

# The handbook of preclinical dentistry

## Introduction

The aim of this manual is to provide students with instructions for practical exercises on models and simulators. It should serve students of Preclinical Dentistry I and II. Information contained herein can replace neither lectures nor practical lessons in clinical dentistry.

## Content:

### I. CAVITY PREPARATION AND MAKING OF THE FILLING

Classification of carious cavities, their preparation and fillings according to Black

Principles of preparation

Examination, preparation and filling tools

Cavity preparation in individual classes

Techniques for cavity preparation and making of the filling

### II. BASICS OF PRECLINICAL ENDODONTICS

Definition of endodontics

Morphology of the pulp chamber and root canals

Endodontic instruments

Basics of manual preparation

Basics of root canal filling

## Classification of carious cavities and prepared cavities

The division of dental caries into five classes according to G. V. Black is of practical significance for cavity preparation.

### I. class: **Caries in pits and fissures**

These caries appear in fissures (on the occlusal surfaces of premolars and molars), caries in foramen caecum are also ranged into this class. Foramen caeca are pits on buccal surfaces of the lower molars, palatal surfaces of upper molars, and on palatal surfaces of upper incisors.

### II. class: **Caries on proximal surfaces of premolars and molars**

They usually begin under the contact point or in its close proximity or in the gingival third of proximal surface. They can be covered by a ridge of hard tissues or be opened in the direction of occlusal surface.

### III. class: **Caries on proximal surfaces of incisors and canines with no damage of incisal edge**

They arise close to the contact point and may spread in the gingival, incisal or labiooral direction.

### IV. class: **Caries on proximal surfaces of incisors and canines with damage of incisal edge**

Incisal edge is weakened and lost (so-called loss of cusp). This class includes not only defects caused by caries, but also by injuries. In case of injuries, the loss of dental tissue is more extensive. Treatment of both carious and non-carious defects is similar.

### V. class: **Cervical caries**

These are caries located in the gingival third of the crown. In this area we can find also defects which are not caused by caries (erosion, abrasion, wedge defects). They are treated similarly as caries.

### VI. class: **Caries on cusps or abraded incisal edge**

These are small, isolated defects which do not exceed the cusp or the incisal edge (they affect neither proximal space nor fissures). These defects were added later to the original Black's classification.

## **Principles of preparation**

Caries result from repeated exposure to acids produced from sugar fermentation caused by microbes in dental biofilm. At the beginning loss of minerals occurs without any defect on the dental tissue, later dental tissues disintegrate and a cavity is created. The cavity must be treated by preparation and filling. Greene Vardiman Black defined preparation as follows: "By the phrases 'Excavation of cavities', 'Preparation of cavities' or 'Cavity preparation' is meant such a mechanical treatment of the injuries to the teeth produced by dental caries as will best fit the remaining part of the tooth to receive a filling restoring the original form, give it strength, and prevent recurrence of decay in the same surface" (Black 1914: 105). This definition determines the basic principles of preparation:

### **1. The principle of preventive extension**

Preparation is performed in a way that maximally reduces the risk of secondary caries formation (caries at the edge of the filling). It is vital to correctly determine the outline of the cavity. The criteria which matter the most are the type of filling material and the level of oral hygiene.

All carious dentin must also be removed so that recurring caries under the filling are prevented.

## **2. The principle of retention**

Preparation must be performed in such a way that the filling does not fall out of the cavity.

## **3. The principle of resistance**

Preparation must be performed in such a way that the tooth treated with the filling withstands the strains of its function (biting and chewing). This rule concerns both dental tissues and filling.

Individual steps of preparation:

1. First we need to gain access to the carious lesion and open it.  
Then the undermined enamel or ridge of dental tissues above the carious lesion must be removed; it may also be necessary to remove the old filling, push away or remove any ingrown gingival tissue or separate teeth most commonly with a wedge, less often with a separator.  
We can use carbide or diamond burs with standard grit (blue code) with ca 200,000 revolutions per minute on handpiece with red strip; alternatively, we can use an air-turbine handpiece mainly for removal of old fillings or for cutting through a thick ridge of dental tissues.
2. Determining the outline of the cavity – preventive extension  
The criteria that need to be taken into consideration are mainly the type of filling material used and the level of oral hygiene.
3. Removal of carious dentin  
Softened dentin is excavated with a rotary instrument – with a ball bur (small number of revolutions, about 3,000 per minute) in a handpiece with a blue or green strip (blue or green handpiece); or manually with an excavator.
4. Securing retention  
Retention depends on the type of material used (undercuts, fissures and grooves for amalgam, dental tissue etching for composite, treatment with conditioner for glass ionomer cement).
5. Securing resistance  
Resistance depends on the size and location of the caries and on the material used (the filling must be thick enough, no sharp edges and no undermined cusps, and others).
6. Treating cavity edges  
Again the type of material used, and location of carious lesion are decisive. In some cases enamel is bevelled, in others smoothing is performed. A fine diamond bur with red code is usually used.
7. Toilet and final examination of a cavity  
Washing and drying, visual examination and examination with an explorer.

Preparation techniques

1. Preparation with a rotary instrument

It is vital that the instruments are sharp and centred (after being anchored no instrument must be eccentric).

We hold the handpiece correctly.

2. We guide the preparatory instrument most commonly at a right angle to the surface of the tooth and prepare the cavity with a slight pressure and with interruptions (1 period preparation, 2 periods break). In this way we protect dental tissues from overheating.
3. We prepare smooth lines.
4. We interrupt preparation and check the result with direct and indirect look.

Preparation practice with plates from Novodur should serve for acquiring correct instrument guiding and creating smooth lines. It is a good training before preparation on models.