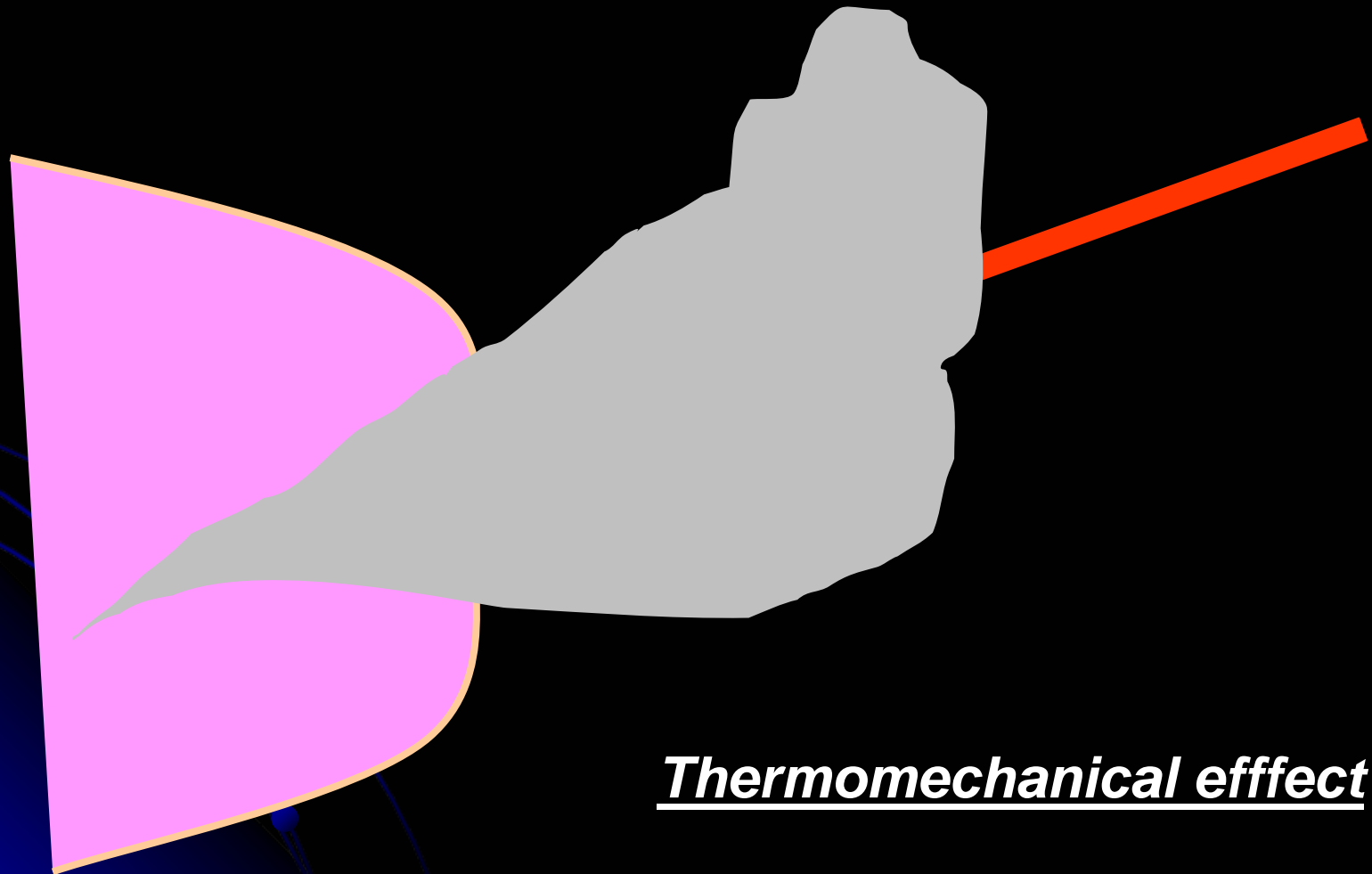
# Er,Cr:YSGG Laser System

Waterlase (Biolase, USA)



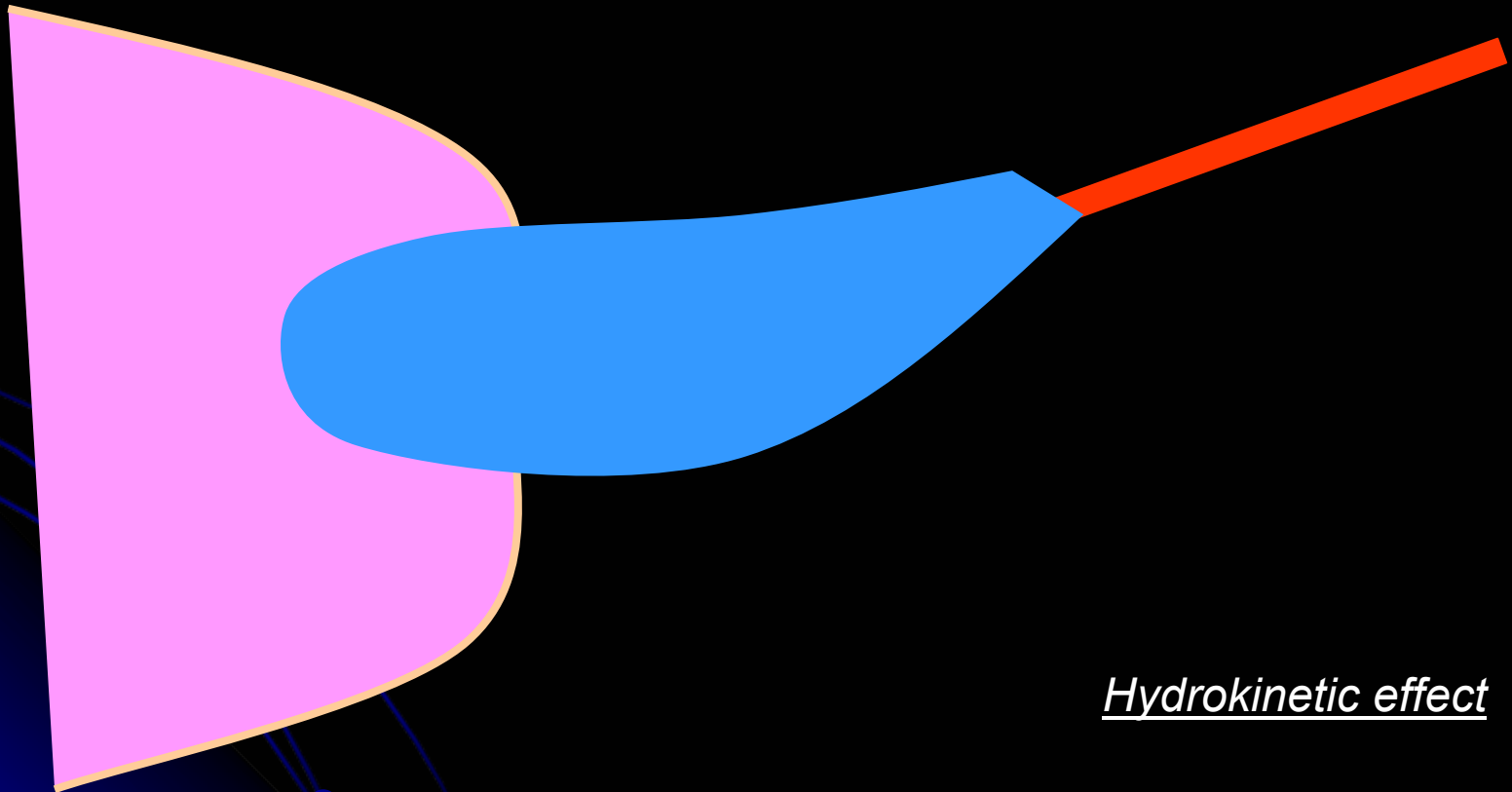


# Principle of action



*Thermomechanical effect*

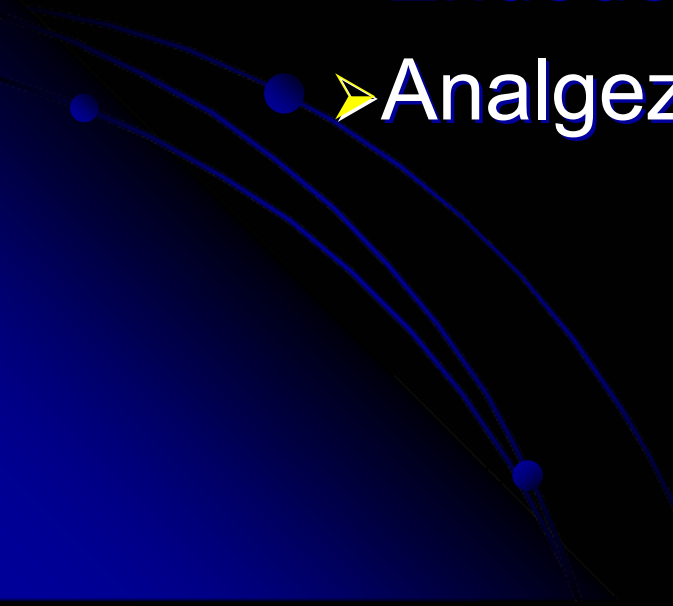
# Mechanismus účinku



Hydrokinetic effect

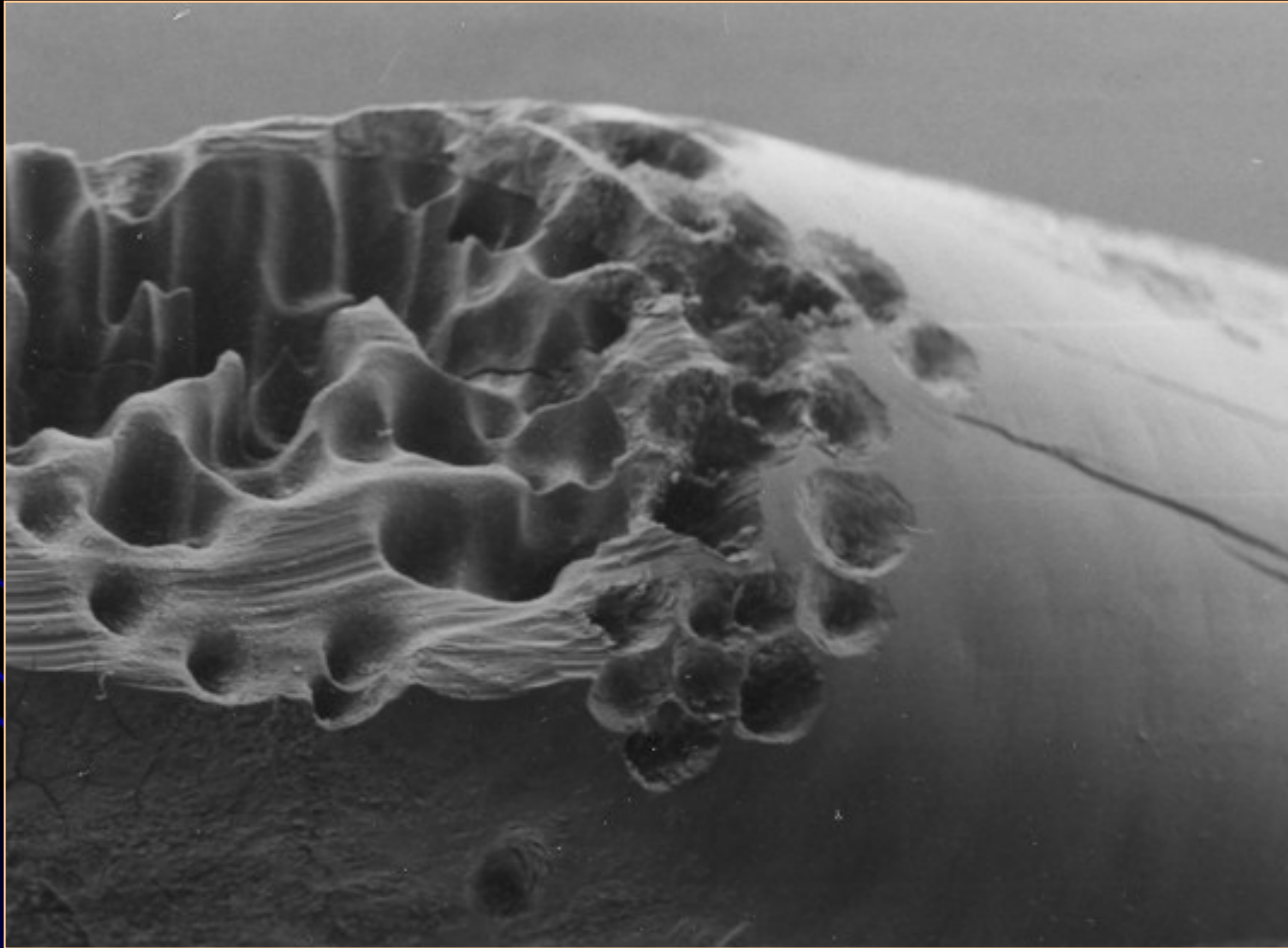


# Indications

- Preparation
  - Mucogingival surgery
  - Endodontics
  - Analgezia, biostimulation
- 



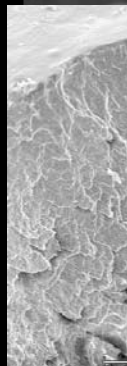
# Pulse regime



# Preparation

- Cavities

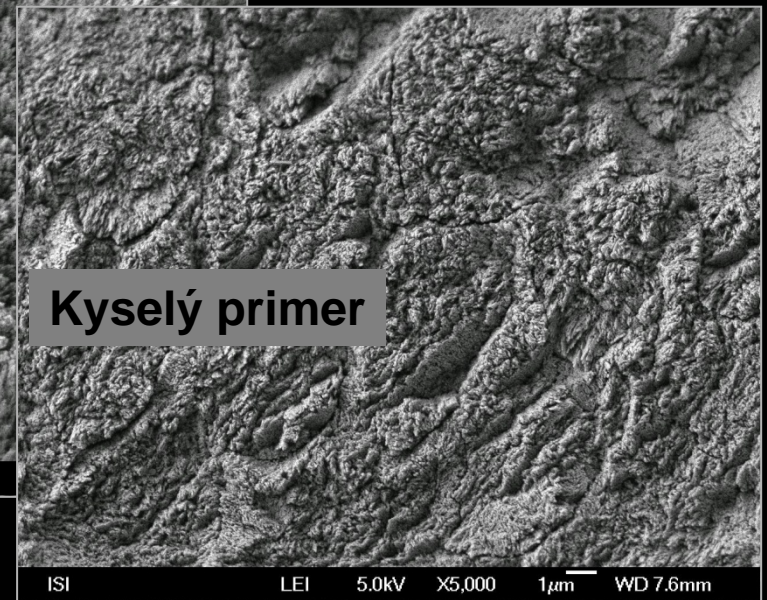
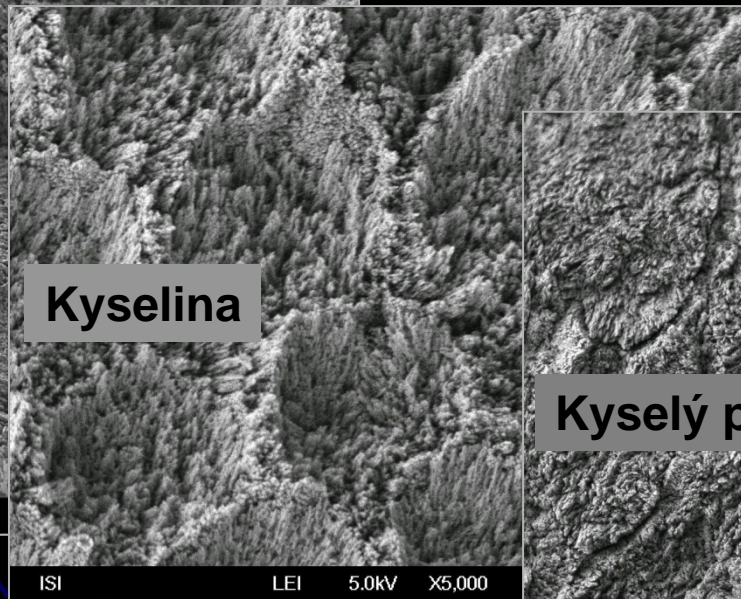
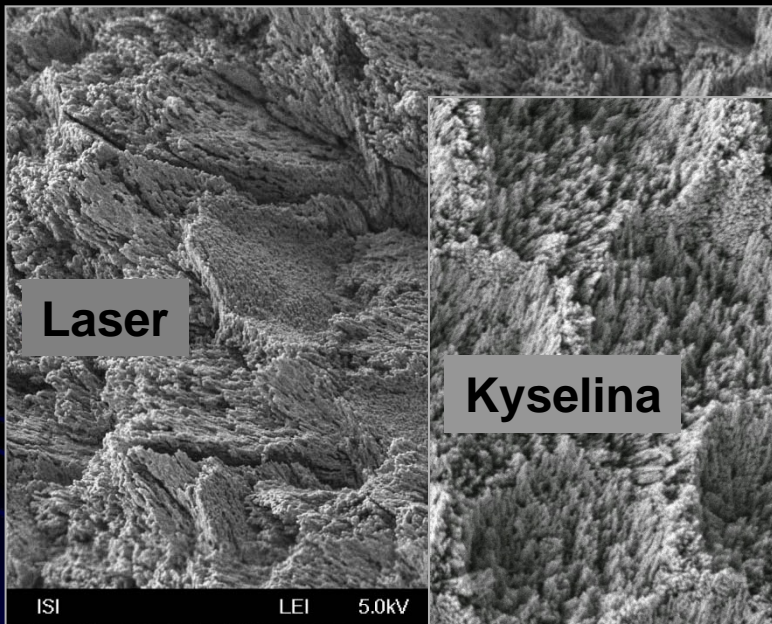
- Adhesive preparation – laser etching



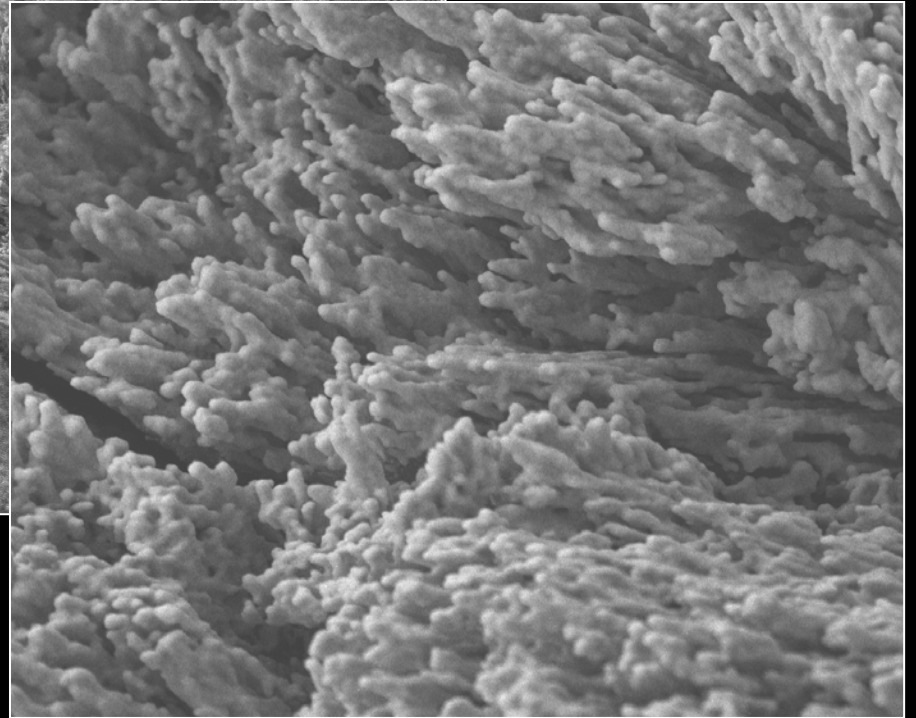
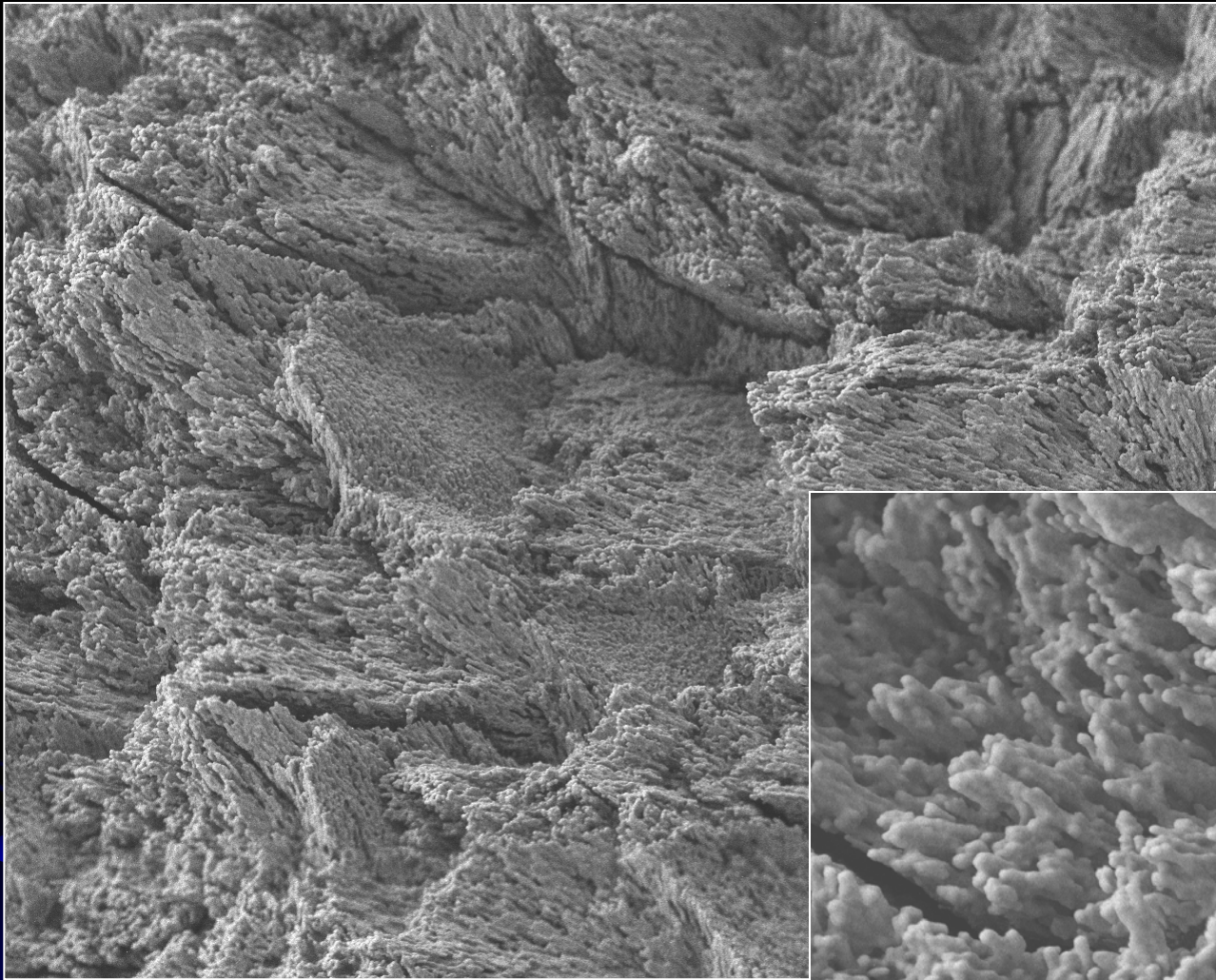
5 mm

# Results

## Enamel

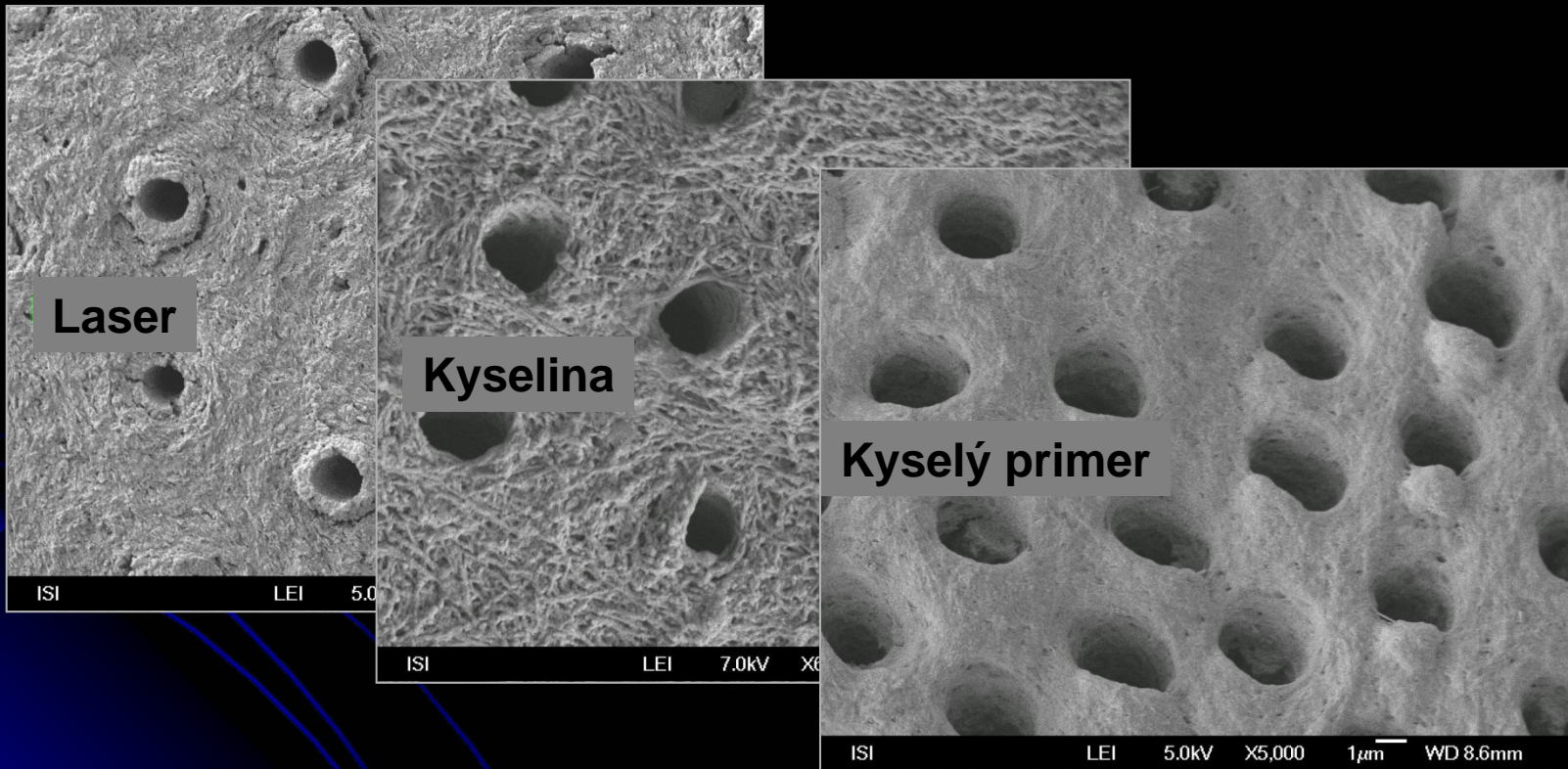






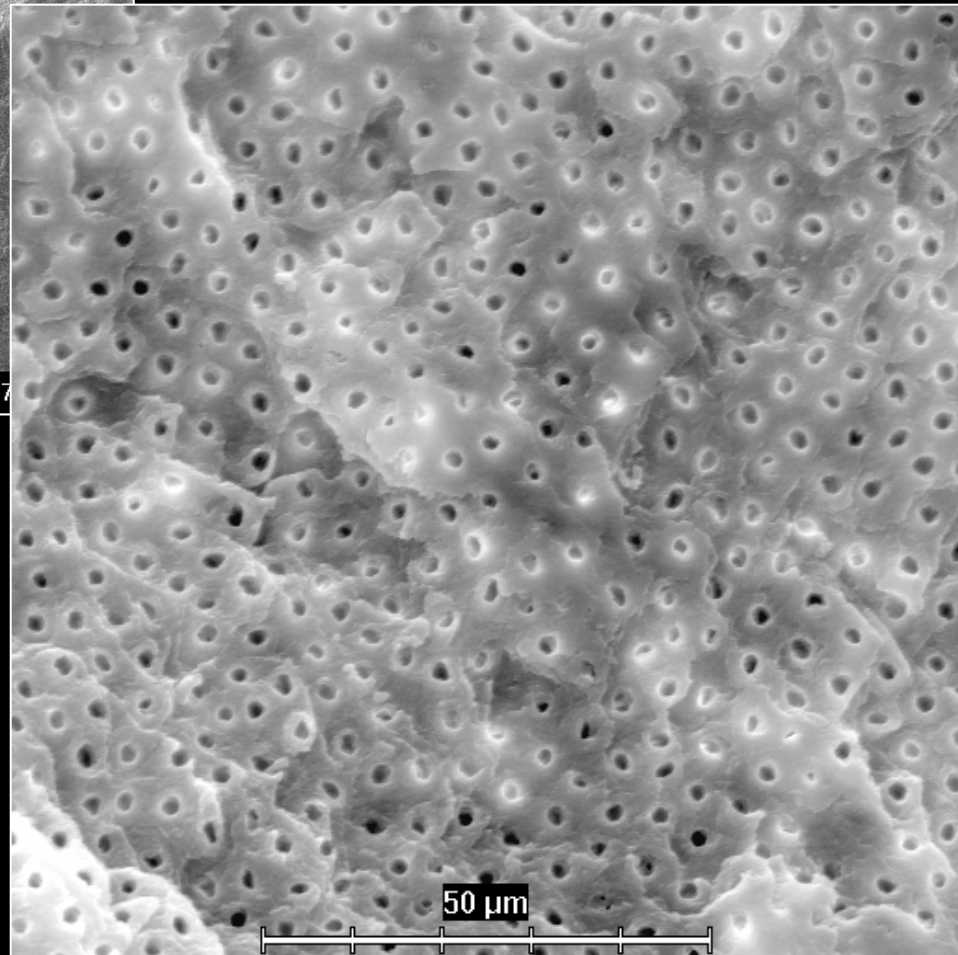
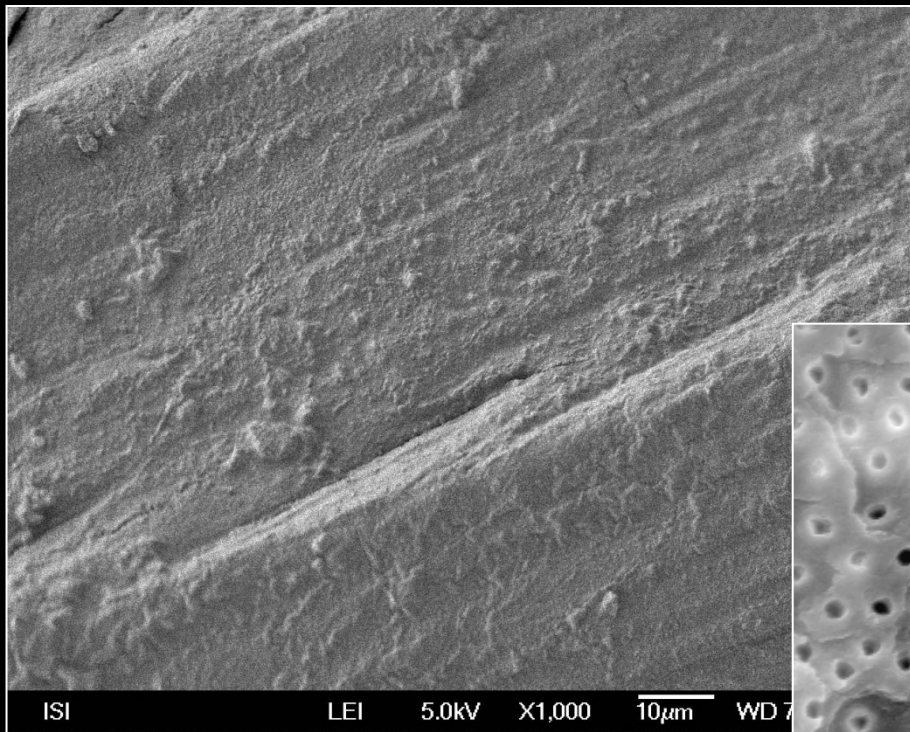
# Results

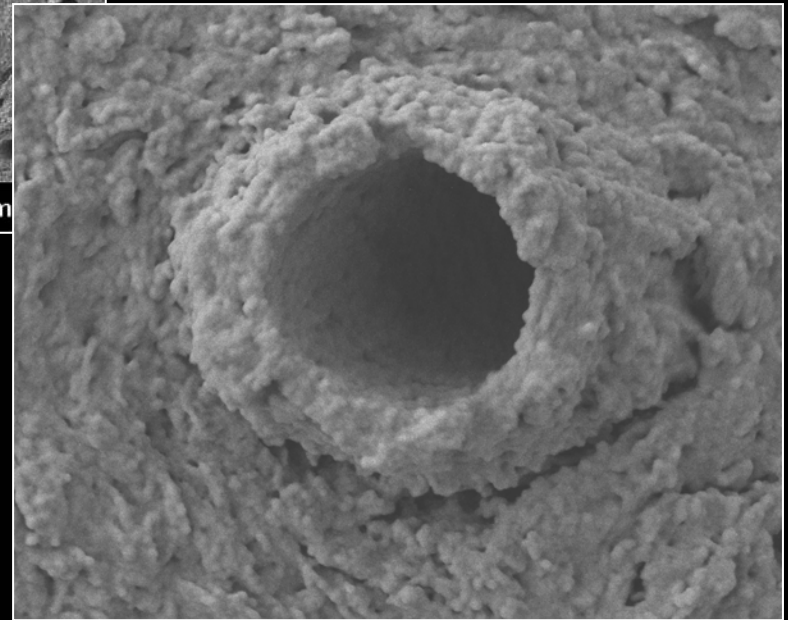
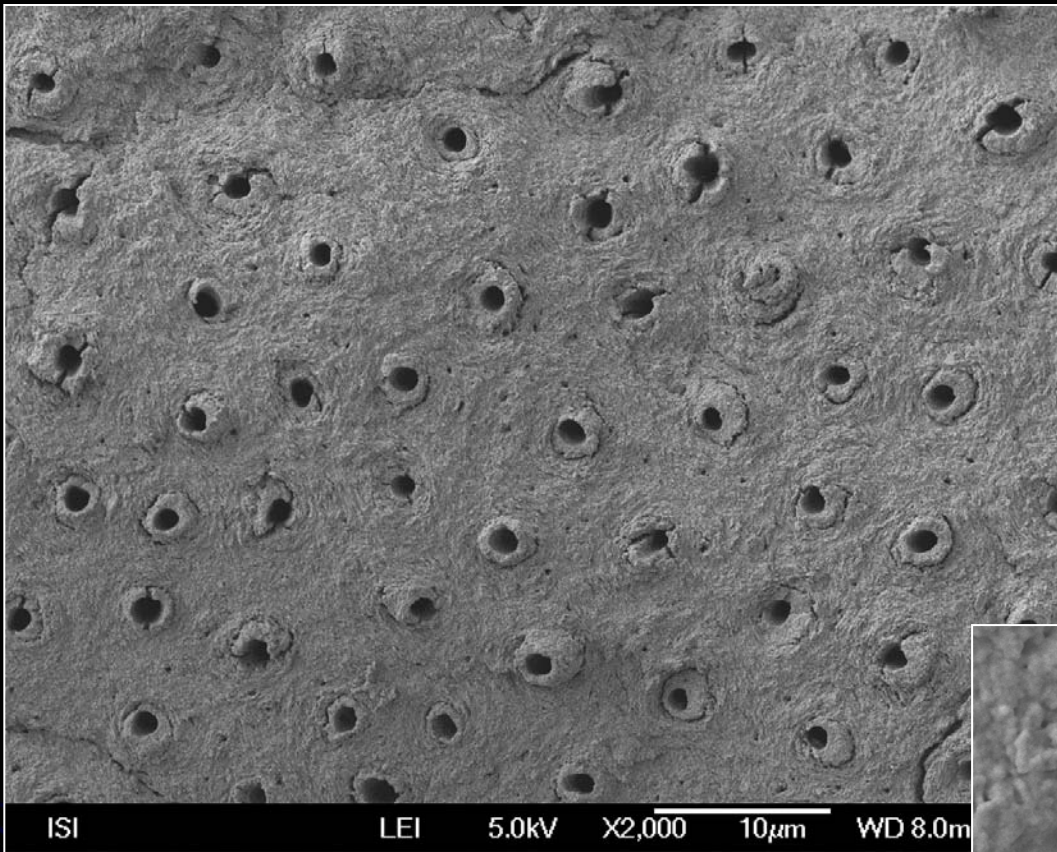
## Dentin



*Roubalíkova L., Neděla V., Poleník P.: Adhesive Preparation.  
A Comparison of Various Methods  
ESOLA, Bruges, 2006*







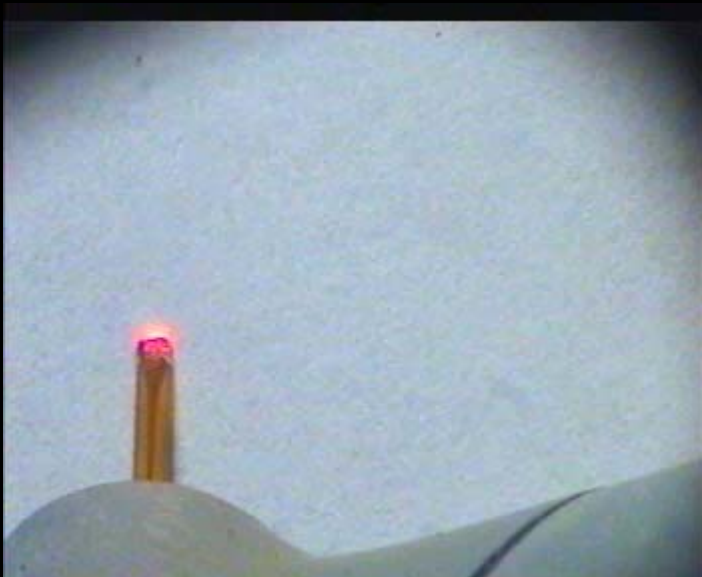


# Laser - benefits

- Minimally invasive treatment
- No anaesthesia
- No smear layer
- Dentine tubules are open
- Antimicrobial effect













*Roubalíková L, Wilhelm Z, Bilder J. : Use of Er:YAG laser  
in non carious cervical lesions. Clin Oral Invest, 2003.*





Laser



Rotary instrument







# Gingivektomie Gingivoplastika

