250 years of EXCELLENCE
in medical education,
research & innovation
and healthcare

# Preparation techniques in conservative dentistry (and endodontics)

**dr. Alexandra Kovács**

Phd student

*Department of Restorative Dentistry and Endodontics*

# Caries







*localised destruction of dental hard tissues by acidic by-products of special bacterias in saliva*

In early stages: prevention (secunder)

- Incipient caries

**REVERSIBLE**

Therapy:
restoration→ cavity preparation, filling

**IRREVERSIBLE**



# Cavity preparation



- Removal of tooth structure for healing purposes
- Possibilities:
  - Manual (hand) instruments
  - Rotary instruments (gold standard)
  - Oscillating instruments
  - Laser
  - Air abrasion
  - Chemo-mechanical (ICON)









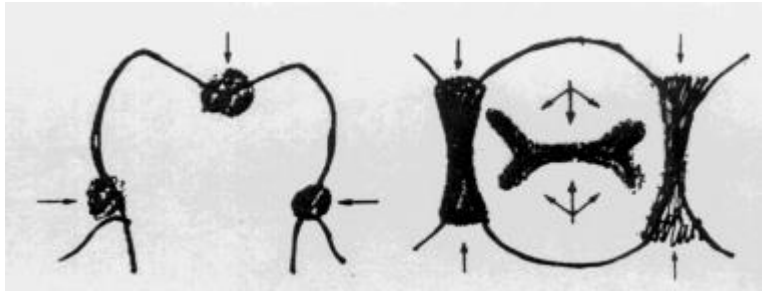


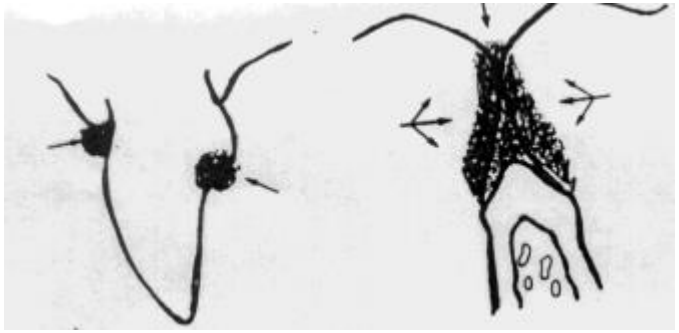


# Predilection spots (areas)

- Predilection spots are retention areas
  - these areas are not self-cleaning (debris)

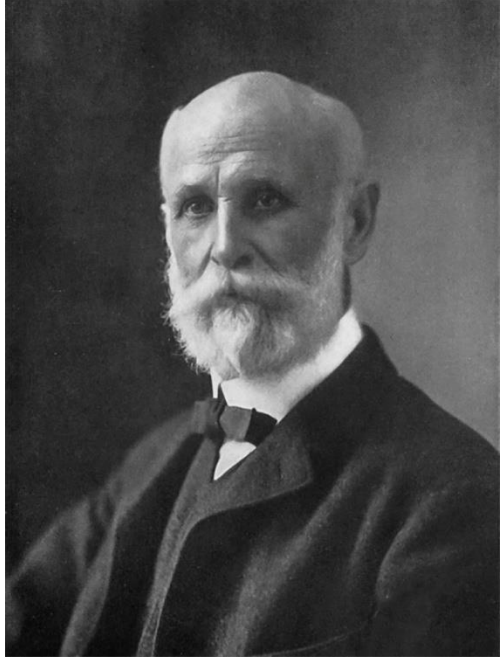
➢Fissures
➢Pits
➢Approximal surfaces (under the contact point)
➢Smooth surfaces between the aquator of the tooth and the gingiva





# Classification of cavities

- Based on the **predilection spots** of caries on the anatomical crown (until the CEJ; clinical crown?)
  - Class I-V
- Later extra classes were added
  - Class VI: not predilection area (for example: top of the cusp)
  - Root surface caries: not on the anatomical crown; clinical crown!)



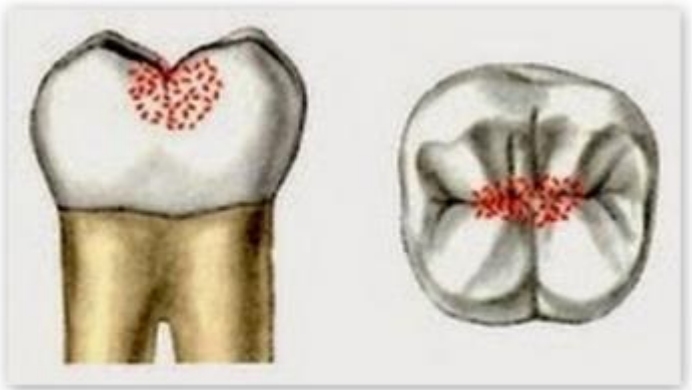
G.V. Black (1914)




Normal Tooth

# Class I

Pits and fissure cavities





Class I Lesions

# Class II

Cavities on the proximal surface of posterior (premolar and molar) teeth (MO, OD, MOD)



Class II Lesions

# Class III

Cavities on the proximal surface of anterior teeth, incisal edge is intact



Class III Lesions

# Class IV

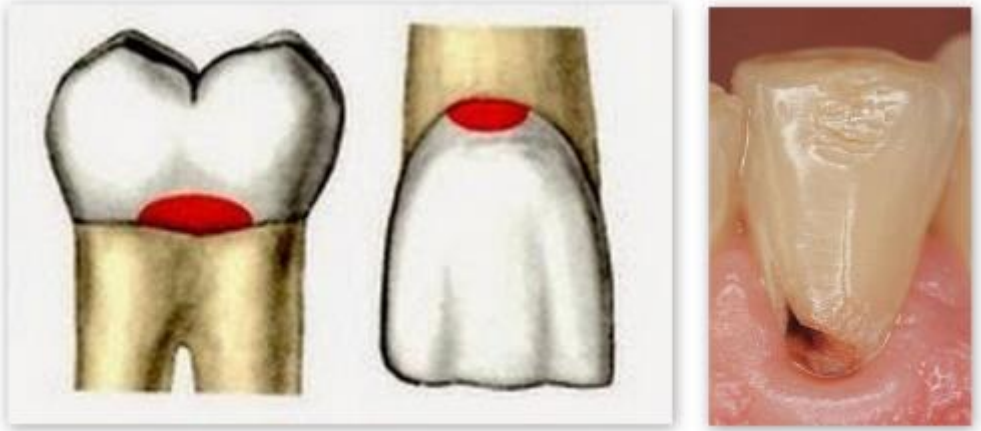
Cavities on the proximal surfaces of anterior teeth that involves the incisal edge



Class IV Lesions

# Class V

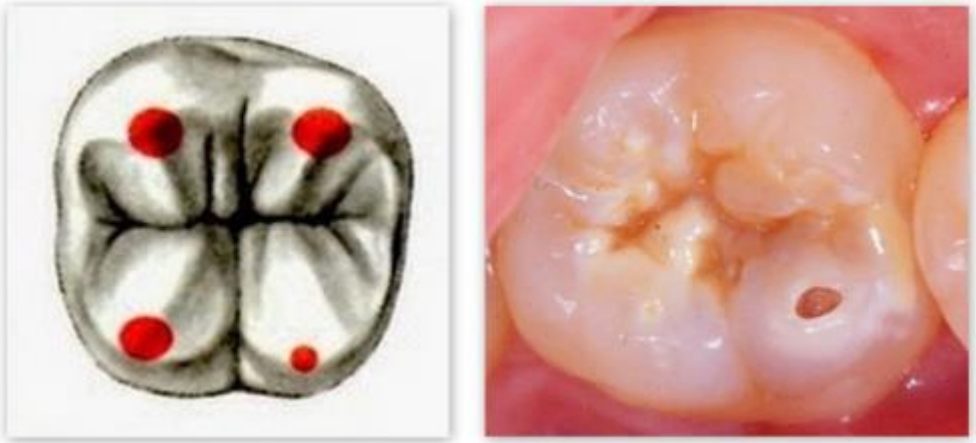
Cavities on the gingival third of the anatomical crown (bucal/oral)→ smooth surface caries



Class V Lesions

# Class VI

Cavities on the incisal edge of anterior teeth, or on the occlusal cusp of posterior teeth → not predilection spot



Class VI Lesions

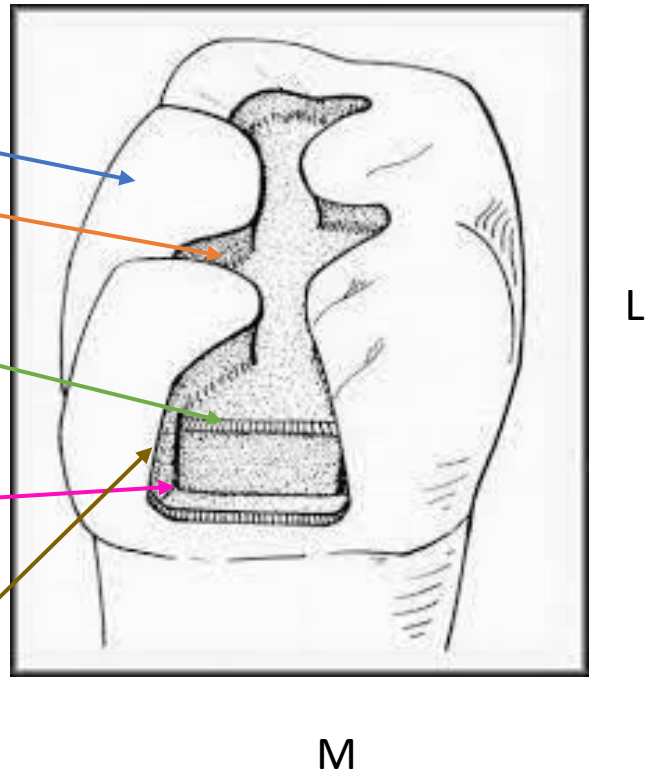
# Root surface caries

Caries develops on the root surface (cementum; clinical crown)



# Nomenclature of cavity preparation

- Surface: unprepared part
- Wall: prepared part→ named after the surface
- Line angle: junction of two walls →named after the walls
- Point angle: junction of three walls: →named after the walls
- Cavosurface angle or cavosurface margin: junction of wall and surface



# General rules of cavity preparation

- Black: EXTENSION FOR PREVENTION→ aim was to prevent the secunder caries
  - the border of the cavity should be extended to areas that are normally self-cleaning, or cleansable, therefore healty tooth structure can be removed
- During the years the rules were modified many times→ principles nowdays:
  - Healthy tooth structure should be preserved
  - All fracturable enamel should be removed
  - All caries/faults should be involved
  - Good polishable position
  - The outline of the filling should be shortened

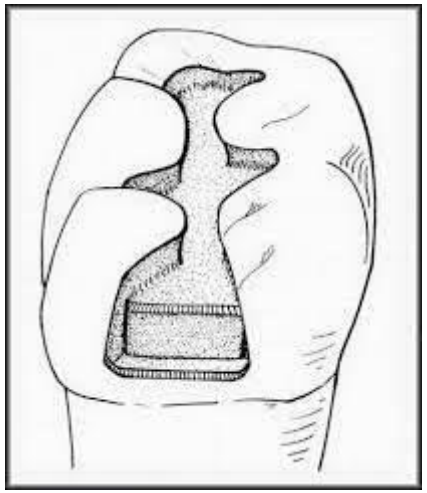


# Preparation techniques

- **Conventional** form:
  - For amalgam, inlay/onlay, root surface caries
  - Macroretention
  - Box-like cavity
  - Special enamel margin
  - Secondary retention are used very often





# Preparation techniques

- **BEVELED CONVENTIONAL** form:
  - Old amalgam filling is changed to composite
  - Macro- and microretention
  - Box form, but enamel margins are beveled for higher microretention

- **MODIFIED** form (ADHESIVE or MINIMAL-INVASIV):
  - No special form
  - Only decayed tooth structure will be removed
  - cavosurface margin will be beveled
  - Composite→ Microretention

**Tooth preparation–amalgam Vs composites**

| *Features* | *Amalgam* | *Composite* |
|---|---|---|
| Outline form | a. Include all pits and fissures **(Figs 18.42A and B)** and adjacent suspicious areas.<br>b. For class II tooth preparation, proximal contact has to be broken | a. Include faults but need not to be extended to adjacent pits and fissures.<br>b. For class II tooth preparations, proximal contact need not to be broken in all the cases |
| Pulpal depth | • Should be maintained uniform **(Figs 18.43A and B)**<br>• Depth–1.5 mm (Minimum) | • Need not to be uniform<br>• Depth–1–2 mm (usually) |
| Axial depth | • Should be uniform<br>• Depth–0.2-0.5 mm inside DEJ | • Not necessarily uniform<br>• Depth–to extent of the defect |
| Cavosurface margin | 90° at margin | Equal to and greater than 90° at margin |
| Nature of prepared walls | Smoother | Rough |
| Primary retention form | Occlusal convergence | Etching, priming and bonding |
| Bevels | Not indicated in large preparations | |
| Resistance form | Box shaped preparation **(Figs 18.44A and B)**<br>Flat pulpal and gingival floor | Not indicated<br>For small to moderate preparations |
| Secondary retention | Grooves, Coves, slots, pins, locks and bonding | Indicated only for extensive preparations |
| Pulp protection and base | By use of varnish, liner<br>Base: GIC, calcium hydroxide liner | Varnish not indicated |

# Phases of cavity preparation

- Primary phase
  - opening of the cavity
  - outline form, initial depth: prepared together, high speed, watercooling, diamond burs
  - primary retention form:
    - Preparation resists displacement or removal of the restoration from tipping or lifting forces
    - Retention is influenced by the contact between the restorative material and tooth
      - mechanical contact: macromechanical: amalgam micromechanical: composite
      - chemical: rare, glassionomer
      - electrical: weak
  - primary resistance form ~ convinience form:
    - Both the tooth and restoration can withstand without fracture the masticatory forces
    - Primary retention and resistance form are prepared together
    - Principles: box shape, flat floor, slightly rounded line angles, thickness of restorative material, walls: parallel, divergent or convergent

# Phases of cavity preparation

- Secondary phase:
  - removal of infected dentin and old filling:
    - infected dentin always has to be removed
    - old restoration should be removed, if:
      - negatively affect the new one
      - compromise in retention
      - caries is under the filling
      - the pulp was sympthomatic preoperatively
      - the periphery of remaining filling is not intact



  - pulp protection
  - secondary resistance and retention form
  - finishing the prepared walls:
    - aim of finishing is to create the best marginal seal between the the restorative material and tooth; smooth marginal junction; provide maximum strength of both the tooth and filling near the margin
  - cleaning, inspecting

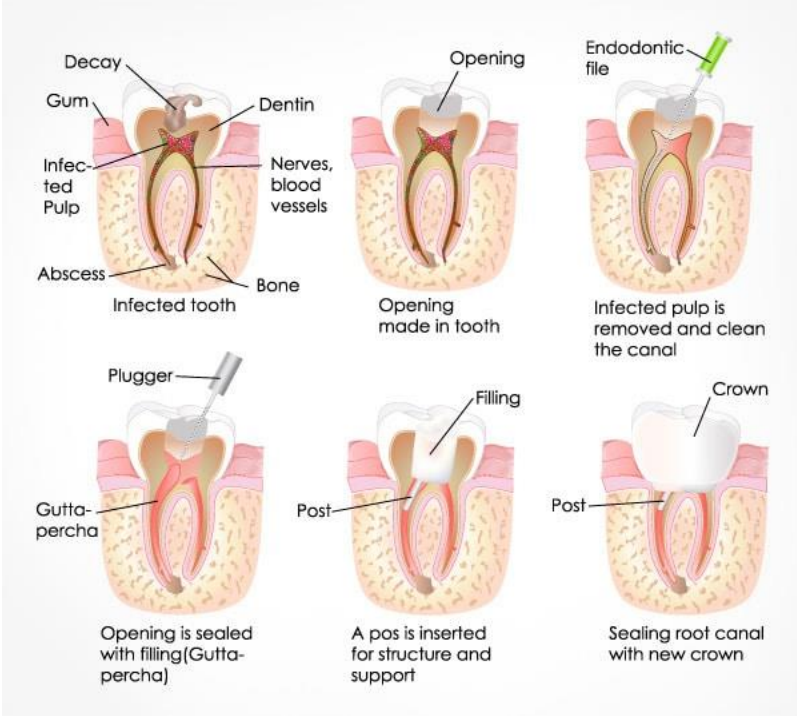


# Endodontics

- What is endodontic treatment?
  - treatment sequence for the infected pulp of a tooth which results in the elimination of infection and the protection of the decontaminated tooth from future microbial invasion
  - **chemo-mechanical shaping**: root canal should be suitable for the root canal filling (elimination of debris, disinfection and shaping)

Chemo: by disinfectants (f.e: Sodium hypochlorite, chlorhexidine)

Mechanical: coronal part: special burs (Gates-gliden); root part: endo files








# Thank you for your kind attention!

