

# PERIODONTAL DISEASES

**4<sup>th</sup> year**

Minsk BSMU 2015

МИНИСТЕРСТВО ЗДРАВООХРАНЕНИЯ РЕСПУБЛИКИ БЕЛАРУСЬ  
БЕЛОРУССКИЙ ГОСУДАРСТВЕННЫЙ МЕДИЦИНСКИЙ УНИВЕРСИТЕТ  
3-я КАФЕДРА ТЕРАПЕВТИЧЕСКОЙ СТОМАТОЛОГИИ

**БОЛЕЗНИ ПЕРИОДОНТА**  
**4 КУРС,**  
**PERIODONTAL DISEASES**  
**4<sup>th</sup> YEAR**

Учебно-методическое пособие

В 2 частях

**Часть 1**



Минск БГМУ 2015

УДК 616.31-085.242(811.111)-054.6(075.8)  
ББК 56.6(81.2 Англ-923)  
Б79

Рекомендовано Научно-методическим советом университета в качестве  
учебно-методического пособия 15.10.2014 г., протокол № 2

А в т о р ы: Л. Н. Дедова, Ю. Л. Денисова, В. И. Даревский, А. С. Соломевич,  
О. В. Кандрукевич, В. И. Урбанович, Л. В. Шебеко, А. А. Володько, Л. В. Белясова,  
В. В. Моржевская, Н. И. Росеник

Р е ц е н з е н т ы: д-р мед. наук, доц. каф. терапевтической стоматологии Белорус-  
ской медицинской академии последипломного образования Н. В. Новак; д-р мед. наук,  
зав. каф. ортопедической стоматологии Белорусской медицинской академии последип-  
ломного образования С. П. Рубникович

**Болезни** периодонта 4 курс = Periodontal diseases 4th year : учеб.-метод.  
Б79 пособие. В 2 частях. Часть 1 / Л. Н. Дедова [и др.]. – Минск : БГМУ, 2015. – 162 с.

ISBN 978-985-567-288-4.

Рассмотрены избранные вопросы разделов терапевтической стоматологии: профилактика,  
кариесология, болезни периодонта и эндодонта. Включены тестовые вопросы для самоконтроля.

Предназначено для студентов 4-го курса медицинского факультета иностранных учащихся,  
обучающихся на английском языке.

УДК 616.31-085.242(811.111)-054.6(075.8)  
ББК 56.6(81.2 Англ-923)

ISBN 978-985-567-288-4 (Ч. 1)  
ISBN 978-985-567-289-1

© УО «Белорусский государственный  
медицинский университет», 2015

**Topic «DIAGNOSIS AND TREATMENT OF PROXIMAL CARIES ON THE ANTERIOR TEETH. SELECTION OF THE APPROPRIATE DENTAL FILLING MATERIALS»**

**Motivational Characteristics.** A high prevalence and intensity of dental caries dictates the necessity of constantly improving its diagnosis at the earliest stage of tooth decay formation. The treatment of proximal dental caries of the anterior teeth (Class III and Class IV) is not an exception. It requires special attention to the technique of dental restoration because an aesthetic factor is put in the forefront along with the restoration of the lost tooth structure. It is necessary to possess certain knowledge and practical experience in making preparation and filling Class III and Class IV dental cavities (G. V. Black’s Classification of Carious Lesions) to achieve good results. These facts determine the practical significance of the lesson topic.

**Aims of the Lesson**

**Didactic:** to motivate students to realize the importance of the correct diagnosis and appropriate treatment approach of Class III and Class IV carious lesions.

**Methodical:** to teach students to follow commonly adopted principles of diagnosis, treatment and prevention of Class III and Class IV carious lesions.

**Scientific:** to develop scientifically-based clinical thinking in students while making diagnosis, performing the treatment and taking preventive measures against Class III and Class IV carious lesions.

**Goals of the Lesson:**

<b>On completing the lesson the students MUST KNOW</b>	<b>On completing the lesson the students MUST BE ABLE</b>
1. The diagnostic methods of dental caries on the proximal surfaces of the anterior teeth. 2. The main features of treating Class III and Class IV cavities, depending on the location, the depth of the lesion and the choice of the filling material. 3. The main characteristics of the filling material choice for treating Class III and Class IV cavities on the proximal surfaces of the front teeth.	1. To make a treatment plan of the patient with Class III and Class IV carious lesions (assisted by the instructor). 2. To make preparation and dental restoration of Class III and Class IV dental cavities (assisted by the instructor). 3. To select the appropriate restorative material for treating Class III and Class IV carious lesions (without assistance).*

\* Manipulation 3 in the column «MUST BE ABLE» is included into the list of practical skills performed without assistance.

**Requirements for the Initial Level of Knowledge:**

1. Morphological peculiarities of the tooth structure.
2. Main and additional diagnostic methods of dental caries.
3. Anesthetic techniques used in treatment of dental caries.
4. Stages of planning the treatment of dental caries.

**Control Questions from the Related Disciplines:**

1. Biochemical and physiological peculiarities of the dental tissues and oral cavity.
2. Etiology and pathogenesis of dental caries.
3. Anatomic pathology of dental caries.
4. Pharmacological medications used for the anesthesia in dental caries treatment.
5. Physicochemical properties and classification of dental filling materials.

**Control Questions on the Topic of the Lesson:**

1. Diagnostic methods of proximal caries on the anterior teeth.
2. Stages of planning the treatment of Class III and Class IV cavities (G. V. Black's Classification of Carious Lesions).
3. Peculiarities of choice of dental filling materials used for the treatment of Class III and Class IV carious lesions (G. V. Black's Classification).
4. Main features of treating Class III and Class IV cavities, depending on the location, the depth of the lesion and the choice of filling material.
5. Criteria for estimation the quality of Class III and Class IV restorations.
6. Discussion of the publications on the topic of the lesson from dental journals, including «The Stomatologist».

**Educational Materials.****Basic chart**

## Stages of treating Class III and Class IV caries

<b>Sequence of Operations</b>	<b>Means of Operation</b>
Examining the patient using subjective and objective methods, making differential diagnosis	Friendly atmosphere favorable for conversation, doctor's attentiveness to the patient, dental armamentarium, tools and equipment for additional methods of examination
Performing dental hygienic procedures	Dental armamentarium, tools and materials for performing dental hygienic procedures
Selecting material and color of restoration	Dental armamentarium, shade guide
Giving anesthesia	Dental armamentarium, anesthetic, carpule syringe
Isolating the operative site	Dental armamentarium, Rubber Dam
Making preparation of the cavity	Dental armamentarium, tools for the dental cavity preparation, finishing burs
Creating the adhesive base for the further restoration	Dental armamentarium, adhesive systems

Sequence of Operations	Means of Operation
Placing the dental filling material	Dental armamentarium, dental filling materials
Finishing the restoration	Dental armamentarium, tools and materials for grinding and polishing the restoration
Estimating the restoration quality	Dental armamentarium

### Tasks for the Students' Individual Work.

Admission of patients is performed according to the approved form and must be done in a certain order: 1) getting acquainted with the patient; 2) performing the examination of the patient with the disease of dental hard tissues and further filling in the case-history chart; 3) diagnosing and developing the treatment plan, that must be further agreed with the instructor. The results of the practical work are to be summed up and possible remarks are to be made at the end of the lesson.

### Self-Testing of the Topic Consolidation

#### Case-studies

**Case-study No 1.** Patient B., aged 35, presented with the problem of dental cavity in tooth 1.1. The patient didn't complain of any pain. He visited the dentist's office not regularly and didn't undergo prophylactic examinations. The patient wasn't motivated. During the oral hygiene examination the following was noted: OHI-S = 1,6 and GI = 1,5. The signs of gingival inflammation were diagnosed in the area of teeth 2.1 and 2.2 as a result of a permanent trauma of the interdental gingival papilla and insufficient oral hygiene. The coronal part of the tooth 1.1 was destroyed for more than  $\frac{1}{2}$  part.

*Develop a treatment plan.*

### TEST QUESTIONS

**1. Indicate the preferable way of access to Class III dental cavity if the cavity is represented by a thin layer of vestibular enamel without dentine: (1 correct answer)**

- a) palatal;
- b) lingual;
- c) vestibular;
- d) It does not matter.

**2. When is the matrix used for restoration of the defect on the anterior tooth? (2 or more correct answers)**

- a) when the adjacent tooth is missing;
- b) in case of the tooth crowding;
- c) if the coronal part of the tooth is damaged significantly;
- d) in case of minor caries defects.

**3. What material is preferably used for Class III and Class IV caries restorations? (1 correct answer)**

- a) glass ionomer cement;
- b) macro-filling hybrid light-cured composite;
- c) micro-filling hybrid light-cured composite;
- d) compomer.

**4. Indicate the clinical control method of contact point quality in case of Class III and Class IV restorations: (1 correct answer)**

- a) making X-ray examination;
- b) making visual diagnosis;
- c) using the dental floss;
- d) using the airstream.

**5. What factors influence the determination of the tooth color? (2 or more correct answers)**

- a) the patient's position in the examination chair;
- b) the light source;
- c) the colors of the walls in the room where the examination is being performed;
- d) the temperature in the room.

**6. If the tooth is damaged significantly, the tooth color has to be determined according to: (1 correct answer)**

- a) the color of the remaining part of the tooth;
- b) the color of two adjacent teeth;
- c) the color of the opposing teeth.

**7. What are the advantages of the flowable composites in comparison with glass ionomer cements? (1 correct answer)**

- a) emission of the fluoride ions;
- b) chemical adhesion to the tissues of the tooth;
- c) high adhesion to the tissues of the tooth;
- d) low coefficient of the thermal expansion.

**8. Choose the correct statement: (1 correct answer)**

- a) chemical adhesion is stronger;
- b) micromechanical adhesion is stronger;
- c) adhesion of glass ionomer cement to dentine is stronger;
- d) chemical adhesion of glass ionomer cement to the tissues of the tooth is stronger than that one to composites.

**9. Select the statements, which explain the reason of the «white line»: (2 or more correct answers)**

- a) excessive photopolymerization time;
- b) stress resulting from the polymerization shrinkage;

- c) enamel preparation with abrasive burs;
- d) thick layer of the adhesive system.

**10. Select the layer, which influences the composite polymerization:**

*(1 correct answer)*

- a) the smear layer;
- b) the layer, inhibited by oxygen;
- c) the layer of necrotizing dentine;
- d) the layer, inhibited with bacteria.

**11. What is the optimal set of tools for finishing and polishing aesthetic restorations? (1 correct answer)**

- a) fine diamond burs, rubbers, strips, polishing paste;
- b) steel burs, coarse diamond burs;
- c) inverted truncated cone tungsten carbide burs, rasps;
- d) scalers, excavators, reamers.

**12. What does the Rubber Dam system include? (1 correct answer)**

- a) Rubber Dam hand punch, frame, clamps;
- b) Nance pliers, Rubber Dam template;
- c) matrix holder, excavator;
- d) needle holder, spreader, reamer.

**13. What kind of enamel bevel should be made for improving the marginal adhesion and fixation of Class IV restorations? (1 correct answer)**

- a) wavy, wide, on the margins of the whole defect on the vestibular surface;
- b) wavy, wide, on the margins of the whole defect on the palatal surface;
- c) wavy, narrow, on the margins of the whole defect on the vestibular surface;
- d) a wide bevel on both vestibular and palatal surfaces.

**LITERATURE**

1. Carranza, F. A. Carranza's Clinical Periodontology / F. A. Carranza. 11<sup>th</sup> ed. Saunders Elsevier, 2012. 825 p.
2. Aesthetic Periodontology / J. L. Denisova [et al.]. Minsk : BSMU, 2015. 20 p.
3. Egelberg, J. Periodontal examination / J. Egelberg, A. Badersten. Copenhagen : Munksgaard, 1994. 85 p.
4. Lindhe, J. Clinical Periodontology and Implant Dentistry / J. Lindhe. 4<sup>th</sup> ed. Blackwell Munksgaard, 2003. 1044 p.
5. Mueller, H. P. Periodontology. The Essentials / H. P. Mueller. Thieme, 2004. 188 p.
6. Perry, D. A. Periodontology for the dental hygienist / D. A. Perry, P. Beemsterboer. 3<sup>rd</sup> ed. St. Louis, Mo. : Saunders Elsevier, 2007. 484 p.
7. Schluger, S. Periodontal diseases : basic phenomena, clinical management and occlusal and restorative interrelationships / S. Schluger, R. Yuodelis, R. C. Page. 2<sup>nd</sup> ed. Philadelphia : Lea & Febiger, 1990. 759 p.
8. Publications on the topic of the lesson in dental journals, including «The Stomatologist».



**ANNOTATION TO THE PRACTICAL LESSON ON THE TOPIC  
«DIAGNOSIS AND TREATMENT OF PROXIMAL CARIES ON THE ANTERIOR  
TEETH. SELECTION OF THE APPROPRIATE DENTAL FILLING MATERIALS»**

1. The diagnostic methods of dental caries on the proximal surfaces of the anterior teeth.

2. The main features of treating Class III and Class IV cavities, depending on the location, the depth of the lesion and the choice of the filling material.

3. The main characteristics of the filling material choice for treating Class III and Class IV cavities on the proximal surfaces of the front teeth.

**1. The diagnostic methods of dental caries on the proximal surfaces of the anterior teeth.**

*Diagnostic methods of the decay on the anterior tooth*

1. Main diagnostic tests:

- questioning the patient (assessment of complaints and medical history);
- visual examining with a dental mirror;
- probing the carious lesion;
- carrying out thermal tests.

2. Additional diagnostic tests:

- transilluminating;
- using laser devices;
- X-ray diagnosing.

The oral examination is carried out with a dental mirror and a dental probe. It is necessary to pay attention to the condition of the contact surfaces of the teeth and the interdental spaces. You must isolate the teeth from saliva, dry the teeth with the airstream and estimate the condition of the tooth proximal surfaces, namely, the change of the color, the contour and the consistency of the enamel. Visual examination reveals the loss of the natural gloss of the affected area of the enamel at the initial stage of caries (enamel demineralization). Dental tissues become more opaque, especially when they are dried. The affected enamel becomes light or dark brown in case of chronic process. Some researchers suggest to use the dental floss before the preparation. Sharp margins of the cavity will disrupt the integrity of the dental floss or interfere with its removal in case of the presence of hidden cavities. When the carious process is accompanied by a significant impairment of proximal surfaces with the access to the vestibular or oral surface, it is possible to probe the cavity easily, determining its size and the level of the dentine demineralization. The final size of the cavity can be received only after a «test preparation».

In some clinical cases, when the carious process is localized in the region of the tooth equator and probing is difficult, it is necessary to use additional diagnostic tests:

**Transillumination.** This method involves scanning of the teeth with a halogen lamp or a lamp for curing composite materials. Affected dental tissues look darker («area of shading»), than the healthy ones. The method allows to detect the initial forms of caries, secondary caries around the filling material and cracks in the enamel of the tooth.

**Caries diagnosis using laser devices.** This device allows to detect areas of demineralization difficult for diagnosing, fissure caries, process on the proximal surfaces of the teeth and the level of necrotomy during the cavity preparation. Recently, the KAVO company has developed 2 types of such devices: DIAGNOdent and the portable device called DIAGNOdent pen.

**X-ray method.** Allows to detect:

- hidden carious lesions on the proximal surfaces;
- secondary caries;
- overhanging margins of fillings;
- dental calculus.

## **2. The main features of treating Class III and Class IV cavities, depending on the location, the depth of the lesion and the choice of the filling material.**

**Opening the cavity.** An important step is the opening of the cavity. First of all it is necessary to determine the surface (vestibular or palatal) of preparation. If the carious lesion is closer to the vestibular wall of the tooth, it is recommended to make an access from this surface, if it is closer to the palatal wall an access should be made from the palatal surface of the tooth. All the enamel without dentine support must be removed during the opening of the cavity. If the incisal margin is represented by a thin layer of enamel, less than 2 mm, it must be removed as well.

**Making necrotomy.** The necrotomy stage has to be done thoroughly and carefully. You must remember that the pulp horn is closely located in the upper lateral incisors, lower central and lateral incisors. It is necessary to use only a low speed dental handpiece and round carbide dental burs matching the size of the cavity for the necrotomy. Remove the demineralized enamel in the part of the tooth near the gingiva and on the proximal surfaces. Use caries-markers for controlling the necrotomy.

**Forming the cavity.** It is necessary to make round or oval «soft» contours, without sharp corners. Preparation of Class III and Class IV cavities in the front teeth requires making the bevel on the enamel not less than 2 mm. The length of the bevel depends on the size of the cavity or tissue defect: the bevel must be deep (the entire thickness of the enamel) at the base of the cavity and gradually come to naught on the incisal margin of the tooth. The contours of the bevel must be made wavy (three or four waves) to achieve the best aesthetic result. It is necessary to make the first wave of the bevel at the beginning of

the preparation, for example, in the part of the tooth near the gingiva, then the second wave in the central part of the tooth and the wave in the region of the incisal margin. The derived bevel should have wavy «ragged» contours.

If the preparation of Class III cavity is made from the palatal surface, it is necessary to make a small bevel on the enamel. When the preparation of the cavity is made from the vestibular surface of the tooth, it is necessary to make a wide bevel on the enamel.

There is no need to make the bevel on the enamel, if glass ionomer cements or compomers are used for restoration and the access to the cavity is made from the palatal surface of the tooth. Enamel margins must be only smoothed.

Class III cavities with a thin layer of enamel on the incisal margin without dentine must be modified into Class IV cavities.

The preparation of the tooth is conducted after taking the patient's history, making the examination and conducting tests on the vitality of the pulp.

The size of the split has to be taken into consideration during the preparation of the angle of the tooth crown:

- in case of  $\frac{1}{4}$  part of a tooth crown defect, keeping more than half of the incisal margin, it is recommended to make the 3–4 mm bevel with wavy contours on the vestibular surface of the tooth; it is necessary to make small bevel on the whole area of the enamel split on the palatal surface;

- in case of  $\frac{1}{3}$  part of a tooth crown defect, keeping less than half of the incisal margin, it is recommended to shorten the remaining incisal margin by 2 mm and overlap it with the composite material; it is necessary to make a 4 mm bevel on the vestibular surface of the tooth;

- when the incisal margin is split, the defect occupies more than  $\frac{1}{3}$  part of the crown; the remaining vestibular part of the tooth is prepared with a chamfer for the veneer.

### **3. The main characteristics of the filling material choice for treating Class III and Class IV cavities on the proximal surfaces of the front teeth.**

#### ***Choosing the color of the filling material***

1. Estimate the translucency of the tooth:

- in case of a «translucent» tooth (with a gray shade) opaque masses should be used in smaller amounts, the enamel layer should be made thicker;

- in case of an «opaque» tooth restoration should be done mainly from the opaque mass, using a thin layer of enamel shades on the vestibular surface;

2. Determine the basic tone of the tooth and its intensity. The basic tone is determined by the color of the dentine at the neck of the tooth.

3. Estimate the shade of the tooth in different areas: the neck, the body of the tooth and the incisal margin. Various hues may be given to the filling using different enamel shades of the filling material or special stainings.

4. Use a darker shade when doubting of the choice of the color, as a darker restoration looks visually better than a light one.

5. If the color of the restoration doesn't match the color of the natural tooth, the last portion of the enamel shade can be replaced on the translucent shade for the incisal margin. This technique will help to disguise the border «restoration-tooth».

***Planning the stages of treatment Class III and Class IV cavities.*** Stages of treatment Class III and Class IV carious lesions are as follows:

1. Cleaning the tooth from plaque with different brushes and toothpastes that do not contain fluoride.

2. Selecting the appropriate shade of the filling material. The basic shade of the tooth, the presence of hypoplasia spots, the spreading of the translucent areas and the anatomical shape of the tooth are estimated at this stage.

3. Giving anesthesia.

4. Isolating the operational field (Rubber Dam, "Optragate").

5. Making preparation of the dental cavity.

6. Placing the dental filling.

7. Finishing the restoration (checking the occlusion, making the anatomical shape and polishing the filling).

**Topic «ROOT CARIES IN PATIENTS WITH GINGIVAL RECESSION:  
CLASSIFICATIONAL CHARACTERISTICS, MECHANISM  
OF DEVELOPMENT, CLINICAL FEATURES, DIAGNOSIS,  
TREATMENT APPROACHES»**

**Motivational Characteristics.** Diagnosis of root caries is based on the knowledge of its risk factors, classification criteria and specific clinical features. All these parameters allow to choose a suitable individual treatment plan for the patient with root caries.

**Aims of the Lesson**

**Didactic:** to learn the fundamental principles of diagnosis and treatment of patients with root caries.

**Methodical:** to learn methodical approaches to diagnosis and treatment of patients with root caries.

**Scientific:** to learn to apply scientifically proven clinical principles of the root caries diagnosis and treatment.

**Goals of the Lesson:**

<b>On completing the lesson the students MUST KNOW</b>	<b>On completing the lesson the students MUST BE ABLE</b>
1. The definition, epidemiology, risk factors, classifications, specific clinical features of root caries in patients with gingival recession. 2. The choice of the treatment strategy and methods for the local medical treatment of root caries. 3. The specific features of carious cavity preparation in case of root caries. The choice of the appropriate restorative materials for the treatment of root caries	1. To perform a clinical examination of a patient with root caries, to identify the risk factors (assisted by the instructor). 2. To use the classification terminology for making the diagnosis of "root caries" (assisted by the instructor). 3. To make a treatment plan of the patient with root caries (without assistance). <sup>*</sup> 4. To perform the preparation of the root carious cavity (assisted by the instructor). 5. To choose the restorative material for treating root caries (assisted by the instructor)

<sup>\*</sup> Manipulation 3 in the column «MUST BE ABLE» is included into the list of practical skills performed without assistance.

**Requirements for the Initial Level of Knowledge:**

1. Risk factors of root caries.
2. Main and additional methods of diagnosing root caries.
3. Anesthetic techniques used in root caries treatment.
4. Physicochemical properties and classification of the dental restorative materials.
5. Justification of the mineralization therapy in case of root caries.
6. Steps of the carious cavity preparation.

### **Control Questions from the Related Disciplines:**

1. Anatomical features of the tooth structure.
2. Histological features of the tooth structure.
3. Pathological and morphological characteristics of the carious tissues of the tooth.

### **Control Questions on the Topic of the Lesson:**

1. Root caries: definition, epidemiology and risk factors.
2. Root caries classifications: WHO (1995), L. N. Dedova, O. V. Kandroukevich (2008). Specific clinical features of root caries.
3. The choice of the treatment plan, depending on the depth of the root carious cavity.
4. Methods of local treatment of root carious spots.
5. The remineralization therapy method developed at the 3<sup>rd</sup> Department of Therapeutic Dentistry (application instruction of the Ministry of Health, Republic of Belarus No 044-0409, 11.06.2009).
6. Special features of the root carious cavity preparation.
7. Choice of the restorative materials for root caries therapy.
8. Discussion of the publications on the topic of the lesson from dental journals, including «The Stomatologist».

### **Educational Materials.**

#### **Dental Root Caries Classification (L. N. Dedova, O. V. Kandrukevich, 2008)**

<b>1. Dental Root Caries</b>				
<b>1.1. Clinical course</b>	<b>1.2. Depth</b>	<b>1.3. Dental Tissue</b>	<b>1.4. Topographic root surface</b>	<b>1.5. Localization</b>
1.1.1. Rapidly progressing 1.1.2. Progressing 1.1.3. Remission 1.1.4. Relapse	1.2.1. Spot without hard dental tissues lesion 1.2.2. Lesion of the hard dental tissues	1.3.1. Cementum 1.3.2. Dentine	1.4.1. Vestibular 1.4.2. Oral 1.4.3. Proximal 1.4.4. Circular	1.5.1. Above the gum 1.5.2. Under the gum

### **Tasks for the Students' Individual Work.**

A student should revise the test questions from the related disciplines and possess prior knowledge for a complete topic comprehension. Students answer the «Questions on the Topic of the Lesson» and see patients with a topic-related disease at the lesson. The student should examine the patient, make the diagnostic procedures, develop a treatment plan and perform all treatment steps under the supervision of the instructor. All aspects of the examination, diagnosis and dental treatment should be reflected in the patient's dental history and checked by the instructor.

## Self-Testing of the Topic Consolidation

### Case-studies

**Case-study No 1.** Patient V., 30 years old, the initial diagnosis of root caries was made after the examination. Root caries was not accompanied by the formation of the cavity defect and it was not covered with the marginal gingiva. Oral hygiene marked OHI-S = 1,0. The assessment of the gingiva condition showed GI = 1,1.

*What is your tactic in this situation?*

**Case-study No 2.** Patient A., 45 years old, complained of the gingival recession and tooth sensitivity from the cold water.

*Objectively:* 2–3 mm gingival recession, light brown spots on the labial surface of the 1.1 and 2.1 roots, which were not covered with the marginal gingiva. These spots were slightly rough and painful on probing.

*Perform examination, make diagnosis and develop a treatment plan.*

**Case-study No 3.** Patient E., 35 years old, complained of a carious cavity in 2.2 tooth.

*Objectively:* on the palatal surface of 2.2 tooth there was a root carious cavity, which was not covered with marginal gingiva. This cavity was filled with softened dentine and it was slightly painful on probing.

*Make diagnosis and develop a treatment plan.*

## TEST QUESTIONS

**1. Identify root caries according to ICD-DA classification: (2 or more correct answers)**

- a) caries of cementum;
- b) root caries, crown caries;
- c) initial, medium;
- d) caries extending into dentine.

**2. What criteria does the contemporary caries classification include? (1 correct answer)**

- a) depth of the tooth decay, clinical course, duration;
- b) depth of the tooth decay, spread, affected area;
- c) depth of the tooth decay, clinical course, localization;
- d) clinical course, affected area, tissue color.

**3. Choose one of the root caries characteristics: (1 correct answer)**

- a) can exist without cavity formation;
- b) can not exist without cavity formation;
- c) pulpitis is an inevitable root caries complication;
- d) always progresses to the tooth crown.

**4. What is the prevalence of root caries in the Republic of Belarus (according to L. N. Dedova, O. V. Kandroukevich, 2006) in the study group of people aged 45–54? (1 correct answer)**

- a) 92 %;
- b) 32.5 %;
- c) 20.1 %;
- d) 18.5 %.

**5. What are the risk factors of root caries that influence the surrounding of the tooth crown? (2 or more correct answers)**

- a) the change of the saliva characteristics;
- b) sodium deficiency;
- c) pregnancy;
- d) dental plaque bacteria.

**6. What kinds of bacteria are most often found in root carious cavities? (2 or more correct answers)**

- a) Staphylococci;
- b) Actinomyces, Lactobacilli;
- c) Enterococci, Treponemas;
- d) Streptococci.

**7. What are the risk factors of root caries that influence the surrounding of the tooth root? (2 or more correct answers)**

- a) horizontal movements during toothbrushing, sour drinks, heredity;
- b) poor oral hygiene, bad habits, old age;
- c) periodontal diseases, decrease of the dentogingival attachment;
- d) occupational hazards, heredity, gingival hyperplasia.

**8. What is the thickness of the dental cementum in the cervical part of the tooth? (1 correct answer)**

- a) 200–500  $\mu\text{m}$ ;
- b) 100–1500  $\mu\text{m}$ ;
- c) 20–50  $\mu\text{m}$ ;
- d) 2–3 mm.

**9. What covers the tooth root in the cervical part? (1 correct answer)**

- a) cell cementum;
- b) noncell cementum;
- c) cell and noncell cementum;
- d) there is usually no cementum in the area of the tooth neck.

**10. What are the characteristics of the rapidly progressing root caries? (2 or more correct answers)**

- a) softened consistency;
- b) the affected surface is smooth, shiny, hard;
- c) the margins of the cavity are smooth, dense;
- d) sharp, irregular margins of the cavity.

**11. What are the characteristics of the root caries at the stage of remission? (2 or more correct answers)**

- a) sharp, irregular margins of the cavity;
- b) the affected surface is smooth, shiny, hard;
- c) the margins of the cavity are smooth, dense;
- d) softened consistency.

**12. What types of restorative materials are recommended for filling root carious cavity? (2 or more correct answers)**

- a) composites only;
- b) Glass Ionomer Cements, amalgams;
- c) compomers;
- d) microfile composites, inlays.



**13. What is necessary to do during preparation and restoration of the teeth affected with root caries?** (2 or more correct answers)

- a) keep the treatment area dry, prevent mechanical trauma of the gingiva;
- b) retract and protect the gingiva from chemical injury;
- c) retract the gingiva, put sclerosants into the gingival sulcus;
- d) keep the treatment area dry, exclude necrectomy.

**14. What are the clinical features of root caries?** (1 correct answer)

- a) slow progression, carious lesion spreads mostly on the root surface, but not into the depth of the tissues, the spread of the carious lesion increases with the patient's age;
- b) carious lesion spreads mostly on the root surface, rapid progression, absence of connection with the patient's age;
- c) slow progression, high incidence in teenagers;
- d) root caries incidence increases with the patient's age, carious cavities have a V-form.

**15. What is the aim of making X-rays?** (1 correct answer)

- a) to identify hidden cavities on the root's contact surface and/or under the gingiva, to estimate the periodontal tissues condition, excluding periapical complications;
- b) to identify hidden cavities on the root's contact surface, to find out denticles in the pulp;
- c) to exclude periapical complications, to reveal infrabony pockets;
- d) to estimate periodontal tissues condition and dental tissues mineralization.

**16. What is used for the local non-surgical treatment of root caries?** (2 or more correct answers)

- a) steroid anti-inflammatory medications;
- b) fluorides in combination with antiseptics or without antiseptics;
- c) calcium phosphates;
- d) non steroid anti-inflammatory medications.

**17. Conservative (without restoration) treatment of a root carious spot is:** (2 or more correct answers)

- a) impossible;
- b) possible, if oral hygiene is good;
- c) possible, if the patient follows the doctor's recommendations;
- d) possible, only if the patient is younger than 50 years old.

**18. Conservative (without restoration) treatment of a root carious spot is planned at OHI-S (points):** (2 or more correct answers)

- a) 3.14;
- b) 0.1;
- c) 0.6;
- d) more than 1.5.

**19. What are the steps of preparation of the root carious cavity? (2 or more correct answers)**

- a) making necrectomy;
- b) opening the cavity;
- c) making preparation of the cavity;
- d) forming the cavity .

**20. What are the risk factors of root caries? (2 or more correct answers)**

- a) change in the amount of gingival fluid, pregnancy;
- b) phosphorus deficiency, tooth crown caries;
- c) dental plaque bacteria, cariogenic diet;
- d) fluoride deficiency, changes in qualitative and quantitative characteristics of the saliva.

**21. What age group has the highest prevalence of root caries in the Republic of Belarus (according to O. V. Kandroukevich, 2002)? (1 correct answer)**

- a) 35–44 years old;
- b) 45–54 years old;
- c) 55–64 years old;
- d) 75 years old or older.

**22. What is the prevalence of root caries in the Republic of Belarus (according to O. V. Kandroukevich, 2002) in the group of people aged 55–64? (1 correct answer)**

- a) 5,1 %;
- b) 25,1 %;
- c) 35,2 %;
- d) 100 %.

**23. What age group has the lowest prevalence of root caries in the Republic of Belarus (according to O. V. Kandroukevich, 2002)? (1 correct answer)**

- a) 35–44 years old;
- b) 45–54 years old;
- c) 55–64 years old;
- d) 75 years old or older.

**24. What is the intensity of root caries for the group of people aged 45–54 in the Republic of Belarus (according to L. N. Dedova, O. V. Kandroukevich, 2006)? (1 correct answer)**

- a) 0,46;
- b) 0,63;
- c) 0,86;
- d) 1,12.

**25. The risk factors of root caries that influence the surrounding of the tooth crown do not include: (2 or more correct answers)**

- a) fluoride deficiency;
- b) potassium deficiency;
- c) caries of the tooth crown;
- d) cariogenic diet.

**26. Risk factors of root caries that influence the surrounding of the tooth root do not include: (2 or more correct answers)**

- a) brushing with horizontal movements, bruxism, heredity;
- b) adolescence, acidic drinks;
- c) periodontal diseases, loss of the periodontal attachment;
- d) poor oral hygiene, bad habits, old age.

## LITERATURE

1. *Carranza, F. A.* Carranza's Clinical Periodontology / F. A. Carranza. 11<sup>th</sup> ed. Saunders Elsevier, 2012. 825 p.
2. *Aesthetic Periodontology* / J. L. Denisova [et al.]. Minsk : BSMU, 2015. 20 p.
3. *Dibard, S.* Practical periodontal plastic surgery / S. Dibard. M. Karima. Ames, Iowa : Blackwell Munksgaard, 2006. 108 p.
4. *Egelberg, J.* Periodontal examination / J. Egelberg, A. Badersten. Copenhagen : Munksgaard, 1994. 85 p.
5. *Lindhe, J.* Clinical Periodontology and Implant Dentistry / J. Lindhe. 4<sup>th</sup> ed. Blackwell Munksgaard, 2003. 1044 p.
6. *Mueller, H. P.* Periodontology. The Essentials / H. P. Mueller. Thieme, 2004. 188 p.
7. *Perry, D. A.* Periodontology for the dental hygienist / D. A. Perry, P. Beemsterboer. 3<sup>rd</sup> ed. St. Louis, Mo. : Saunders Elsevier, 2007. 484 p.
8. *Sculean, A.* Periodontal regenerative therapy / A. Sculean. London : Quintessence, 2010. 294 p.
9. *Schluger, S.* Periodontal diseases : basic phenomena, clinical management and occlusal and restorative interrelationships / S. Schluger, R. Yuodelis, R. C. Page. 2<sup>nd</sup> ed. Philadelphia : Lea & Febiger, 1990. 759 p.
10. Publications on the topic of the lesson in dental journals, including «The Stomatologist».

### ANNOTATION TO THE PRACTICAL LESSON ON THE TOPIC «ROOT CARIES IN PATIENTS WITH GINGIVAL RECESSION: CLASSIFICATIONAL CHARACTERISTICS, MECHANISM OF DEVELOPMENT, CLINICAL FEATURES, DIAGNOSIS, TREATMENT APPROACHES»

1. The definition, epidemiology, risk factors, classifications, specific clinical features of root caries in patients with gingival recession.
2. The choice of the treatment strategy and methods for the local medical treatment of root caries.
3. The specific features of carious cavity preparation in case of root caries. The choice of the appropriate restorative materials for the treatment of root caries.

#### **1. The definition, epidemiology, risk factors, classifications, specific clinical features of root caries in patients with gingival recession.**

**Definition.** Root caries is a result of interaction of unfavorable factors, leading to the occurrence and progression of the demineralization process in the root of the tooth.

**Epidemiology.** The prevalence of root caries in Belarus is from 1.3 % (in people aged 25–29) to 35.2 % (in people aged 55–64) (L. N Dedova, O. V. Kandroukevich, 2002–2006).

**Risk factors.** Risk factors of root caries are divided into two groups:

1. Risk factors that influence the surrounding of the tooth crown are :

- dental plaque bacteria;
- cariogenic diet;
- fluoride deficiency;
- the change of the saliva characteristics.

2. *Risk factors that influence the surrounding of the tooth root are :*

- poor oral hygiene;
- periodontal diseases;
- old age;
- anatomical features of the dentoalveolar system;
- decrease of the dentogingival attachment.

### **Classifications**

*The International Classification of Diseases to Dentistry and Stomatology (ICD-DA, WHO, 1995)* includes root caries in the section **K02 Dental Caries**.

Root caries has the code «K02.2 — Caries of cementum». Here is a fragment from ICD-DA, WHO, 1995.

#### **K02 Dental caries**

##### **K02.0 Caries limited to enamel**

White spot lesion [initial caries]

##### **K02.1 Caries extending into dentine**

##### **K02.2 Caries of cementum**

##### **K02.3 Arrested caries**

##### **K02.4 Odontoclasia**

Infantile melanodontia

Melanodontoclasia

*Excludes:* internal and external resorption of teeth (K03.3)

##### **K02.8 Other specified dental caries**

##### **K02.9 Dental caries, unspecified**

Caries extending into dentine (K02.1) and arrested caries (K02.3) can be located on the exposed roots of the teeth.

*Dental Root Caries Classification (L. N. Dedova, O. V. Kandrukevich, 2008)*. Root caries should be classified according to the **depth of the hard tissue lesion**. There are carious spots without impairment of the hard tissues (without cavity) on the root surface and there are lesions of the dental hard tissues (with cavity). Dental examination and probing of the carious spot characterizes it as the absence of the cavity and a small change of the dental tissue color and texture. Lesion of the dental hard tissues is a limited loss of the hard tissue, forming a cavity on the tooth root.

**Progressing root caries** is a root caries without a tendency of the process to spread rapidly. It is characterized by the «chondroid-like» texture of the caries lesion on probing. The margins of the cavity are gently sloping or slightly saped.

**Rapidly progressing root caries** is a carious lesion that spreads rapidly downwards. It is characterized by a softened texture of the hard tissues during probing, sharp, irregular and saped margins of the carious cavity.

**Remission of the root caries** is an inactive lesion with no progress. The surface of the lesion is smooth, shiny and hard; the cavity margins are smooth, dense and gently sloping.

**Root caries relapse** is a spread of the carious process around the margins of the filling, previously placed on the root surface.

Location of the carious lesion in relation to gingiva influences the choice of the treatment plan.

**Supragingival root caries** is observed when a free gingival margin is situated apically in relation to the carious lesion on the tooth root.

**Subgingival root caries** is observed when a free gingival margin fully or partially covers the carious lesion.

The affected root loses cementum as a result of the mechanical impact. Thus, cementum or dentine may cover the surface of the affected root.

While making the diagnosis, it is important to note the **affected root tissue**.

**Caries of the root cementum** is a partial carious lesion of the tooth root cementum, while cementodentinal junction is preserved.

**Caries of the root dentine** is a carious lesion of the cementum, cementodentinal junction and root dentine.

**Clinical features.** Patients with root caries may complain of:

- aesthetic defect (if the cavity is localized on the vestibular surface of the anterior teeth roots);
- discomfort during eating and toothbrushing;
- pain from thermal, mechanical and chemical irritants, disappearing immediately after removal of the stimulus;
- symptoms, associated with periodontal disease of the patient;
- the patient may have no complaints (pain often occurs only after the development of complications).

The clinical picture of the root caries is characterized by the following features:

- slow progression;
- wide cavity entrance;
- shallow cavity;
- the carious process spreads mostly along the root surface.

Complications of root caries (pulpitis, apical periodontitis) may develop both in cases of deep and shallow cavities.

## **2. The choice of the treatment strategy and methods for the local medical treatment of root caries.**

### ***The choice of the treatment strategy***

<b>Clinical case</b>	<b>Treatment strategy</b>
Spot without hard dental tissues lesion (without cavity)	Elimination of risk factors. Regular oral hygiene measures. Application of the remineralising medications.
Lesion of the hard dental tissues (cavity)	Preparation and filling

<b>Clinical case</b>	<b>Treatment strategy</b>
Subgingival defect of the hard dental tissues (cavity)	Flap operation in the area of the causative tooth. Filling of carious defect during surgery.

**Methods of the local medical treatment of root caries.** Techniques of local medical treatment of root caries:

1. Clinical fluoride procedures.
2. Combined antiseptics and fluoride treatment.
3. Deep fluoridation of dental tissues.
4. Combined calcium — phosphorus medications and fluoride treatment.
5. Combined use of physiotherapy (laser, ozone treatment, vacuum-therapy) and fluoride medications.
6. Use of sealants (Desensitizers).
7. Method of complex treatment of carious spots on the surface of the tooth root (The 3<sup>rd</sup> Department of Therapeutic dentistry, Dedova L. N., Kandroukevich O. V).

**The Remineralisation therapy method developed at the 3<sup>rd</sup> Department of Therapeutic dentistry (instruction for use of the Ministry of Health, Republic of Belarus No 044-0409, 11.06.2009).** Method of complex treatment of carious spots on the surface of the tooth root.

<b>Medical agent</b>	<b>Mechanisms of action</b>
Sodium bicarbonate	Buffering properties — normalizes pH. Abrasive properties — additionally cleans the root surface.
0.01 % Miramistin	Wide spectrum of the antiseptic actions. Increases local protective reactions, regenerative processes (due to local modulation of cellular and humoral immune response). Has a therapeutic effect on periodontal diseases. Unlike chlorhexidine does not color the teeth and oral mucosa.
2.5 % Calcium Glycerophosphate	Increases the mineralization of tooth structure as a substrate for the phosphatase. Reduces dentine sensitivity.
Calcium Hydroxiapatite Gel	Contains calcium and phosphorus at a molar ratio of 1.67 (the optimum ratio for the hard dental tissues). Nanoparticles penetrate the dentinal tubules and fill demineralized dentine defects. Has an increased ability to transform into calcium and phosphate ions, which ensure better absorption. Reduces dentine sensitivity.
Fluoride-containing Sealant for Dentine (Desensitizer)	Promotes long-term contact of medications with tooth root. Reduces dentine sensitivity. Provides excretion of fluoride ions for a long time. Prevents abrasion of the cervical parts of the teeth.

Contraindications for the application of this method:

- 1) hypersensitivity or allergy to the medications, used in this method;
- 2) subgingival carious lesions;
- 3) carious lesions of the tooth root with the defect of the hard dental tissues;
- 4) poor oral hygiene.

### **3. The specific features of carious cavity preparation in case of root caries. The choice of the appropriate restorative materials for the treatment of root caries.**

*Main features of the root carious cavity preparation.* Cavity preparation in case of root caries has its specific features:

- excluding the stage «opening the cavity» in most cases;
- performing the stage «necrectomy» carefully without preventive removal of intact dental tissues;
- carrying out preventive wide preparation of the cavity only according to these indications: rapidly progressing caries, multiple root carious lesions, poor oral hygiene, systemic diseases which have a negative impact on the caries resistance;
- making an additional platform on the oral surface of the tooth root on the same level as the main cavity for better access to the proximal cavity (if needed);
- forming a rectangular bevel around the margins of the cavity for prevention of the restorative material thinning (if needed);
- making an oval shape of the cavity;
- creating the enamel bevel (2–5 mm), if part of the carious lesion is located on the cemento-enamel junction and the dentist plans to use adhesive systems for filling the cavity.

*The choice of restorative materials for the treatment of root caries.* Glass Ionomer Cements, amalgams and compomers are currently considered to be the most acceptable types of restorative materials for filling dental root cavities.

Glass Ionomer Cements have the following characteristics:

- *chemical adhesion* to the dentine and cementum of a tooth without acid etching;
- *anticariogenic effect due to fluoride excretion*: fluoride release reaches a maximum level after 24–48 hours and lasts for 1–6 months;
- *biocompatibility*: Glass Ionomer Cements can be used without lining materials which is especially important in small root cavities. The manufacturer recommends the use of a liner with Calcium Hydroxide (0.5 mm) near the dental pulp where active caries is present;

- *low module of elasticity*: reduces tension which exists in the cervical region during chewing; the coefficient of thermal expansion is close to that of dental hard tissues which ensures a good marginal adaptation of the restoration;
- *water absorption*: compensates the shrinkage during solidification and improves the marginal adaptation of Glass Ionomer Cements;
- *resistance to excess moisture*: it is more typical for hybrid Glass Ionomer Cements.

***Silver amalgam*** has the following characteristics:

- moisture-resistance in the oral cavity;
- mechanical resistance;
- easy application;
- anti-bacterial properties;
- moderate price.



**Topic «INTERNAL ROOT RESORPTION. CLINICAL FEATURES, DIAGNOSIS, TREATMENT PLAN»**

**Motivational characteristics.** The problem of internal root resorption is very versatile and requires a deep understanding of the mechanisms of its development. Root resorption is not always easy to diagnose and even harder to treat, which determines the relevance of this topic.

**Aims of the Lesson**

**Didactic:** to learn the basic diagnostic criteria, which characterize the internal root resorption with the aim of choosing the optimal method of treatment.

**Methodical:** to obtain new knowledge and skills for treating patients with internal root resorption.

**Scientific:** to form the students' clinical thinking in making the right choice of medical treatment of internal root resorption.

**Goals of the Lesson:**

<b>On completing the lesson the students MUST KNOW</b>	<b>On completing the lesson the students MUST BE ABLE</b>
1. The definition and classification characteristics of internal root resorption. 2. The mechanism of the development of internal root resorption. 3. The diagnosis and treatment of internal root resorption.	1. To interpret the data of radiographic examinations in assessing the condition of the tooth (assisted by the instructor). 2. To plan the treatment of a patient with internal root resorption (assisted by the instructor). 3. To prepare the paste on the basis of Calcium Hydroxide (without assistance).

**Requirements for the Initial Level of Knowledge:**

1. To know the pathomorphological and pathogenic processes in the periodontium in case of apical periodontitis.

2. To know the clinical picture and methods of diagnosis of all forms of chronic apical periodontitis.

3. To know the methods of root canal obturation (lateral and vertical condensation and other).

4. To know endodontic instruments and methods of their application.

**Control Questions from the Related Disciplines:**

1. Examination of the dental patient.

2. Topographic tooth anatomy of the upper and lower jaws.

3. The pathogenesis of inflammation.

4. Tools for medical treatment of the root canal.

5. X-ray diagnosis of dental hard tissues.

### **Control Questions on the Topic of the Lesson:**

1. Pathological root resorption: definition, classification.
2. The development mechanism of internal root resorption.
3. The treatment methods of internal root resorption.
4. Discussion of the publications on the topic of the lesson in dental journals of the Republic of Belarus, including «The Stomatologist».

### **Educational materials.**

Sets of endodontic instruments, x-rays, sealers, main and additional Gutta-Percha points, a pulp vitality tester, an apex locator.

### **Tasks for the Students' Individual Work.**

The student should study the recommended literature on the causes, pathogenesis, diagnosis and treatment of internal root resorption for learning the educational material of the lesson. The student must see patients under the supervision of the instructor. The student conducts the examination of the dental patient, makes the differential diagnosis, prepares the treatment plan and performs the treatment under the guidance of an instructor. All the treatment data must be rendered in the patient's case-history chart and certified by the instructor.

### **Self-Testing of the Topic Consolidation**

#### *Case-studies*

**Case-study No 1.** Patient A., 28 years old, came for a preventive examination. A focus of dental tissues destruction within the root canal of 1.2 tooth was identified on the panoramic X-ray.

*Make the initial and differential diagnosis.*

**Case-study No 2.** Patient B., 31 years old, complained of aching pain in 1.1 tooth. The pain intensified from biting on 1.1 tooth. The clinical examination was performed including the X-ray diagnosis. A focus of dental tissues destruction of 1.1 tooth root canal was revealed by the control X-ray. This focus of destruction was adjacent to the periodontal ligament space, which was more apical than the level of the alveolar bone.

*Develop the treatment plan.*

### **TEST QUESTIONS**

**1. The type of dental tissue resorption in the pulp cavity is called \_\_\_\_\_ resorption.**

**2. What class does the pathological dental tissue resorption, according to the ICD-DA classification, belong to? (1 correct answer)**

- a) K.03.1;    b) K.03.3;    c) K05.1;    d) K.06.3.

**3. What do the contours in the area of the lesion look like on the X-ray of the tooth with the internal root resorption? (1 correct answer)**

- a) are determined;
- b) are not determined;
- c) are defined only in the teeth of the temporary dentition;
- d) are absent only in the teeth of the temporary dentition.

**4. What are the basic principles of the root canal therapy? (1 correct answer)**

- a) chemical-mechanical preparation of the root canal;
- b) using a 3 % solution of hydrogen dioxide;
- c) complete disinfection of the root canal;
- d) filling the root canal with warm gutta-percha;
- e) obturation of the root canal.

- 1) a, b, c;
- 2) a, c, d;
- 3) a, c, e;
- 4) b, c, d;
- 5) c, d, e.

**5. What components are used for preparing the Calcium Hydroxide paste? (2 or more correct answers)**

- a) 3 % sodium hypochlorite solution;
- b) 0,9 % sodium chloride solution;
- c) 1,4 % anesthetic solution;
- d) 2 % hydrogen dioxide solution.

**6. What material do the dentists apply for filling the defect of the root, while treating internal root resorption by a conservative method? (1 correct answer)**

- a) warm gutta-percha;
- b) Endomethasone;
- c) cold gutta-percha (Gutta Flow 2);
- d) Canason paste.

**7. What happens to the osteoclasts function after a temporary filling the root canal of the tooth with Calcium Hydroxide paste? (1 correct answer)**

- a) It is inhibited;
- b) It does not change;
- c) It is activated;
- d) It is activated within the first three hours.

**8. When is the second visit organized in case of perforating internal root resorption (after filling the root canal defect with Calcium Hydroxide paste)? (1 correct answer)**

- a) in 2 weeks;
- b) in 4 weeks;
- c) in 6 weeks;
- d) in 8 weeks.

## LITERATURE

1. Carranza, F. A. Carranza's Clinical Periodontology / F. A. Carranza. 11<sup>th</sup> ed. Saunders Elsevier, 2012. 825 p.
2. Egelberg, J. Periodontal examination / J. Egelberg, A. Badersten. Copenhagen : Munksgaard, 1994. 85 p.
3. Foce, E. Endo-Periodontal Lesions / E. Foce. London : Quintessence, 2011. 120 p.
4. Lindhe, J. Clinical Periodontology and Implant Dentistry / J. Lindhe. 4<sup>th</sup> ed. Blackwell Munksgaard, 2003. 1044 p.
5. Mueller, H. P. Periodontology. The Essentials / H. P. Mueller. Thieme, 2004. 188 p.
6. Perry, D. A. Periodontology for the dental hygienist / D. A. Perry, P. Beemsterboer. 3<sup>rd</sup> ed. St. Louis, Mo. : Saunders Elsevier, 2007. 484 p.
7. Sculean, A. Periodontal regenerative therapy / A. Sculean. London : Quintessence, 2010. 294 p.
8. Schluger, S. Periodontal diseases : basic phenomena, clinical management and occlusal and restorative interrelationships / S. Schluger, R. Yuodelis, R. C. Page. 2<sup>nd</sup> ed. Philadelphia : Lea & Febiger, 1990. 759 p.
9. Publications on the topic of the lesson in dental journals, including «The Stomatologist».

### ANNOTATION TO THE PRACTICAL LESSON ON THE TOPIC «INTERNAL ROOT RESORPTION. CLINICAL FEATURES, DIAGNOSIS, TREATMENT PLAN»

1. The definition and classification characteristics of internal root resorption.
2. The mechanism of the development of internal root resorption.
3. The diagnosis and treatment of internal root resorption.

#### **1. The definition and classification characteristics of internal root resorption**

**Definition.** Root resorption is a physiological or pathological process, that leads to loss of dental tissues, including dentine, cementum and alveolar bone.

**Internal root resorption** is a kind of dental tissue resorption in the root canal.

**Idiopathic root resorption** is a resorption of the tooth root, the cause of which has not been revealed.

#### **Classification**

**WHO classification (ICD–DA, WHO, 1995):**

<b>K.03.3. Pathological resorption of teeth</b>
---

K03.30 External
-----------------

K03.31 Internal [internal granuloma] [pink spot]
--

K03.39 Pathological resorption of teeth, unspecified
--

#### **2. The mechanism of the development of internal root resorption**

Normally mineralized dental tissues of adults do not undergo resorption. The dentine of the root canal is protected by predentine and a layer of odontoblasts.

Internal resorption is one of the main mysteries in dentistry. It is most common in the area of the incisors (Cohen S.). The reasons for its development are not known. Predisposing factors to the development of internal root resorption are: injury due to the tooth crown preparation, injury due to a trauma and orthodontic treatment. It was found that internal resorption is more likely to occur in the area of blood vessels. The reason for this is that hyperemia with a high partial pressure of oxygen supports and initiates a function of pulp's odontoclasts.

The mechanism of root resorption development can be described in two stages. The first stage is an acute trauma of the tooth with internal bleeding (hematoma), which leads to the reduction and disappearance of odontoblasts and the appearance of cells in the pulp, which are similar to macrophages. The second stage is the restructuring of the hematoma, which leads to the formation of granulation tissue. Proliferating granulation tissue exerts pressure on the dentine walls. Formation of pre-dentine stops. Odontoclasts are differentiated from the connective tissue and the pathological resorption begins.

One of the leading factors in the development of internal resorption is an infectious, inflammatory process, which is accompanied by the formation and release of cytotoxins — IL-1 and lymphotoxin. There is Prostaglandin E2 in the focus of inflammation and the waste products of bacterial cells, including endotoxins, which destroy odontoblasts, pre-dentine and activate the function of odontoclasts. Infectious resorption develops rapidly and can lead to a complete destruction of the root. Leif Tronstad and his co-authors found that progressive internal root resorption is supported by infection and tissue necrosis in the coronal part of the root canal and the pulp chamber.

### **3. The diagnosis and treatment of internal root resorption**

***Diagnosis of internal root resorption.*** Internal resorption is usually asymptomatic and it is first detected by the X-ray. You need to make some additional x-rays from different angles to determine the amount of lost dental tissues and to plan a treatment. If the focus of resorption does not change its position in different projections of the X-ray, then it is within the root canal, and thus, it is an internal resorption. According to Gortner a root canal or pulp chamber has an expansion area, the contours of which are not clearly determined in case of internal resorption.

Pain can be caused by perforation of the root, leading to the development of pathological changes in the periodontium. According to Kronfeld clinical diagnosis of internal resorption, as a rule, does not cause difficulties. Any radiographically visible defect in the tooth, not caused by caries, is the result of one or another kind of resorption process.

Internal resorption can occur quickly, destroying the tooth for a few months, or last for years. As the speed of destruction is not possible to predict, its treatment should be started as soon as possible.

***Treatment of internal root resorption.*** There are three main methods of the treatment of internal resorption:

- 1) conservative endodontic treatment;
- 2) recalcification with Calcium Hydroxide;
- 3) surgical treatment.

The choice depends on the technical abilities of the doctor (to fulfill the requirements of endodontic treatment), as well as the prevalence and the topography of the defect.

***Conservative endodontic treatment.*** Conservative treatment is the method of choice, if endodontic requirements can be fulfilled (mechanical treatment, disinfection and obturation) and the focus of resorption does not perforate the wall of the root canal.

Indications for conservative (endodontic) treatment:

1. Prevalence and topography of the defect:
  - the pathological process didn't completely destroy the dental tissues, it is still possible to restore the anatomical shape of the tooth;
  - the focus of resorption does not perforate the wall of the root canal.
2. The technical abilities of the doctor to conduct high-quality endodontic treatment (full maintenance of the endodontic treatment principles).

The essence of conservative treatment consists of creating endodontic access and determining the working length of the root canal. It is necessary to expand the contours of access to a size that is optimal for treatment of resorption. The coronal part of the root canal above the area of resorption, has to be extended by using the spherical dental burs, Gates Glidden burs or Peeso drill burs. Then, the pulp and granulation tissue in the resorption area has to be removed using elongated spherical burs No. 4 or No. 6 in the low-speed handpiece or an endodontic probe N 33L. Hemostatics, hemostatic sponge and 5.25% sodium hypochlorite solution are used for the hemostasis.

If the bleeding does not stop, a surgical method should be applied. It is necessary to carry out endodontic treatment of the apical part of the root canal in the usual manner after drying the working field. Then the canal should be dried and sealed by the method of lateral condensation. Excess of gutta-percha should be removed. If there is no bleeding, the dental tissue defect in the area of resorption should be filled with warm thermoplastified gutta-percha, cold gutta-percha — Gutto Flow 2 or quickly setting zinc-oxide eugenol cement. It is important to remember that the success of treatment depends on the quality of root canal 3D obturation. In all cases of internal resorption of the tooth root, you should strengthen the tooth using a stainless steel post.

#### ***Recalcification with Calcium Hydroxide***

Indication: perforating internal resorption of the root canal.

Until recently, the surgical method was the only method of treatment of perforating internal root resorption. At the present time in connection with

the development of knowledge about the mechanism of action of Calcium Hydroxide, the possibility of a conservative method appeared due to the high ability of this medication for recalcification. In addition, it is established that the paste on the basis of Calcium Hydroxide contributes to the physiological recovery of small perforations. It was experimentally proved, that this paste stimulates poorly differentiated mesenchymal cells to produce reparative dentine in the apical part of the periodontal ligament. In case of the perforating internal root resorption, periodontal ligament is damaged on the lateral surface of the root. It has the same high reparative potential, as periodontal ligament at the apical part. If the root perforation is apical regarding the periodontal attachment and it is not connected with the oral cavity, Calcium Hydroxide will reduce the inflammatory response and promote the recovery of the dental tissues of the tooth root. This material inhibits locally the activity of osteoclasts due to the high alkaline reaction, which occurs at the place of Calcium Hydroxide application and circulates to the dentine. Calcium Hydroxide neutralizes the lactic acid, produced by osteoclasts, and prevents root demineralization due to its high pH (near 12.0). An alkaline environment in the area of resorption leads to the decrease of the activity of collagenase and acid hydrolases of resorption cells, and also stimulates the activation of alkaline phosphatase, which plays an important role in the formation and regeneration of dental tissues. In addition, the paste on the basis of Calcium Hydroxide has an antimicrobial action.

#### *Methods of application*

After obturation of the apical part of the root canal, the area of resorption should be filled with a paste based on Calcium Hydroxide. The anesthetic solution, physiological solution or liquid for injection should be mixed with pulvis of Calcium Hydroxide to the consistency of paste. The tooth should be sealed with dental cement after filling root canals. Examination of a patient should be conducted over 6 weeks. Clinical assessment should be carried out, taking into account the dynamics of the process (the patient's complaints and feelings), X-ray examinations and the state of the paste in root canals. If the paste is porous or completely resorbed, additional filling of the defect with the paste should be carried out and the patient should be assigned to a follow-up visit in 6 weeks. This scheme should be repeated until the time, when the paste in root canals will be dry and dense. If the paste in the root canals is firm and dry during the first visit of the patient, its replacement and check-up should be carried out with an interval of 3 months. The treatment is considered to be successful, if there is a complete remineralization of the defect. X-rays are the criteria: a partial recovery of the root surface and complete restoration of the periodontal ligament space.

#### ***Surgical treatment.*** Indications:

– inability to apply conservative treatment or the method of recalcification by using calcium hydroxide;

- lack of positive effect of the conservative method;
- resorption of the root apex with an abnormal anatomical structure;
- inability to stop bleeding from the perforation defect;
- perforation in the area of dentogingival attachment.

Characteristics of surgical intervention depend on the localization of the process and the size of the defect.

If the defect is large or root tissues are not enough for fixing the tooth, the removal of tooth is required.

Hemisection is possible in multi-rooted teeth.

If the perforation is in the coronal part of the root and it has a connection with the oral cavity, the curettage of the defect should be performed before the creation of the endodontic access. Instrumental preparation and filling of the apical part of the root canal should be performed by a standard method after drying the surgical area. An intracanal post should be fixed in the root canal, and the defect must be replaced with an adhesive material. Periodontal pocket may appear during surgical interventions in the area of dentogingival attachment. The bottom of this pocket will be the apical border of the root filling material. The patient should be informed about this situation.

If resorption is located in the apical part of the root, then the root apex resection is done, excising completely the area of the defect after the preliminary endodontic treatment.



## Topic «ERGONOMICS IN PERIODONTOLOGY»

**Motivational Characteristics.** The four-handed dentistry system developed in the 1960s served as the basis for further improvement of the dentist workplace organization. The proprioceptive derivation (Pd) concept was a great stride forward as it ensured optimal positions of the dentist and his/her assistant in the course of their work. Literature sources indicate that gained ergonomics skills positively influence the dentist's productivity and quality of work (H. C. Kilpatrick, 1971). At the same time, irrationally organized treatment process might cause risk factors to the health of the dentist (Murphy, 1997). The knowledge, gained by the students in the class, will assist in implementing new solutions into an optimized workplace of the periodontist.

### **Aims of the Lesson**

**Didactic:** to motivate students to realize the importance of the application of new concepts of the treatment process organization.

**Methodical:** to teach students to use the fundamentals of ergonomics in periodontal practice.

**Scientific:** to ground scientifically the fact that workplace organization influences the dentist's productivity, quality of work and health.

### **Goals of the Lesson:**

<b>On completing the lesson the students MUST KNOW</b>	<b>On completing the lesson the students MUST BE ABLE</b>
1. Ergonomics: definition, goals. 2. Main features and requirements for the dentist's workplace organization. 3. Optimization of the working position of a dentist and his assistants while performing periodontal procedures.	1. To perform examination of the oral cavity and instrumental examination of periodontal tissues, maintaining the optimal working position (assisted by the instructor). 2. To perform professional hygiene, maintaining the fundamentals of ergonomics (without assistance).

### **Requirements for the Initial Level of Knowledge:**

1. The equipment and instrumentation of the dentist and his/her assistant at the working place.
2. Requirements for the modern equipment and the infection control.
3. Safety measures while operating a modern dental equipment.
4. Modern dental instrumentations used in Periodontology.
5. Dentist's workplace organization according to the ergonomics requirements.

### **Control Questions from the Related Disciplines:**

1. Anatomical and physiological peculiarities of the dental tissues and the oral cavity.

2. Anatomy and physiology of the eye.
3. Anatomy and physiology of the musculoskeletal system.
4. The state of the peripheral nervous system, depending on the pathological processes in the musculoskeletal system.

**Control Questions on the Topic of the Lesson:**

1. Fundamentals of the four-handed dental treatment concept.
  - 1.1. Rational working position of the dentist and his/her assistant.
  - 1.2. Aid of the qualified assistant; his/her functions and responsibilities.
  - 1.3. Organization of the treatment and the equipment lay-out.
2. Fundamentals of the Pd (proprioceptive derivation) concept, which makes it possible to arrange the optimal working position of the operator.
  - 2.1. Height of the patient's position in the dental chair.
  - 2.2. The operator's movements relative to the patient's head, according to the clock-face system.
  - 2.3. Variation of the occlusal plane angle of the upper jaw relative to the vertical line.
  - 2.4. Allowable rotation angles of the patient's head to the left or to the right.
  - 2.5. Width of the patient's mouth opening.
3. Ergonomic fixation of the dental instruments (handpiece, probes, scalers, mirrors), performed with the dentist's hands to provide optimal control.
4. Methods of instrument changes between the dentist and the assistant during periodontal manipulations in the patient's mouth.
5. Discussion of the publications on the topic of the lesson in dental journals, including «The Stomatologist».

**Educational Materials.**

Logical and didactic structure of acquiring ergonomic skills according to the Pd concept (HPI, Atami, Japan):

1. Determination of the height of the patient's position in the dental chair.
2. Determination of the operator's position relative to the patient's head using the vector direction of the operating finger.
3. Using the position «sleeping hand» and straight wrist, determination of the occlusal plane angle relative to the vertical line, rotation angle of the patient's head and the width of the patient's opened mouth.
4. Basic fixation of periodontal instruments in the dentist's hands, ensuring the patient's safety and accuracy of performed manipulations.
5. Performing professional hygiene using an ultrasonic scaler and curettes according to the fundamentals of ergonomics.

**Tasks for the Students' Individual Work.**

Classes are held in the room, equipped with dental units, necessary devices, materials and instruments. The students work under permanent control of the instructor, observing safety measures.

Training of the ergonomic practical skills in Periodontology is performed in a certain order:

1) students train to fix the dental instruments in their hands to provide a control of the force and the quality of performed manipulations (using jaw models);

2) students examine one another, performing the examination of the oral cavity and the instrumental examination of the hard dental tissues and periodontal tissues, providing proper fixation of dental instruments in their hands to ensure the patient's safety and the accuracy of the manipulations;

3) students perform professional hygiene using an ultrasonic scaler and cures, observing the fundamentals of ergonomics. At the end of the classes the results must be summed up and possible remarks must be made.

### TEST QUESTIONS

#### **1. What are the problems, which Ergonomics in dentistry deals with?**

*(2 or more correct answers)*

a) investigation of the influence of the surrounding factors, the factor of the working position on the functional state of the operator;

b) development of the means for protection from harmful surrounding factors, i. e. finding comfort zones;

c) development of the requirements for the design and lay-out of the dental equipment;

d) development of ethical norms of human behavior in the society.

#### **2. Indicate the concepts of the four-handed dental treatment:**

*(2 or more correct answers)*

a) rational working positions of the dentist, the assistant, the patient;

b) aid of the qualified dental technician working in the dental team;

c) treatment organization;

d) equipment lay-out.

#### **3. What science teaches the dentist and his/her assistant to maximize their own abilities and equipment performance?**

---

#### **4. What does the using of the dental assistant, working near the dentist, allow? *(2 or more correct answers)***

a) to increase the labor productivity;

b) to improve the quality of work;

c) to decrease the muscle tension and the tiredness of the dentist;

d) to increase the number of the dentist's movements and the shifts.

**5. What is the working position of the dentist, when the patient is in the lying position? (1 correct answer)**

a) sitting position with the back leaning on the back of the dentist's chair, the body bending to the right, feet localizing on the floor with the center of the gravity shifted on the right leg, hands being outstretched and supported by the muscles of the shoulders and the back;

b) sitting position with the back of the dentist being upright without leaning on the chair back, the body slightly bending forward, upper parts of the arms being positioned close to the body;

c) sitting position with the height of the seat providing 140° angle between the dentist's thigh and shin, the feet localizing on the chair rack, the back of the dentist not leaning on the chair back, the upper part of the body bending to the right with right arm being positioned on the back of the dentist's chair.

**6. Indicate the parameters of the dentist's chair which meet the requirements of ergonomics: (1 correct answer)**

a) the chair seat is soft, the width of the seat is shorter than the length, the frontal margin of the seat is rounded and it is slightly raised, the chair is equipped with arms, the height of the seat back is not adjustable and supports the back at the height of 500 mm above the seat;

b) the chair seat is dense, the length of the seat is shorter than the width, the frontal margin of the seat is rounded and it is slightly lowered, the height of the seat back is adjustable and supports the back at the height of 200 mm above the seat;

c) the shape and the design of the dental chair should be individually selected according to the stature of the dentist as well as his/her habits and wishes.

**7. What determines the height of the patient's position in the dental chair? (1 correct answer)**

a) vision acuity of a particular dentist;

b) a distance of 35–40 cm between the dentist's eyes and the object, at which the work is performed;

c) a distance of 50 cm and more between the dentist's eyes and the object, at which the work is performed;

d) it does not matter.

**8. What factors influence the range of the dentist's movements relative to the patient's head? (2 or more correct answers)**

a) technical data of the dental equipment;

b) availability of the assistant;

c) wishes of the patient;

d) dentist's knowledge of ergonomics and his/her practical skills.

**9. What is the preferable angle of the upper jaw occlusal plane relative to the vertical axis, while working with the lower jaw teeth? (1 correct answer)**

- a) equal to +25 degrees;                      c) equal to +10 degrees;  
b) equal to -10 degrees;                      d) It does not matter.

**10. Indicate the fundamentals of the Pd concept (HPI, Atomi, Japan), which make it possible to keep optimal working position: (2 or more correct answers)**

- a) the height of the patient's position in the dental chair;  
b) the operator's position relative to his/her assistant;  
c) changing of the upper jaw occlusal plane relative to the vertical axis;  
d) turning of the patient's head to the right or to the left.

**11. What is the acceptable limit for turning the patient's head in both directions from the vertical axis, while working in the oral cavity? (1 correct answer)**

- a) 5 degrees;                      b) 45 degrees;                      c) 10 degrees;                      d) 30 degrees.

#### LITERATURE

1. Carranza, F. A. Carranza's Clinical Periodontology / F. A. Carranza. 11<sup>th</sup> ed. Saunders Elsevier, 2012. 825 p.
2. Egelberg, J. Periodontal examination / J. Egelberg, A. Badersten. Copenhagen : Munksgaard, 1994. 85 p.
3. Finkbeiner, B. L. Four-Handed Dentistry Revisited / B. L. Finkbeiner // J. Contemp. Dent. Pract. 2000. Vol. 1. № 4.
4. Human Performance and Informatics Institute, Japan. Sim 0 and 1 program for acquisition of skills and associated judgements in clinical dentistry. Atami, 1992. 80 p.
5. Lindhe, J. Clinical Periodontology and Implant Dentistry / J. Lindhe. 4<sup>th</sup> ed. Blackwell Munksgaard, 2003. 1044 p.
6. Mueller, H. P. Periodontology. The Essentials / H. P. Mueller. Thieme, 2004. 188 p.
7. Nixon, G. S. Chairside ergonomics / G. S. Nixon // J. Int. Dental. 1971. Vol. 21. № 2. P. 270–277.
8. Paul, E. Instrument Exchange / E. Paul // Quint. Inter. 1982. № 3. P. 349–354.
9. Perry, D. A. Periodontology for the dental hygienist / D. A. Perry, P. Beemsterboer. 3<sup>rd</sup> ed. St. Louis, Mo. : Saunders Elsevier, 2007. 484 p.
10. Schluger, S. Periodontal diseases : basic phenomena, clinical management and occlusal and restorative interrelationships / S. Schluger, R. Yuodelis, R. C. Page. 2<sup>nd</sup> ed. Philadelphia: Lea & Febiger, 1990. 759 p
11. Wagner, B. Optimal Working Posture / B. Wagner // Quint. Inter. 1984. № 1. P. 77–81.
12. Publications on the topic of the lesson in dental journals, including «The Stomatologist».

#### ANNOTATION TO THE PRACTICAL LESSON ON THE TOPIC

##### «ERGONOMICS IN PERIODONTOLOGY»

1. Ergonomics: definition, goals.
2. Main features and requirements for the dentist's workplace organization.
3. Optimization of the working position of a dentist and his assistants while performing periodontal procedures.

## **1. Ergonomics: definition, goals.**

**Definition. Ergonomics** (from the Greek ergon — work, nomos — law) is a science, which studies the functional abilities of a person in the working processes with the purpose of the creation of the optimal working conditions.

Modern dentistry is a result of the gradual development of science and technology. In order to meet the increasing demands of the people to the dental office, Ergonomics, like many professions, actively makes new progress, that benefits both, the dentist and the patient. Thus Ergonomics aims to protect the dentists' work, improving its efficiency and quality, to provide dentists with a normal working environment.

**Goals.** Ergonomics in dentistry attains the following goals:

1. Studies the influence of various environmental factors (composition of air, radiation, noise, vibration, lighting), as well as the influence of the working position on the functional state and the working capacity of the doctor.

2. Develops means of protection against the harmful effects of the environment, i. e. determines the comfort zones:

– defines the allowable level of bacterial contamination of the air in a dental office;

– defines the permissible level of radiation, vibration and noise;

– determines the required level of illumination;

– determines the optimal working posture of a dentist, an assistant and a patient in a dental chair;

– defines the functional areas of the working movements of the doctor and his assistant.

3. Develops requirements to:

– the design of the workplace;

– the equipment of the working room and the placement of the equipment according to the anthropometric data and the characteristics of the working positions;

– the design of the dental equipment.

## **2. Main features and requirements for the dentist's workplace organization.**

The system of the dental treatment in four hands is based on the following principles:

1. Rational working posture of the dentist and the patient.

2. A qualified assistant, working all the time next to the operator.

3. Rational organization of the treatment.

4. Location of the equipment (provides a maximum simplification of the working movements by the rational distribution of the dental equipment and instruments).

***Rational working posture of the dentist and the patient.*** Working posture is a posture, in which the dentist performs the work with patients: examination of the oral cavity, dental treatment and teeth extraction.

The optimal working posture of the dentist with the patient lying on the back will be the following:

- 1) sitting;
- 2) the back is straight;
- 3) without bending;
- 4) feet are completely on the floor;
- 5) the body is slightly inclined forward;
- 6) the upper part of the hands is close to the body;

7) the angle between the height of the seat and the legs of the dentist should be 90–115 degrees.

The sitting doctor should position his working area (the patient's mouth) in such a way, that the doctor can perform all the operations highly effectively without deformation of his own body. This is best achieved when the patient is lying on the back in the dental chair.

As a result of the research, it was found that a normally curved as a spine position of the patient in the dental chair is the most appropriate for his body as it relaxes the patient and provides good working conditions for the long-term clinical procedures in the mouth.

There are certain medical conditions, when dental manipulations should be carried out with the patient sitting or semilying in the dental chair (R. Hilger, 1998). They are:

- 1) limitation of the respiratory function;
- 2) stagnation in the small circulatory system;
- 3) hypertension;
- 4) asthma;
- 5) an abnormality of the nasal breathing;
- 6) an old patient with heart diseases.

***A qualified assistant.*** Activities of the dental assistant are an integral part of the overall concept of the four-handed work. The role of the assistant becomes very important when solving two major problems that practical dentists often face, such as:

- the need to maintain or even increase the productivity of the work without the detriment of the treatment quality;
- the need to minimize stress and tiredness.

In its turn, an irrationally organized treatment process significantly reduces the working productivity of the medical team, as the role of an assistant does not have a proper place and it is restricted to the preparation of the workplace.

***Rational organization of the treatment.*** The third principle of the four-handed dentistry consists of the treatment planning of the individual patient,

from the moment of his arrival at the dental clinic until the last minute of his/her visit. In particular, registration and treatment of patients is carried out by a coordinated team, consisting of a dentist and several assistants, for increasing the treatment efficiency in many dental offices. The first assistant takes care of all administrative work, while the second one assists the dentist directly near the dental chair. The third assistant carries out all the necessary laboratory work and at the same time he watches closely the treatment process and he is always ready at any moment to give the necessary materials or tools to the second assistant, who works near the dental chair. One of the functions of the third assistant is collecting the used dental instruments as well. All of these assistants are interchangeable and they can equally perform one another's functions.

***Location of the equipment.*** The fourth principle of four-handed dentistry consists of the maximum simplification of working movements by the rational placing of the dental equipment and instruments. The optimum of the dentist's and his assistant's movements during the work depends on the location of the dental furniture, appliances and tools. Dr. E. J. Chasteen (1978) attempted to classify the movements of the dentist and, as a result, he was able to identify five classes:

- the 1<sup>st</sup> Class — movements of the fingers;
- the 2<sup>nd</sup> Class — movements of the fingers and hand;
- the 3<sup>rd</sup> Class — movements of the fingers, hand and forearm;
- the 4<sup>th</sup> Class — movements of the whole arm from the shoulder;
- the 5<sup>th</sup> Class — movements of the whole arm from the shoulder and rotation of the body.

The basic idea of this classification is to limit the dentist's movements within the movements of the 1<sup>st</sup> Class and the 2<sup>nd</sup> Class. Movements of the 4<sup>th</sup> Class and the 5<sup>th</sup> Class should not be present during the performance of the medical procedures. They should be minimized due to the assistant's help.

### **3. Optimization of the working position of a dentist and his assistants while performing periodontal procedures.**

The optimal choice of the working position determines the success of our future actions: accuracy of the performance, working efficiency, adequate opportunity to view and monitor the power of the tools application and minimal stress on the body of the operator.

Nevertheless, one should not believe that a doctor, working in a sitting position, will overcome all the physical stress and strain. Everything will depend on the efficiency of the chosen working position, the effectiveness of which is achieved through the implementation of certain actions in the correct sequence (HPI, Atamy, 1988):

***The height of the patient's position.*** The necessary distance between the eyes and the object should be maintained for working with high precision.



There is no certain working distance, because each operator has a different vision acuity. Therefore, the doctor must locate the object of the operation at the distance that will allow him to see the papillary pattern on the fingers of his hands. If the doctor has a good vision acuity, this distance is 35–40 cm. If the working distance is more than 50 cm, the correction of vision with glasses is required.

***Operator's movement in relation to the patient's head.*** At the second stage it is necessary to determine the position of the operator in relation to the patient's head. Use the direction of the operating finger vector for it (this is the direction of the force, which the doctor applies to the instrument). The doctor should sit in such a way that the direction of the force, which he will apply to the operated object, will pass through the median plane of his body. The range of the doctor's movements is rather wide. It can be from 1 hour to 10 hours, based on the abstract system of the face of a clock.

***Changing the angle of the occlusal plane of the upper jaw relative to the vertical plane.*** The definition of the optimal angle of the upper jaw occlusal plane consists of the following steps:

1. It is necessary to sit in the chair and take a comfortable working position. The arms are bent at the elbows and hanging down freely along the operator's body.

2. The fingers are relaxed within the stabilized straight wrist.

3. Keeping the wrist straight, you need to touch the occlusal surface of the tooth, that will be treated, with the palmar surface of the tip of the operating arm second finger for the upper jaw, and with the palmar surface of the tip of the operating arm first finger for the lower jaw. Keeping the finger contact with the surface of the operated teeth, turn the patient's head forward or backward, so that you feel the good fingers control on the operated tooth surface. It is believed that the degree of the angle changes of the maxilla occlusal plane in relation to the vertical plane shouldn't exceed (–25) degrees for the comfort of the patient. Exceeding this index causes stress to the neck muscles of the neck. If the turning of the head is not enough, it is necessary to lower the back of the dental chair. The angles most often used in dentistry are: –25; –7; +8 degrees.

***Turning the patient's head to the left or to the right.*** When the degree of visibility and the finger control of the operated tooth are insufficient, it is necessary to turn the patient's head to the left or to the right. The term «fingers control» means:

- 1) the reliability of the tool fixation;
- 2) the ability to control the power of the tool application;
- 3) comfort of the manipulation.

It is allowed to turn the patient's head no more than 45° to both sides from the vertical midline.

***The width of the patient's mouth opening.*** It is necessary to adjust the degree of the patient's mouth opening to provide a good view or an access to a particular group of teeth. A widely opened mouth causes stress to the chewing muscles and soft tissues of the oral cavity and thereby makes the access to the posterior teeth difficult. If you want to have a better access and view, you should ask the patient to close his mouth slightly. It contributes to the muscles relaxation and allows the soft tissues to be more mobile. In this case, the optimal distance between the jaws should be the width of two fingers, which is sufficient for putting the saliva ejector and manipulating with the handpiece of the drilling machine.

## Topic «PERIODONTAL TISSUES, DETERMINATION OF THEIR STATUS»

**Motivational Characteristics.** Knowledge of the normal and the pathological condition of the periodontal tissues contributes to early diagnosis of the periodontal diseases. A dentist should be able to identify the pathology of the periodontal tissues in the initial stages and timely inform the patient about the presence of risk factors and the phases of the periodontal diseases. This will help the patient to start timely preventive measures and treatment.

### **Aims of the Lesson**

**Didactic:** to form among students the clinical thinking in assessing the condition of the periodontal tissues, which will contribute to the timely realization of the treatment, the prophylactic measures and the influence on the further prognosis of the periodontal diseases;

**Methodical:** to integrate theoretical and practical knowledge of the normal and pathological condition of the periodontal tissues, form the basis for further diagnosis of the periodontal tissues status;

**Scientific:** to motivate students to understand the importance of the knowledge of the normal and pathological condition of the periodontal tissues.

### **Goals of the Lesson:**

<b>On completing the lesson the students MUST KNOW</b>	<b>On completing the lesson the students MUST BE ABLE</b>
1. Classification of the periodontal diseases (Prof. L. N. Dedova. 2012, WHO. 1995). 2. Terminology in Periodontology. 3. Characteristics of healthy periodontal tissues. 4. Biological system of the periodontal tissues. 5. Microcirculation in the periodontal tissues in the normal and the pathological conditions. 6. X-ray characteristics of the alveolar bone in the normal condition.	1. To determine the gingiva condition of the periodontal patient. 2. To determine the periodontal ligaments condition of the periodontal patient (assisted by the instructor). 3. To determine the condition of microcirculation in the periodontal tissues, using a vacuum test and PBC index (assisted by the instructor). 4. To interpret the x-ray of the alveolar bone of the patient with healthy periodontal tissues (assisted by the instructor).*

\* Manipulation 4 in the column «MUST BE ABLE» is included into the list of practical skills performed assisted by the tutor.

### **Requirements for the Initial Level of Knowledge:**

1. Examination of the dental patient.
2. The role of microorganisms in the development of diseases of the oral cavity.

3. X-ray features of the alveolar bone pathology of the upper and the lower jaws.

**Control Questions from the Related Disciplines:**

1. The role of microorganisms in the development of various forms of the inflammation.
2. The pathogenesis and stages of connective tissue inflammation.
3. Histology and histopathology of periodontal tissues.
4. X-ray features of the maxillo-facial pathology.

**Control Questions on the Topic of the Lesson:**

1. Classification of periodontal diseases by Prof. L. N. Dedova (2012), WHO (1995).
2. Interpretation of the terms in Clinical Periodontology.
3. Definition, clinical characteristics of periodontal tissues (color, surface, contour, consistency, depth of periodontal pockets, bleeding, gingival index).
4. Biological system of the periodontal tissues.
5. Characteristics of the surrounding barriers of the dental root. Microcirculation in the periodontal tissues in the normal and pathological conditions.
6. Characteristics of the surrounding barriers of the dental crown.
7. X-ray characteristics of the alveolar bone in the normal and the pathological conditions.
8. Discussion of the publications on the topic of the lesson in dental journals, including «The Stomatologist».

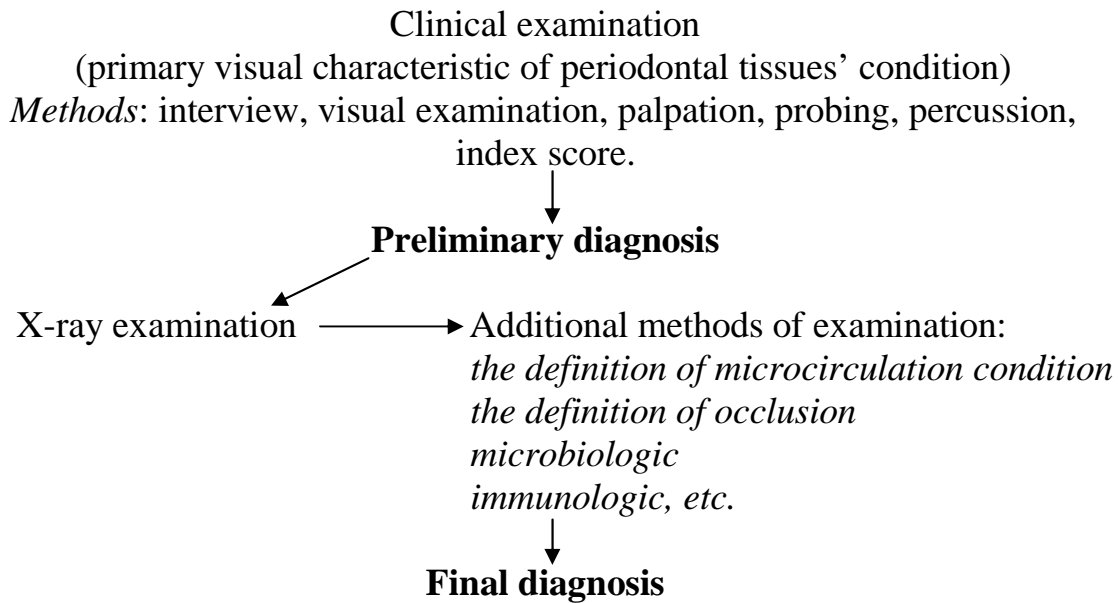
**Educational Materials**

**Determination of the Periodontal Tissues Condition in Normal Status and in Chronic Inflammation**

<b>Estimated criteria of periodontal tissues' condition</b>	<b>The means and conditions of examination</b>	<b>Normal condition</b>	<b>Gingivitis</b>	<b>Periodontitis</b>
<i>Condition of the gingiva</i>	The survey is conducted in artificial light with the help of dental mirrors			
Color	Visual examination	From pale pink to coral	From mild hyperemia to bluish tint	From dark red to blue-red
Surface	Visual examination	Slightly uneven, like the surface of citrus	Smooth, shiny	Various alteration
Contour	Visual examination	Pointed interdental papillae	The tops of the papillae are rounded, edematous	The tops of the papillae are rounded, the gums are smooth and shiny

<b>Estimated criteria of periodontal tissues' condition</b>	<b>The means and conditions of examination</b>	<b>Normal condition</b>	<b>Gingivitis</b>	<b>Periodontitis</b>
Consistency	Palpation	Dense	Pastose	Loose
Bleeding	Probing	Absent	Various levels of bleeding	Various levels of bleeding
<i>Condition of the dento-gingival junction</i>				
Safety localization probing depth	Probing	The integrity of the periodontal connection is saved, localized at the enamel-cementum border, the probing depth is up to 3.5 mm	There is no infraction of integrity and modification of the periodontal connection, the probing depth can be more than 3.5 mm with hyperplastic gingivitis form	The localization is changed, the probing depth is more than 3.5 mm
<i>Condition of the periodontal ligament and alveolar bone</i>				
Migration of teeth	Visual examination	Absent	Absent	Is typical for complex periodontitis
Tooth mobility	Palpation	Absent	Absent	Is typical
The level of destruction	X-ray examination	No destruction	No destruction	Is typical (from destruction of the integrity of the interdental septa to the destruction of $\frac{2}{3}$ of the length of the root and more)
<i>Condition of the microcirculation</i>	Vacuum examination	The time of formation of a hematoma in the area of the lower central teeth is 50 seconds and more. PBCI = 0,8–1,0	The time of formation a hematoma in the area of the lower central teeth is 40–30 seconds. PBCI = 0,5–0,7	The time of formation of a hematoma in the area of the lower central teeth is 30 seconds and less. PBCI = 0,5 and less

## Diagnosis of the periodontal tissues pathology



### Tasks for the Students' Individual Work.

For a complete learning of the topic of this lesson the students must study the lecture material "Periodontal diseases: theoretical aspects" (4<sup>th</sup> year, 7<sup>th</sup> semester) and the recommended literature. During the practical part of the lesson, the students must treat patients under the supervision of the tutor. Patients' examination is conducted by using the standard technique. The student must pay a special attention to the periodontal examination. The student must be able to estimate the periodontal tissues condition and to describe it. The student must prove a verbal description by the PMA, GI and PI indices.

### Self-Testing of the Topic Consolidation

#### Case-studies

**Case-study No 1.** Patient A., 15 years old. The doctor paid attention to the condition of the gums during the primary visual characteristics of the periodontal tissues (hyperemia, edema, bleeding during probing, changing of the gingival contour) and made a preliminary diagnosis of periodontitis.

*What else should be estimated and described for the statement of the diagnosis?*

**Case-study No 2.** Patient B., 19 years old, presented with complaints of «increasing» crowns of 1.3, 2.3 teeth, pain in the cervical area of the teeth while toothbrushing and eating.

*Objectively*: displacement of the gingiva in the apical direction.  
OHI-S = 0,6.

*What is the preliminary diagnosis?*



- c) in the furcation area;
- d) presents all over the tooth root.

**11. A narrow split-like space between the tooth and the gingiva located from the margin of the free gingiva to the epithelium connection is called gingival \_\_\_\_\_**

**12. The part of the chewing mucous membrane of the mouth covering the alveolar bone and the cervical part of the tooth is called \_\_\_\_\_**

**13. The part of the gingival tissue that extends above the crown of the tooth and fills the space between the contact surfaces of teeth is called \_\_\_\_\_ gingiva.**

**14. Unattached gingiva 0.5-1.5 mm in wide which forms a soft wall of the gingival sulcus and includes the interdental and coronal parts is called \_\_\_\_\_ gingiva.**

**15. The stationary part of the gingiva located between the free gingiva and the mucogingival connection is called \_\_\_\_\_ gingiva.**

**16. Indicate the type of the gingival epithelium: (1 correct answer)**

- a) attached;            b) free;            c) marginal;            d) basal.

**17. What is the distance between the top of the alveolar ridge and the cemento-enamel junction in the healthy periodontal tissues (mm)? (1 correct answer)**

- a) 1,0–1,5;    b) 0,015–0,05;    c) 0,001–0,0015;    d) 0,1–0,5.

**18. Where is the acellular cementum localized? (1 correct answer)**

- a) in the coronal part of the root;
- b) in the furcation area of the tooth;
- c) in the the area of the root apex;
- d) in the median and apical areas of the root.

#### LITERATURE

1. *Birnbaum, W.* Oral Diagnosis. The Clinical's Guide / W. Birnbaum, S. M. Dunne. Oxford, 2002. P. 90–94.
2. *Carranza, F. A.* Carranza's Clinical Periodontology / F. A. Carranza. 11<sup>th</sup> ed. Saunders Elsevier, 2012. 825 p.
3. *Egelberg, J.* Periodontal examination / J. Egelberg, A. Badersten. Copenhagen : Munksgaard, 1994. 85 p.
4. *Lindhe, J.* Clinical Periodontology and Implant Dentistry / J. Lindhe. 4<sup>th</sup> ed. Blackwell Munksgaard, 2003. 1044 p.
5. *Mueller, H. P.* Periodontology. The Essentials / H. P. Mueller. Thieme, 2004. 188 p.
6. *Perry, D. A.* Periodontology for the dental hygienist / D. A. Perry, P. Beemsterboer. 3<sup>rd</sup> ed. St. Louis, Mo. : Saunders Elsevier, 2007. 484 p.
7. *Schluger, S.* Periodontal diseases : basic phenomena, clinical management and occlusal and restorative interrelationships / S. Schluger, R. Yuodelis, R. C. Page. 2<sup>nd</sup> ed. Philadelphia : Lea & Febiger, 1990. 759 p.
8. Publications on the topic of the lesson in dental journals, including «The Stomatologist».



**ANNOTATION TO THE PRACTICAL LESSON ON THE TOPIC  
«PERIODONTAL TISSUES, DETERMINATION OF THEIR STATUS»**

1. Classification of the periodontal diseases (Prof. L. N. Dedova. 2012, WHO. 1995).
2. Terminology in Periodontology.
3. Characteristics of healthy periodontal tissues.
4. Biological system of the periodontal tissues.
5. Microcirculation in the periodontal tissues in the normal and the pathological conditions.
6. X-ray characteristics of the alveolar bone in the normal condition.

**1. Classification of the periodontal diseases (Prof. L. N. Dedova. 2012, WHO. 1995).**

*Classification of the periodontal diseases* (prof. L. N. Dedova. 2012)

<b>1. Gingivitis (K 05)</b>				
<b>1.1 Clinical course</b>	<b>1.2 Form</b>	<b>1.3 Stage</b>	<b>1.4 Prevalence rate</b>	<b>1.5 Severity</b>
1.1.1 acute (K05.0)	1.2.1 simple marginal (K05.10)	1.3.1 initial	1.4.1 localized	1.5.1 slight
1.1.2 chronic (K05.1)	1.2.2 ulcerative (K05.12)	1.3.2 early	1.4.2 generalized	1.5.2 moderate
1.1.3 recurrent	1.2.3 hyperplastic (K05.11)	1.3.3 developed		1.5.3 severe
1.1.4 progressive	1.2.4 symptomatic (K05.13, K05.08, K05.18, K069.1, B00.2)			
1.1.5 reversible				
<b>2. Periodontitis (K 05)</b>				
<b>2.1 Clinical course</b>	<b>2.2 Form</b>	<b>2.3 Prevalence rate</b>	<b>2.4 Severity</b>	
2.1.1 acute (K05.2)	2.2.1 simple	2.3.1 localized	2.4.1 slight	
2.1.2 chronic (K05.3)	2.2.2 complex	2.3.2 generalized	2.4.2 moderate	
2.1.3 exacerbation of the chronic course, including abscess (K05.20, K05.21)	2.2.3 symptomatic (K05.38, K05.39, K05.5)		2.4.3 severe	
2.1.4 rapidly progressive (K05.4)				
2.1.5 remission				
<b>3. Endoperiodontitis</b>				
<b>3.1 Clinical course</b>	<b>3.2 Form</b>	<b>3.3 Prevalence rate</b>	<b>3.4 Severity</b>	
3.1.1 acute	3.2.1 simple	3.3.1 localized	3.4.1 slight	
3.1.2 chronic	3.2.2 complex		3.4.2 moderate	
3.1.3 exacerbation of the chronic course, including abscess	3.2.3 symptomatic		3.4.3 severe	
3.1.4 remission				
<b>4. Gingival recession (K 06.0)</b>				
<b>4.1 Form</b>	<b>4.2 Prevalence rate</b>		<b>4.3 Severity</b>	
4.1.1 anatomical (K 06.2)	4.2.1 localized		4.3.1 slight	
4.1.2 physiologic	4.2.2 generalized		4.3.2 moderate	
4.1.3 symptomatic (K 05)			4.3.3 severe	

<b>5. Periodontal atrophy (K 05.5)</b>		
<b>5.1 Form</b>	<b>5.2. Prevalence rate</b>	<b>5.3 Severity</b>
5.1.1 physiologic 5.1.2 symptomatic (Q67.4, K07, K06.1)	5.2.1 generalized	5.3.1 slight 5.3.2 moderate 5.3.3 severe
<b>6. Gingival hypertrophy</b>		
<b>6.1 Form</b>	<b>6.2 Prevalence rate</b>	
6.1.1 fibromatosis 6.1.2 other gingival hypertrophy	6.2.1 localized 6.2.2 generalized	

*Classification of the periodontal diseases (WHO, 1995)*

**K05 GINGIVITIS AND PERIODONTAL DISEASES**

*Includes: disease of edentulous alveolar ridge*

**K05.0 Acute gingivitis**

*Excludes: acute pericoronitis (K05.22)*

*acute necrotizing ulcerative gingivitis [fusospirochaetal gingivitis] [Vincent's gingivitis] (A69.10)*

*herpesviral gingivostomatitis (B00.2X)*

K05.00 Acute streptococcal gingivostomatitis

K05.08 Other specified acute gingivitis

K05.09 Acute gingivitis, unspecified

**K05.1 Chronic gingivitis**

K05.10 Simple marginal

K05.11 Hyperplastic

K05.12 Ulcerative

*Excludes: necrotizing ulcerative gingivitis (A69.10)*

K05.13 Desquamative

K05.18 Other specified chronic gingivitis

K05.19 Chronic gingivitis, unspecified ICD-DA

**K05.2 Acute periodontitis**

K05.20 Periodontal abscess [parodontal abscess] of gingival origin without sinus

Periodontal abscess of gingival origin with no reference to sinus

*Excludes: acute apical periodontitis of pulpal origin (K04.4) acute periapical abscess of pulpal origin (K04.6, K04.7)*

K05.21 Periodontal abscess [parodontal abscess] of gingival origin with sinus

*Excludes: acute apical periodontitis of pulpal origin (K04.4) acute periapical abscess of pulpal origin (K04.6, K04.7)*

K05.22 Acute pericoronitis

K05.28 Other specified acute periodontitis

K05.29 Acute periodontitis, unspecified

**K05.3 Chronic periodontitis**

K05.30 Simplex

K05.31 Complex

K05.32 Chronic pericoronitis

K05.33 Thickened follicle

K05.38 Other specified chronic periodontitis

K05.39 Chronic periodontitis, unspecified

**K05.4 Periodontosis**

Juvenile periodontosis

**K05.5 Other periodontal diseases**

**K06 OTHER DISORDERS OF GINGIVA AND EDENTULOUS ALVEOLAR RIDGE**

*Excludes:* atrophy of edentulous alveolar ridge (K08.2)  
gingivitis (K05.0, K05.1)

**K06.0 Gingival recession**

*Includes:* postinfective  
postoperative

K06.00 Localized

K06.01 Generalized

K06.09 Gingival recession, unspecified

**K06.1 Gingival enlargement**

*Includes:* tuberosity

K06.10 Gingival fibromatosis

K06.18 Other specified gingival enlargement

K06.19 Gingival enlargement, unspecified

**K06.2 Gingival and edentulous alveolar ridge lesions associated with trauma**

K06.20 Due to traumatic occlusion

K06.21 Due to toothbrushing

K06.22 Frictional [functional] keratosis

K06.23 Irritative hyperplasia [denture hyperplasia]

K06.28 Other specified gingival and edentulous alveolar ridge lesions associated with trauma

K06.29 Unspecified gingival and edentulous alveolar ridge lesions associated with trauma

**K06.8 Other specified disorders of gingiva and edentulous alveolar ridge**

K06.80 Gingival cyst of adult

*Excludes:* gingival cyst of newborn (K09.82)

K06.81 Peripheral giant cell granuloma [giant cell epulis]

K06.82 Fibrous epulis

K06.83 Pyogenic granuloma

*Excludes:* pyogenic granuloma of site other than gingiva or edentulous alveolar ridge (K13.40)

K06.84 Flabby ridge

K06.88 Other

## **K06.9 Disorder of gingiva and edentulous alveolar ridge, unspecified**

### **2. Terminology in Periodontology**

**Gingiva** is a part of the chewable mucosa of the oral cavity, covering the alveolar ridge and the cervical part of the tooth.

**Gingival sulcus** is a gap between the teeth and the gingiva, located from the epithelial attachment to the margin of the gingiva. Histological width is 0.15 mm, the clinical depth is 0.5–3.0 mm.

**Crevicular fluid** is an exudate, which is located in the gingival sulcus. There is a small amount of the crevicular fluid in a healthy gingiva.

**Periodontal ligament** is a dense connective tissue surrounding the roots of the teeth located between the cementum and the alveolar bone, extending from the crown of the tooth to the alveolar ridge. It retreats from the cementoenamel junction by 1.0–1.5 mm in the apical direction. The width of the ligament is 0.2–0.5 mm.

**Mucogingival connection** is a clinically distinguishable line between the gingiva and the mucosa of the alveolar ridge.

**Interdental bone** is located apically from the cementoenamel junction on 1.0–1.5 mm. The main function of bone is to hold the teeth in the jaw. At the anterior area the ridges of the bone are spinous, in the posterior area they are trapezoidal. Alveolar bone consists of the spongy substance and the cortical bone.

**Dental cementum** is a solid-state connective tissue, into which Sharpey's fibers are woven. It covers the dentine of the root. The dental cementum consists of 40–60 % of inorganic substances (hydroxyapatite). The thickness of the cementum is from 0.1 mm to 1.0 mm. In the area of the cementoenamel junction cementum is cell-free. There are lacunae in the dental cementum, where the bacteria exist.

**Dental plaque** is a specific formation, different in its structure caused by the accumulation and the growth of the microorganisms on the tooth surfaces, consisting of numerous species and strains of the microbes, spreading to the growth zone of the tooth.

**Periodontium** is a single complex of nearby tissues, supporting the tooth, associated in its development, topography and function. The periodontal tissues: gingiva, periodontal ligament, alveolar bone and dental cementum.

**Gingivitis** is an inflammation of the gingiva, caused by the influence of general and local factors and passing without impairment of the periodontal attachment.

**Periodontitis** is an inflammation of the periodontal tissues, maintained by the destruction of the periodontal ligament and the bone.

**Endoperiodontitis** is a combined endodontic-periodontal lesion, which is associated with the inflammatory and destructive changes in the periodontium.

**Gingival recession** is an apical migration of the gingiva along the tooth root, which leads to its exposure.

**Periodontal atrophy** is a decrease in the size of gingiva and alveolar bone without visible inflammation, accompanied by the apical movement of the gingival margin without formation of dental pockets.

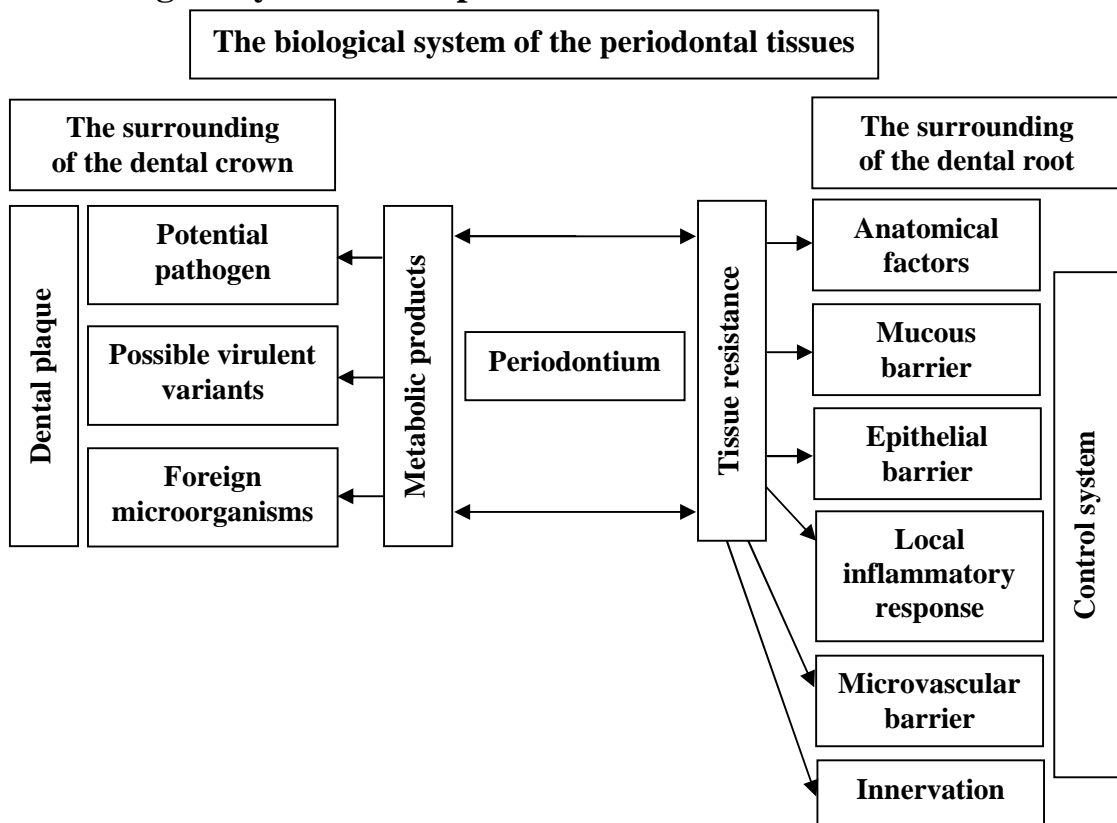
**Clinical periodontal pocket** is a state of periodontium, diagnosed with slight probing, when the probing depth of the gingival margin exceeds 3 mm.

**Pathological periodontal pocket** is a pathologically modified gingival sulcus, lined with the epithelium of the gingival pocket. There are gingival and periodontal pathological periodontal pockets.

### 3. Characteristics of healthy periodontal tissues.

The normal color of the gingiva may be from pale pink to coral. The surface of the gingiva is slightly tuberous, as a lemon crust. The contour of the gingiva: the interdental papillae are acuminate. Gingiva has a firm texture. Probing depth of the gingival sulcus is not more than 3 mm in the normal state, the epithelial junction is not destroyed. There is no gingival bleeding on probing in the normal state. The score of the gingival index (GI) is not more than 0.8.

### 4. Biological system of the periodontal tissues



***The surrounding of the dental crown.*** Healthy gingiva is covered with a thin layer of the dental plaque, consisting of several layers of the cells. Among them, about 75 % are gram-positive aerobic cocci and bacilli. These are nonpathogenic microorganisms. The anaerobic flora is represented by anaerobic gram-positive and gram-negative flora: Streptococci, Micrococci, Lactobacilli, Actinomycetes, Veillonella, Bacteroides, Fusobacteria, etc. Black Bacteroides, Actinobacilli and some Treponemas are pathogenic microorganisms. They are involved in the damage of the periodontal tissues. The amount of gram-negative anaerobes increases with the increase of the dental plaque that may cause inflammation in the gingiva.

#### ***The surrounding of the dental root***

1. ***Anatomical barrier.*** Despite the fact that periodontal tissues have a different structure, they form a single anatomical and functional complex. The probability of a breakdown of the barrier is evident in the case of accumulation of the dental plaque in the areas, where the connection between the periodontal tissues is weakened. This may lead to the beginning of the illness.

2. ***Mucous barrier.*** Saliva is a barrier to infection. It surrounds the flora of the oral cavity and controls its growth. However, getting into the risk areas, saliva can be a substrate for dental plaque.

3. ***Epithelial barrier.*** Any irritation of the gingiva leads to the thickening of the epithelium and to an increase in the speed of cell differentiation. The nonkeratinous epithelium of the sulcus can be easily damaged, contributing to the penetration of the microflora in the subjacent tissues.

4. ***Microvascular barrier.*** The state of the microcirculation depends on the integral status of all systems of the body. Microcirculatory section is a preclinical informer of the pathological process, which is one of the initiators of the imbalance in the surrounding of the tooth root.

#### **5. Microcirculation in the periodontal tissues in the normal and pathological conditions**

There is a correlation between the state of microcirculation in the periodontal tissues and an active inflammation. To determine the condition of blood circulation in the periodontal tissues dentists use a capillaroscopic and a reoperiodontographic, bio- and microscopic examinations, laser and optical diagnosis, supersonic and laser Doppler imaging.

***Vacuum test to determine the resistance of gingival capillaries (V. I. Kulagenko, 1960).*** Dentists judge about the capillary resistance of the gingiva to the effects of the local vacuum according to the time of the formation of the vacuum blood hematoma on the mucosa of the alveolar bone. In a normal state the time of the formation of a vacuum hematoma in the lower central incisors area is about 50–80 seconds, in the area of the premolars it is 60–90 seconds, and in the molar region it is 60–100 seconds.

*Peripheral blood circulation index (L. N. Dedova, 1981).* Dentists take into an account the indicant of the gingival capillaries resistance and the indicators of hematoma resorption time. In a normal state, peripheral blood circulation index is 0,8–1,0 (80–100 %).

#### **6. X-ray characteristics of the alveolar bone in the normal condition.**

The X-ray examination is necessary to determine the status of the interalveolar bone and its involvement in the pathological process. It is necessary to note the following:

- looping of the osseous structure;
- the presence of the compact lamina;
- the height of the top of the alveolar crest related to the length of the tooth;
- the presence of osteoporosis of the interalveolar septum;
- the state of the periodontal ligament area;
- the state of the periodontal tissues and the dental root;
- the presence of the vertical and angular resorption.

There is no resorption of the bone tissue of the alveolar ridge in the normal state, the compact lamina of the bone tissue remains unchanged.

## Topic «EXAMINATION PLAN OF PATIENTS WITH PERIODONTAL DISEASES»

**Motivational Characteristics.** The aim of the examination of patients with periodontal diseases is to determine the type, the form and the severity of the disease, to reveal its development characteristics, general and local etiological and pathogenetic factors of the disease. The most substantial information allows to make the correct diagnosis and to carry out the appropriate treatment.

### **Aims of the Lesson**

**Didactic:** to motivate students as to the necessity of the thorough patient's examination in case of periodontal diseases.

**Methodical:** to teach students the order of the examination of patients with periodontal diseases.

**Scientific:** to teach students to explain the collected data scientifically, to develop the skills of comparing the collected data for making a correct explanation of the origin of the periodontal diseases.

### **Goals of the Lesson:**

<b>On completing the lesson the students MUST KNOW</b>	<b>On completing the lesson the students MUST BE ABLE</b>
1. Characteristics of the stages of examining the patients with periodontal diseases (anamnesis, complaints, oral cavity status, initial visual characteristics of the periodontal tissues, X-ray diagnosis).	1. To choose the necessary communication pattern for the current periodontal patient.* 2. To make a scheme of examining a patient with periodontal disease.* 3. To examine and interpret the following collected data on their own: – oral hygiene level (OHI-S, Fedorov–Volodkina index, PHP); – the level of gingiva involvement in the pathological process (bleeding index WHO, 1980 and Koethe, 1960).

\* Manipulation 1 and 2 in the column «MUST BE ABLE» is included into the list of practical skills performed assisted by the instructor.

### **Requirements for the Initial Level of Knowledge:**

1. Oral hygiene indices.
2. The connection between the oral hygiene status and the pathological process in the periodontal tissues.
3. Clinical signs of the gingival inflammation.
4. The definition of the gingival groove, gingival pocket, gingival recession and the tooth mobility.
5. Indices for the evaluation of the periodontal tissues condition.



### **Control Questions from the Related Disciplines:**

1. Anatomical and histological features of the periodontal tissue structure.
2. The pathogenesis of the inflammation.
3. Morphological changes in the periodontal tissues during the inflammation.
4. X-ray diagnosis of the teeth and jaws:
  - X-ray anatomy of the teeth and jaws;
  - X-ray methods of the teeth and jaws examination.
5. Ethics and deontology in the examination of a dental patient.

### **Control Questions on the Topic of the Lesson:**

1. The sequence of the examination of a patient with periodontal diseases during the 1<sup>st</sup> visit:
  - acquaintance with the patient;
  - the patient's medical history;
  - the patient's social history;
  - complaints;
  - anamnesis of the present illness;
  - oral cavity status;
  - initial visual characteristics of the periodontium (principles, aims, tasks);
  - initial diagnosis;
  - X-ray diagnosis as an obligatory examination method for periodontal diseases.
2. The sequence of examination of the patient with periodontal disease during the 2<sup>nd</sup> visit:
  - oral hygiene evaluation in dynamics;
  - detailed examination of the periodontium (aim, sequence, characteristics of steps):
    - determination of the level of the gingiva involvement into the pathological process;
    - determination of the level of the epithelium junction loss and the level of the alveolar bone destruction;
    - determination of the microcirculation status.
3. Comparison of the X-ray and the clinical data received during the periodontal tissue examination.
4. First-priority and supplementary diagnostic tests.
5. The choice of the diagnostic methods, used for the examination of the periodontal patient in order to make the final diagnosis.
6. Discussion of the publications on the topic of the lesson in dental journals, including «The Stomatologist».

## Educational Materials

### The Recommended Scheme of Directed Actions for Examination of a Patient with Periodontal Disease

Steps	Tools and conditions	Self-control criteria
1. Acquaintance with the patient		Determination of the patient's psychological condition, selection of the necessary communication pattern
2. The patient's medical history	Dental History	Attentive attitude to a patient
3. The patient's social history	Dental History	Revealing bad habits, level of the oral hygiene knowledge, oral hygiene habits
4. Complaints, anamnesis of the present illness	Dental History	Appearance of the first signs of the disease, their development, frequency of recurrences. Periodontal treatment received (if any), its results
5. Oral cavity status	Dental mirror, probe	Hygiene, halitosis, saliva, lips. Oral mucosa: commissures, cheeks, tongue-throat area, palate, oral surface of maxillary gingiva, upper and lower surface of the tongue, floor of the oral cavity. Oral surface of mandibular gingiva, vestibule of the mouth. Examination of the teeth pathological migration, determination of occlusal contacts
6. Initial visual characteristics of the periodontium	Dental mirror, probe	Color, consistency, size, gingival surface, bleeding, condition of the epithelium junction
7. Initial diagnosis	Dental History	Data of the interview and medical visual examination
8. X-ray diagnosis	X-ray room	X-rays of teeth and jaws, method of the X-ray diagnosis, X-ray interpretation
9. Detailed examination of the periodontium	Apparatus for the vacuum-diagnosis, periodontal probe, panoramic X-ray	Determination of the oral hygiene level, the level of the gingiva involvement into the pathological process, the level of the periodontal tissues destruction, condition of the microcirculation, occlusal trauma
10. Laboratory diagnosis	Instruments for taking the material, the glass, test tubes with culture medium	Biochemical and clinical signs of blood and saliva. Cytological, histological and microbiological methods

**Tasks for the Students' Individual Work.** In order to get the information of the current lesson the student should learn the material of the lecture and the recommended literature, revise the material from the fields of the adjacent subjects. The student should know the sequence of the dental patient's examination and should know how to fill in medical documentation and to prove the necessity of making additional tests and consulting other specialists.

### **Self-Testing of the Topic Consolidation**

#### ***Case-studies***

**Case-study No 1.** Patient A., 21 years old, came for an oral cavity sanitation. The patient brushed his teeth irregularly.

*Objectively:* external examination was without distinctive features, oral cavity mucosa did not contain any pathological elements. The bite was orthognatic, labial and tongue frena had a normal position. There was a defected filling, partly hanging over the interdental space on the distal-occlusal-mesial surfaces of 3.6 tooth. The gingival margin around 3.6 and 3.5 teeth was swollen, bright red, intensively bled on probing. Probing depth around 4.6 tooth was less than 3 mm. There was a great amount of dental plaque on the teeth.

*Is this data sufficient for making the final diagnosis?*

**Case-study No 2.** Patient B., 35 years old, complained of the gingiva bleeding and tenderness of the gingiva during tooth brushing and consumption of firm food, halitosis. These complaints had been present for 1.5–2 years. The patient had never visited the periodontist.

*Which examination methods are you going to use during his 1<sup>st</sup> visit?*

**Case-study No 3.** Patient C., 44 years old, complained of carious lesion in 4.6 tooth and food stagnation in the cavity.

*Anamnesis data:* periodically patient suffered from the gingiva bleeding on toothbrushing and tooth sensitivity to cold irritants. The last visit to the dentist occurred 2 years ago. The patient was aware of the reasons of his gingiva condition, but had never undergone periodontal treatment. The patient brushed his teeth once a day after meal, he used different toothpastes and smoked.

*Examination data:* face configuration, skin and mucosa color corresponded to the norm. Lymphatic nodes were not enlarged, not painful. Oral mucosa was pale, wet, without pathological signs. There were Class I and Class II cavities, dental plaque and calculus below and above gingiva. Tooth necks were bared, gingiva had a cyanotic tint. Serous-purulent discharge occurred on palpation.

*What disease can you suggest? Which methods is it necessary to apply to make the examination of the patient's health more thoroughly?*

**Case-study No 4.** Patient D., 22 years old. The visit to the dentist was caused by complaints of gingiva bleeding during tooth brushing and an unpleasant taste in the mouth after night. Bleeding had been causing discomfort over the last year. The patient's oral hygiene education was poor.

*Make a plan of the patient's examination.*

**Case-study No 5.** Patient E., 42 years old, applied to the dentist with complaints of a toothache. The examination revealed significant dental plaque and calculus below and above gingiva, gum bleeding and tooth mobility. The dentist rendered the patient first aid and sent him for an X-ray.

*Which additional diagnostic methods is it necessary to apply to determine the periodontal tissues condition and to make a correct diagnosis?*

**Case-study No 6.** Patient T., 35 years, complained of gum bleeding during toothbrushing and spontaneously, discomfort and burning sensation in gum when eating, a flash painful feeling under the exposure of cold irritants.

*Anamnesis:* the previous visit to a dentist occurred more than 5 years ago, the patient had never undergone professional oral hygiene. The level of his hygienic skills is low. The patient had never been taught how to maintain oral hygiene. Gingival bleeding occurred 3–4 times per year. In these cases the patient carried out self-treatment with herbal solutions rinsing.

*Data of visual examination:* plentiful plaque, swollen gingiva bleeding on probing, gingival papillae were separated from the tooth surface under the exposure of an air stream.

*Suggest the doctor's tactics to make a correct diagnosis.*

## TEST QUESTIONS

**1. Choose the correct sequence of the diagnostic procedures in case of periodontal diseases: (1 correct answer)**

- a) acquaintance with the patient;
  - b) initial visual characteristics of the periodontium;
  - c) the patient's medical and social history;
  - d) oral cavity status;
  - e) detailed examination of the periodontium;
  - f) X-ray diagnosis;
  - g) laboratory tests.
- 1) a, b, c, d, e, f, g;
  - 2) a, c, b, d, e, f, g;
  - 3) a, c, d, b, f, e, g;
  - 4) a, c, d, b, e, f, g.

**2. The preliminary diagnosis of the periodontal disease is determined after: (1 correct answer)**

- a) an interview;
- b) an interview, a medical visual examination, a visual evaluation of the periodontal tissues condition;
- c) an interview, a medical visual examination, an X-ray diagnosis;
- d) an interview, a medical visual examination, a detailed examination of the periodontium.

**3. When is the oral hygiene level determined?** (1 correct answer)

- a) during the visual examination of the dentition;
- b) during the visual examination of the oral cavity;
- c) during the index evaluation;
- d) during the coloration of the dental plaque.

**4. Why is the index evaluation of the periodontal tissue condition held?**

(1 correct answer)

- a) to determine the oral cavity status;
- b) to make a preliminary diagnosis;
- c) to determine the level of the periodontal tissue involvement into the pathological process;
- d) to make a differential diagnosis.

**5. When should the risk factors of the periodontal diseases be revealed?** (1 correct answer)

- a) during the 1<sup>st</sup> step of the examination;
- b) during the X-ray diagnosis;
- c) during the 2<sup>nd</sup> step of the examination;
- d) during the laboratory diagnosis.

**6. It is necessary to reveal bad habits in:** (1 correct answer)

- a) young-aged patients;
- b) patients with plentiful dental plaque;
- c) all patients necessarily;
- d) patients with systemic diseases.

**7. What is the plan of the examination of a patient with periodontal diseases?** (1 correct answer)

- a) a standard scheme of the dental patient's examination;
- b) an individualized scheme of a diagnostic investigation, aimed at revealing the suspected periodontal diseases;
- c) a complex of the diagnostic methods;
- d) a sequence of the diagnostic methods.

**8. How is the examination of a patient with periodontal disease usually carried on?** (1 correct answer)

- a) in one phase;
- b) in several phases;
- c) during the 1<sup>st</sup> visit;
- d) during all the visits of the patient.

**9. Consultation of the endocrinologist is obligatory when the patient is revealed:** (1 correct answer)

- a) a great amount of the dental plaque;
- b) an increase in the gingival size;
- c) dryness in the mouth, gingival and periodontal abscesses;
- d) an increased tooth sensitivity.

**10. Determine the sequence of the 1<sup>st</sup> phase of the examination of a patient with periodontal disease: (1 correct answer)**

- a) acquaintance with the patient;
  - b) the patient's social history;
  - c) complaints, the history of the present illness;
  - d) oral cavity status;
  - e) initial visual characteristics of the periodontium;
  - f) detailed examination of the periodontium.
- 1) a, b, c;
  - 2) a, b, c, d;
  - 3) a, b, c, d, e;
  - 4) a, b, c, d, e, f.

**11. What is revealed during the detailed examination of the periodontal tissues condition? (1 correct answer)**

- a) the presence of the gingival inflammation;
- b) the presence of the tooth mobility;
- c) the presence of the tooth roots exposure;
- d) the level of the periodontal tissues involvement into the pathological process.

**12. The depth of the periodontal pocket must be probed: (1 correct answer)**

- a) on the vestibular surface of a tooth;
- b) on the oral surface of a tooth;
- c) on the proximal surfaces of a tooth;
- d) on all tooth surfaces.

**13. The hematologist's consultation in a case of the revealing gingival ulcers, gum bleeding and hyperplasia is: (1 correct answer)**

- a) planned;
- b) not planned;
- c) planned only for patients under 35 years old;
- d) planned only for patients older than 65 years.

**14. What is it necessary to do to confirm the diagnosis «symptomatic gingivitis»? (1 correct answer)**

- a) to question the patient thoroughly;
- b) to carry out a thorough medical visual examination;
- c) to carry out additional diagnostic procedures;
- d) to prescribe the consultation of an appropriate general practitioner.

**15. What probe should be used to determine the furcation involvement into the pathological process? (1 correct answer)**

- a) a straight probe;
- b) an angular probe;
- c) a bent Nabers probe;
- d) a buttoned probe.

**16. What time period is needed to determine gum bleeding on probing?**  
(1 correct answer)

- a) 10 seconds;      b) 20 seconds;      c) 30 seconds;      d) 60 seconds.

**17. What are clinical signs of the occlusal trauma?** (1 correct answer)

- a) food debris;  
b) cheek biting;  
c) gum bleeding;  
d) dentine sensitivity on the occlusal surface of the premolars and molars;  
e) ulcerous lesions of the gingiva;  
f) hyperplasia of the gingiva.

1) a, c, e;

2) a, b, c, e;

3) a, b, d, f;

4) a, b, c, d, e, f.

**18. What are the X-ray signs of an occlusal trauma?** (1 correct answer)

a) dilatation of the space of the periodontal ligament with thickening of the compact plates along the lateral wall of the root, its apical and furcation zone;

b) horizontal resorption of the intraalveolar bone with the development of a suprabony pocket;

c) vertical resorption of the intraalveolar bone with the development of an intrabony pocket;

d) X-ray contrast and density of the alveolar bone;

e) osteoporosis of the intraalveolar bone and the body of the maxilla/mandible.

1) a, b, d;

2) a, b, e;

3) a, c, d;

4) a, c, e.

**19. What is the maximum pressure, that should be used for probing the gingival sulcus?** (1 correct answer)

- a) 10 g;      b) 20 g;      c) 30 g;      d) 40 g.

**20. What index is used for the evaluation of the bleeding intensity?**  
(1 correct answer)

a) Green–Vermilion index;

b) Koethe index;

c) Russel index;

d) Loe–Silness index.

**21. Indicate the sequence of stages for the determination of the oral cavity status during the examination of a patient with periodontal disease:**

*(1 correct answer)*

- a) bad breath;
- b) teeth;
- c) architectonics of the vestibulum;
- d) saliva;
- e) oral hygiene;
- f) mucous membrane of the oral cavity.

1) a, b, c, d, f, e;

2) e, a, d, f, c, b;

3) c, b, a, d, f, e.

**22. Gum inflammation due to the adverse effects of general and local factors, without abnormality of the periodontal attachment integrity, is called \_\_\_\_\_**

**23. Indicate the sequence of the detailed examination of the periodontal tissues in patients with periodontal disease:** *(1 correct answer)*

- a) level of the gum involvement into the pathological process;
- b) level of periodontal tissues destruction, the presence of periodontal pockets;

c) presence of the supragingival and subgingival calculus;

d) state of microcirculation in the periodontium;

e) trauma from occlusion;

f) level of alveolar bone destruction.

1) a, b, c, d, f, e;

2) c, a, b, f, e, d;

3) c, b, a, d, f, e.

**24. Indicate the sequence of dental examination of patients with periodontal disease:** *(1 correct answer)*

a) dentine sensitivity;

b) number of lost teeth and the causes of their loss;

c) pathological migration of teeth;

d) status of teeth contact points;

e) examination of occlusion.

1) a, b, c, d, f, e;

2) b, a, d, f, c, e;

3) c, b, a, d, f, e.

**25. Which method allows to reveal tooth mobility?** *(1 correct answer)*

a) probing;

c) palpation;

b) percussion;

d) radiographic.



**26. What allows to examine the depth of the periodontal pocket?**  
(1 correct answer)

- a) a periodontal probe, a graduated probe;
- b) an angular probe, the test of Shiller–Pisarev;
- c) a periodontal probe, a smoother;
- d) an echoosteometry.

**27. In what directions should the tooth mobility be defined?** (1 correct answer)

- a) in the vestibular-oral direction;
- b) in the medio-distal direction;
- c) in the vertical direction, along the axis of the tooth;
- d) in all directions.

**28. The increase of the gingiva as a result of the quantitative growth of its tissue is called \_\_\_\_\_ gum.**

**29. The inflammation of the periodontal tissues, accompanied by the destruction of the periodontal ligament and bone, leading to the loss of teeth is called \_\_\_\_\_**

**30. The displacement of the gingival margin in the apical direction is called \_\_\_\_\_ gum.**

**31. The localized narrow area of gum recession is called \_\_\_\_\_ of the gum.**

**32. What are the clinical signs of occlusal trauma?** (2 or more correct answers)

- a) tendency to the formation of epulis and the interproximal caries;
- b) bruxism and chewing on the one side;
- c) lack of dentine sensitivity of molars and premolars on the occlusal surfaces and gum hyperplasia;
- d) pathological tooth mobility, apical periodontitis.

**33. How are premature contacts of the teeth revealed?** (2 or more correct answers)

- a) using a wax plate;
- b) it can be heard;
- c) using biauricular stethophonendoscope;
- d) using articulating paper.

**34. What are the factors, affecting the reserve forces of the periodontium?** (2 or more correct answers)

- a) inflammation of the periodontal ligament;
- b) pathological tooth migration;
- c) the patient's gender;
- d) advanced caries.

**35. What are the radiographic signs of the occlusal trauma? (2 or more correct answers)**

- a) horizontal resorption of the inter-alveolar septum;
- b) vertical resorption of inter-alveolar septum with the formation of an intrabony defect;
- c) extension of the periodontal ligament space with the thickening of the compact lamina along the lateral walls of the root, its apical region and in the area of the bifurcation, trifurcation;
- d) root resorption.

**36. What is determined on the X-ray in case of an occlusal trauma? (2 or more correct answers)**

- a) vertical resorption of the inter-alveolar septum with the formation of an intrabony defect;
- b) horizontal resorption of the inter-alveolar septum;
- c) ankylosis;
- d) root resorption.

#### **LITERATURE**

1. *Carranza, F. A.* Carranza's Clinical Periodontology / F. A. Carranza. 11<sup>th</sup> ed. Saunders Elsevier, 2012. 825 p.
2. *Egelberg, J.* Periodontal examination / J. Egelberg, A. Badersten. Copenhagen : Munksgaard, 1994. 85 p.
3. *Lindhe, J.* Clinical Periodontology and Implant Dentistry / J. Lindhe. 4<sup>th</sup> ed. Blackwell Munksgaard, 2003. 1044 p.
4. *Mueller, H. P.* Periodontology. The Essentials / H. P. Mueller. Thieme, 2004. 188 p.
5. *Perry, D. A.* Periodontology for the dental hygienist / D. A. Perry, P. Beemsterboer. 3<sup>rd</sup> ed. St. Louis, Mo. : Saunders Elsevier, 2007. 484 p.
6. *Schluger, S.* Periodontal diseases : basic phenomena, clinical management and occlusal and restorative interrelationships / S. Schluger, R. Yuodelis, R. C. Page. 2<sup>nd</sup> ed. Philadelphia : Lea & Febiger, 1990. 759 p.
7. Publications on the topic of the lesson in dental journals, including «The Stomatologist».

#### **ANNOTATION TO THE PRACTICAL LESSON ON THE TOPIC «EXAMINATION PLAN OF PATIENTS WITH PERIODONTAL DISEASES»**

1. Characteristics of the stages of examining the patients with periodontal diseases (anamnesis, complaints, oral cavity status, initial visual characteristics of the periodontal tissues, X-ray diagnosis).

**Diagnosis of periodontal diseases.** Periodontal diseases are diseases of the tissues adjacent to the tooth, the resulting interaction between local and other factors, characterized by the progression of the process and leading to a total loss of the supporting structures of the tooth.

Periodontal diseases occur with a clearly marked, diverse clinical picture.

Rational treatment of patients with periodontal diseases depends on the detection of the cause and nature of the pathological process, the level and

extent of its development. Therefore, the patient's diagnosis includes examination of his general condition with the definition of the dental status.

At the time of diagnosis It is necessary to answer the following questions:

1. What factors have caused periodontal disease: local or general, or both? Can you explain the inflammation in the gingiva as an inflammation of the local or systemic character?

2. What local factors have caused inflammation or another pathological condition?

3. Are there periodontal pockets? What local factors were they caused by?

4. Is there any occlusal trauma and how can it be confirmed?

5. Is there such an occlusal relationship, that can lead to an occlusal trauma?

Optimal diagnosis can be made in several stages.

### **The first stage**

1. Getting acquainted with the patient.

2. Taking the patient's medical history.

3. Taking the patient's social history.

4. Questioning the patient on his complaints.

5. Assessment of the patient's oral status.

5.1. Hygiene.

5.2. Breath.

5.3. Saliva.

5.4. Lips.

5.5. Oral mucosa.

5.6. Tongue.

5.7. Palate.

5.8. Pharyngeal area.

5.9. Architectonics of the vestibule and the floor of the mouth.

5.10. Examination of the teeth.

5.10.1. Assessment of the number and causes of tooth loss.

5.10.2. Sensitivity of dentine.

5.10.3. Condition of the contact surfaces of the teeth.

5.10.4. Tooth mobility.

5.10.5. Percussion of the tooth.

5.10.6. The presence of pathologic migration of the teeth.

5.10.7. Examination of the occlusal contacts.

6. Primary visual characteristics of the periodontal tissues.

7. Preliminary diagnosis.

8. X-ray examination.

### **The second stage**

9. A detailed examination of the periodontal tissues.

9.1. The presence of the supra- and subgingival dental plaque.

9.2. The level of the gingiva involvement in the pathological process.

9.3. The level of the periodontal tissues destruction, the presence of the periodontal pockets.

9.4. The presence of pus discharge from the periodontal pockets.

9.5. The level of the alveolar bone destruction.

9.6. Trauma from occlusion.

9.7. The state of periodontal microcirculation.

10. Laboratory diagnosis.

The survey consists of several stages of the patient's visits. Usually it is carried out within two visits in order to perform the targeted treatment.

#### **Characteristics of examination methods.**

One of the most important parts of the dentist's work and, especially, that of the periodontist, is performing a thorough dynamic examination of patients, when the objective methods of examination are used along with the traditional ones (taking the patient's history, assessment of the dental status and others).

The majority of modern objective examination methods, applied separately, characterize only one of the pathogenetic elements of periodontal diseases. In order to optimize their use it is necessary to select a complex of the diagnostic tests, available for a mass admission and dynamic observation of patients. Such a complex of the objective tests should characterize the inflammatory process in the gum, condition of peripheral vessels in the periodontal tissues, as well as the changes, occurring in the bone of the alveolar ridge. According to this, it is possible to assess the dynamics of the pathological process and to predict the exacerbation of the disease in due time. Following this, further it is possible to prescribe a proper preventive therapy and at the same time to assess the effectiveness of the applied treatment. It is advisable to use the next diagnostic tests: GI, PMA, CPI, PI, peripheral blood circulation index (PBCI), Schiller–Pisarev test, Svrakov iodine number, gingival recession index, hygienic indices of calculus and plaque, a vacuum test to determine the gum capillary resistance, as well as X-ray diagnosis of the alveolar ridges, probing of dentogingival pockets, microbiological examination of the periodontal pockets, etc.

Among the methods of periodontal tissues assessment the *first-priority* tests are GI, gum capillary resistance assessment, Schiller-Pisarev test, Svrakov iodine number, PMA index, OHI-S, periodontal pockets probing. The *subsidiary tests* are PLI, CPI, PI, gingival recession index, a vacuum test to determine the gum capillary resistance, peripheral blood circulation index (PBCI), X-ray and microbiological examination.

Division of the objective methods into two groups is caused by the necessity of their application in practical health care.

Our experience has shown that it is advisable to apply the first-priority tests during each examination, while the subsidiary tests can be used once a year. Subsidiary tests allow to receive advanced information on the patients periodontal tissues condition, that has to be reflected in the epicrisis. These tests

should be applied in cases, when there are doubts in the results of the objective assessment of the patient's condition.

It is necessary to use the developed mathematical charts of different scores variants for any case index in order to simplify their calculation. In the charts there are index scores from 0 to 1 or from 0 to 100 % if there are between 1 and 32 teeth in the mouth. It is better to do calculation, when there are not less than 16 teeth in the oral cavity. Using these charts, the doctor reduces the time spent on one index score calculation on an average by 2 minutes. It significantly decreases the duration of all the indices calculation by 65.1 %. Thus, the patient's examination requires around 30–35 minutes during the period of the dynamic follow-up. It is advisable to determine 2–3 indices simultaneously, for example, GI, PMA and Schiller-Pisarev test (or Svrakov iodine number).

Our experience testifies that, it is necessary not only to make an examination, but to compare the diagnostic test results efficiently for the most objective assessment of the periodontal tissues condition.

Thus, the vacuum test of the gum capillary resistance reflects informatively the condition of the peripheral vessels, independently from inflammation and gingiva bleeding. There is evidence of appropriateness of this test scores application in combinative comparison with the gum bleeding and a gingival index examination.

It has been estimated that there is inconsistency between the gum capillary resistance scores and the vacuum hematoma resorption time score in  $33.61 \pm 4.33$  % of cases during the study. As a result, a new diagnostic test peripheral blood circulation index (PBCI) has been suggested. It consists of the above mentioned tests in a rational comparison. This index gives the possibility to assess the functional state of the peripheral circulation and the protective periodontium function in numbers (L. N. Dedova, 1981).

Schiller–Pisarev test reflects the gingiva inflammation in  $19.98 \pm 1.35$  % of cases, even when it can not be determined visually. According to this, we recommend to use this test in every oral examination during the dynamic monitoring, regardless of the other tests and to compare this test with the GI and PMA indices scores. Moreover, it has been revealed, that the Schiller–Pisarev's test was positive (in dentition lateral parts) while the Svrakov iodine number had zero scores in  $11.98 \pm 1.10$  % of cases. This indicates that it is necessary to use the Schiller–Pisarev test and the iodine number in combination, or to calculate them for all teeth to receive better information, that characterize the gingiva inflammation.

Furthermore, it has been investigated, that the gingiva recession index increased in 7–12 months after treatment in  $26.71 \pm 3.66$  % of the patients with periodontitis and in 1–2 years in  $16.44 \pm 3.07$  % of the patients. Thus, the gingiva recession index is less variable, therefore it can be defined only once a year.

Hygiene indices scores in patients with periodontitis increase in  $27.97 \pm 1.52$  % of cases, according to the GI and PMA indices scores; in  $34.70 \pm 2.62$  % of cases — with a positive Schiller–Pisarev test and in  $25.34 \pm 1.47$  % of cases — with the low capillary resistance. Due to the fact, that hygiene indices reflect informatively the connection between poor oral hygiene and the gum inflammation, they should be used in every follow-up examination of the patient.

A rational comparison of the objective tests allows to determine the pathological process dynamics and to prognose its aggravation in time, as well as to evaluate the efficacy of the applied treatment. In this case, there is an opportunity to apply curative and preventive measures timely before the evident exacerbation of the pathological process during the dynamic monitoring.

Thus, according to our survey, it was sufficient to carry out another short-term re-treatment course in  $40.98 \pm 1.66$  % of cases or to use only partial curative and preventive measures. In  $11.99 \pm 1.1$  % of case the patients were recommended only to follow a proper oral hygiene before the evident exacerbation of the pathological process began. Good treatment results and a prolonged remission period were obtained both in the first and the second clinical cases.

## **Topic «ADDITIONAL RESEARCH METHODS IN CLINICAL PERIODONTOLOGY»**

**Motivational Characteristics.** Application of the additional research methods is necessary for making the differential diagnosis and determining the level of the pathological process. Application of the most specific and sensitive additional research methods allows to predict the treatment outcome.

### **Aims of the Lesson**

**Didactic:** to learn how to choose the necessary additional research methods for the diagnosis of periodontal diseases.

**Methodical:** to learn how to choose the necessary additional research methods of periodontal diseases, which allow to specify the diagnosis and to make the differential diagnosis.

**Scientific:** to study scientifically-based selection of the additional research methods for making a correct diagnosis and further planning of the rational treatment.

### **Goals of the Lesson:**

<b>On completing the lesson the students MUST KNOW</b>	<b>On completing the lesson the students MUST BE ABLE</b>
1. Indications for application of additional methods to examine periodontal tissues. 2. Laboratory, microbiological, immunological, morphological, biochemical and cytological research. 3. Functional methods: vacuum test to determine gingiva capillaries resistance, vacuum test to determine gingiva capillaries permeability, peripheral blood circulation index, biomicroscopy, dopplerography, laser-optical diagnosis of the periodontal tissues microcirculation.	1. To implement a vacuum test to determine the gingiva capillaries resistance and to determine the peripheral blood circulation index (L.N. Dedova) (assisted by the instructor). 2. To perform vitality pulp test of the teeth with the help of the pulp tester (assisted by the instructor). 3. To fill in a direction for additional diagnostic procedures (without assistance).*

\* Manipulation 3 in the column «MUST BE ABLE» is included into the list of practical skills performed without assistance.

### **Requirements for the Initial Level of Knowledge:**

1. To know the sequence of examining a patient with periodontal disease.
2. To be able to evaluate the examination results.
3. To be able to identify risk factors and pathological situations leading to initiation and development of periodontal diseases.
4. To be able to estimate the oral hygiene status.

5. To be able to estimate the inflammation level using visual and index diagnosis.

6. To be able to estimate the destructive processes degree, using indices and X-ray examinations.

**Control Questions from the Related Disciplines:**

1. Indicators of saliva, gingival fluid and blood in norm and at a pathology.
2. The microflora of the dental plaque.
3. The periodontium morphology in normal and pathological conditions.
4. The features of the periodontal tissues microcirculation.
5. The factors, which affect calcium metabolism in the body.

**Control Questions on the Topic of the Lesson:**

1. Additional research methods of the periodontal tissues biological system.
2. Additional research methods in the anatomical barrier determination:
  - teeth anatomy (shape and length of the roots, the furcation structure, enamel projection);
  - the vestibule of the oral cavity structure;
  - the alveolar ridge structure (the study of the bone tissues metabolism, bone density, alveolar index (J. L. Denisova, 2012));
  - genetic tests.
3. Additional research methods in determination of the epithelial barrier state: periodontal indices, morphological research methods.
4. The mucosal barrier research methods (the study of the gingival fluid, the mixed saliva quantity, saliva viscosity, pH and microcrystallization, evaluation of the saliva enzyme systems and saliva immunoglobulins).
5. Additional research methods at the level of a local inflammatory response: the definition of the specific and nonspecific immunity.
6. The microvascular barrier research methods. Laser-optical diagnosis (S.P. Rubnikovich), vacuum test to determine capillary resistance, the index of the peripheral blood circulation (L. N. Dedova, 1980), ultrasound and laser Doppler and rheography.
7. Additional methods in the determination of the periodontal tissues innervation (number, index, the periodontium sensitivity index (L. N. Dedova), morphological methods, the autonomic nervous system research).
8. Additional diagnosis methods of the dental crown surrounding factors (microbiological research methods).
9. Indications for additional research methods.
10. Deontological aspects of diagnosis.
11. Discussion of the publications on the topic of the lesson in dental journals, including «The Stomatologist».

**Tasks for the Students' Individual Work.** For learning this lesson completely the student must study the lecture material and the recommended literature. The student must prepare a table of microorganisms that contribute to



the periodontal disease development. The student must make a table of Kulazhenko test indicators for the upper and lower jaw in the area of individual teeth in normal condition.

To write down a direction to the laboratory and to the general practitioner.

### **Self-Testing of the Topic Consolidation**

#### ***Case-studies***

**Case-study No 1.** Patient T., 42 years old, complained of recurrent abscesses in the gingival area and dry mouth.

*Objectively:* gingiva in the area of all teeth groups was hyperemic, swollen, bleeding. There were periodontal pockets with a depth of 4–6 mm in the area of 1.6, 1.7, 3.6, 4.6, 3.3, 3.4 teeth. On palpation, there was a pus discharge from periodontal pockets.

*Make the preliminary diagnosis. What additional research methods are necessary for the final diagnosis?*

**Case-study No 2.** Patient I., 28 years old, complained of gingival «overgrowth» in the area of 4.1, 4.2, 4.3 teeth, and bleeding on palpation. The submandibular lymph nodes were enlarged.

*Make the examination plan of the patient. What additional research methods should be carried out?*

**Case-study No 3.** Patient L., 24 years old, complained of gum bleeding in the front teeth area and of appearance of hemorrhagic areas.

*On examination:* good oral hygiene (OHI-S = 0.3), gingiva redness and bleeding on slight probing.

*Make a plan of examining the patient. What additional methods are necessary to clarify the diagnosis?*

### **TEST QUESTIONS**

**1. What does the drying of gingiva allow to determine? (1 correct answer)**

- a) consistency;
- b) surface structure;
- c) contours;
- d) size.

**2. What diagnostic test includes staining of gingiva? (1 correct answer)**

- a) Yasinkovski test;
- b) Schiller–Pisarev test;
- c) Kulagenko test;
- d) Kavetsky test.

**3. What is the saliva secretion speed at rest? (1 correct answer)**

- a) from 0.1 to 0.2 ml/min;
- b) from 0.2 to 0.3 ml/min;
- c) from 0.3 to 0.4 ml/min;
- d) from 0.4 to 0.5 ml/min.

**4. What does the Schiller–Pisarev test (1963) define? (1 correct answer)**

- a) gingiva surface;
- b) gingiva contour;
- c) gingiva inflammation;
- d) gingiva consistency.

**5. What is used for taking a sample of gingival fluid to determine its amount? (1 correct answer)**

- a) cotton pads;
- b) cotton rolls;
- c) filter paper strips;
- d) pipettes.

**6. What is the duration of taking a sample of gingival fluid from the periodontal pocket (min)? (1 correct answer)**

- a) 1;
- b) 2;
- c) 3;
- d) 4.

**7. What is the reason for using the cytological method in Periodontology? (1 correct answer)**

- a) treatment planning;
- b) selection of the treatment method;
- c) selection of medicines;
- d) dynamic monitoring of the pathological process and the effectiveness of destructive process treatment.

**8. What does the cytological method allow to explore? (1 correct answer)**

- a) qualitative and quantitative structure of the microflora of periodontal pockets;
- b) qualitative and quantitative structure of cellular elements;
- c) the gingival epithelium structure;
- d) the periodontium structure.

**9. What method should be used for the X-ray characteristics of the pathological process (type, prevalence, depth and length) in the periodontium? (1 correct answer)**

- a) close-focus contact radiography;
- b) panoramic roentgenography;
- c) bite radiography (Bite-wing);
- d) digital radiography.

**10. What does the vacuum test (V. I. Kulagenko, 1960) allow to determine? (1 correct answer)**

- a) PMA index (C. Parma, 1960);
- b) gingival capillary resistance;
- c) PBC index (L. N. Dedova, 1981);
- d) GI index (H. Loe, J. Silness, 1963).

**11. What is the diameter (mm) of the glass cuvettes used for vacuum tests (V. I. Kulagenko, 1960)? (1 correct answer)**

- a) 3;
- b) 5;
- c) 7;
- d) 8.

**12. What is the time (sec) of formation of a vacuum hematoma on the anterior surface of the lower jaw alveolar ridge in healthy people of 20–40 years old? (1 correct answer)**

- a) 10–20;
- b) 20–30;
- c) 35–45;
- d) 50–80.

**13. What is the indication for the blood glucose biochemical test?**  
(1 correct answer)

- a) abundant dental plaque;
- b) frequent gum abscessing;
- c) severe gingiva bleeding;
- d) the presence of putrid smell from the mouth.

**14. What is the method, that helps to determine pathological changes in the gingival tissues on the preclinical stage?** (1 correct answer)

- a) polarography;
- b) Kulagenko vacuum test (1960);
- c) laser-optical method;
- d) estimation of the gingival fluid amount.

**15. What is diagnosed in the oral cavity in case of the endocrine dysfunction?** (2 or more correct answers)

- a) gingival pockets;
- b) deep periodontal pockets in patients before 35 years old;
- c) periodontal pockets;
- d) periodontal pockets with the raspberry-like granulations growth.

**16. What clinical signs indicate the necessity of consulting the endocrinologist?** (2 or more correct answers)

- a) a great amount of dental plaque;
- b) gum enlargement;
- c) dry mouth, gingival and periodontal abscesses;
- d) increased tooth sensitivity.

**17. When is gum enlargement often observed?** (2 or more correct answers)

- a) in puberty;
- b) only in patients younger than 20 years;
- c) during the pregnancy;
- d) only in patients older than 65 years.

**18. What additional diagnostic methods should be applied in patients up to 60 years old in case of suspicion of osteoporosis?** (2 or more correct answers)

- a) microbiological examination;
- b) X-ray densitometry;
- c) immunological examination;
- d) ultrasonic densitometry.

**19. When are laboratory diagnostic methods of periodontal diseases applied?** (2 or more correct answers)

- a) in case when the patient uses a firm brush and complains of gum bleeding while brushing the teeth;

- b) to determine the effectiveness of the treatment;
- c) if the patient has irrational dentures and clinically marked gingival inflammation;
- d) when it is difficult to assess the periodontal status properly.

**20. Match the name of the author with the suggested index, which characterizes the state of the periodontium:**

	Author		Index
1	M. Massler, J. Shour, 1948	A	GI
2	Loe, Silness, 1963	B	Peripheral blood circulation index (PBCI)
3	L. N. Dedova, 1981	C	AI
4	J. L. Denisova, 2012	D	PMA

**21. Match the name of the author with the suggested index**

	Author		Index
1	J. Ainamo, D. Barmes, G. Beagris, 1982	A	Peripheral blood circulation index (PBCI)
2	S. P. Ramfjord, 1959	B	CPITN
3	A. L. Russell, 1956, 1967	C	PI
4	L. N. Dedova, 1981	D	PDI

**22. Match the peripheral blood circulation index (PBCI) indicators (L. N. Dedova, 1981) with the assessment of the blood circulation in periodontal tissues:**

	Indicators of peripheral blood circulation index (PBCI) (L. N. Dedova, 1981)		Assessment of blood circulation in the periodontal tissues
1	60–70 %	A	Good, compensate condition
2	7.5–50 %	B	Physiological standard
3	1.07–7.4 %	C	Satisfactory condition
4	80–100 %	D	The state of decompensation

**23. Match the CPITN index codes and criteria (J. Ainamo, D. Barmes, G. Beagris, 1982):**

	CPITN codes (J. Ainamo, D. Barmes, G. Beagris, 1982)		CPITN criteria (J. Ainamo, D. Barmes, G. Beagris, 1982)
1	Code 0	A	Subgingival calculus is determined with the probe, probing depth is up to 3.5 mm
2	Code 1	B	Healthy gingiva, there is no signs of pathology
3	Code 2	C	The periodontal pocket depth is up to 6 mm
4	Code 3	D	Gingiva bleeding after probing
5	Code 4	E	The periodontal pocket depth is 4–5 mm

**24. Match the indicators with their interpretation from the laser-optical diagnosis of digital speckle photos (LODdsf) (S. P. Rubnikovich, 2011):**

	<b>Indicators of laser-optical diagnosis of digital speckle photos (LODdsf) (S. P. Rubnikovich, 2011)</b>		<b>Indicators interpretation of laser-optical diagnosis of digital speckle photos (LODdsf) (S. P. Rubnikovich, 2011)</b>
1	30–40 conventional units	A	Good
2	20–29 conventional units	B	Satisfactory
3	19 and less conventional units	C	Unsatisfactory

**25. What is the speed of saliva secretion, stimulated by chewing paraffin? (1 correct answer)**

- a) from 1 to 2 ml/min;
- b) from 2 to 3 ml/min;
- c) from 3 to 4 ml/min;
- d) from 4 to 5 ml/min.

**26. When should be the speed of the nonstimulated saliva determined? (1 correct answer)**

- a) immediately after a meal;
- b) in 30 minutes after a meal;
- c) in 60 minutes after a meal;
- d) fasting or after 1.5–2 hours after a meal.

**27. What instrument is used for the saliva viscosity test? (1 correct answer)**

- a) a special tool;
- b) dental tweezers;
- c) a special chemical reagent;
- d) a special device.

**28. What instrument is used for the saliva viscosity determination? (1 correct answer)**

- a) dental tweezers;
- b) a cotton roll;
- c) a special chemical reagent;
- d) a viscosimeter.

**29. What do the microbiological methods in Periodontology include? (2 or more correct answers)**

- a) cultivation of bacteria;
- b) stomatoscopy;
- c) capillaroscopy;
- d) phase-contrast microscopy.

**30. Why is the dental plaque microbiological examination conducted? (2 or more correct answers)**

- a) to specify the suggested diagnosis;
- b) to identify the severity of the pathological process in the periodontium;
- c) to identify the treatment effectiveness;
- d) to choose the anti-inflammatory drugs.

**31. What are the most available and effective ways to examine the microcirculation in the periodontium? (2 or more correct answers)**

- a) capillaroscopy;
- b) rheography;

c) vacuum test to determine the resistance of the gum capillaries (V. I. Kulagenko, L. A. Denisov, L. N. Dedova), peripheral blood circulation index (PBCI) (L. N. Dedova, 1981);

d) vacuum test to determine the permeability of the gum capillaries (V. I. Kulagenko, 1960).

**32. What is the time of vacuum hematoma formation in healthy people (20–40 years old), who haven't had diseases, affecting the capillary resistance? (2 or more correct answers)**

- a) 20–30 sec in the anterior teeth area;
- b) 30–50 sec in the posterior teeth area;
- c) 50–80 sec in the anterior teeth area;
- d) 60–100 sec in the posterior teeth area.

**33. What is the negative pressure in the cuvette for the vacuum treatment procedure? (2 or more correct answers)**

- a) 10 mm Hg;
- b) 20 mm Hg;
- c) 40 mm Hg;
- d) 60 mm Hg.

**34. What should the patient do before the microbiological examination? (2 or more correct answers)**

- a) should not brush his teeth, should be on an empty stomach;
- b) should not rinse his mouth with antiseptics;
- c) should brush his teeth only with hygienic toothpaste;
- d) should not eat carbohydrate food.

**35. What are the functional methods of the microcirculatory examination of periodontal tissues? (2 or more correct answers)**

- a) ultrasound densitometry;
- b) reoperiodontography;
- c) ultrasound Dopplerography;
- d) echoosteometry.

#### LITERATURE

1. *Carranza, F. A.* Carranza's Clinical Periodontology / F. A. Carranza. 11<sup>th</sup> ed. Saunders Elsevier, 2012. 825 p.

2. *Aesthetic Periodontology* / J. L. Denisova [et al.]. Minsk : BSMU, 2015. 20 p.

3. *Egelberg, J.* Periodontal examination / J. Egelberg, A. Badersten. Copenhagen : Munksgaard, 1994. 85 p.

4. *Lindhe, J.* Clinical Periodontology and Implant Dentistry / J. Lindhe. 4<sup>th</sup> ed. Blackwell Munksgaard, 2003. 1044 p.

5. *Mueller, H. P.* Periodontology. The Essentials / H. P. Mueller. Thieme, 2004. 188 p.

6. *Perry, D. A.* Periodontology for the dental hygienist / D. A. Perry, P. Beemsterboer. 3<sup>rd</sup> ed. St. Louis, Mo. : Saunders Elsevier, 2007. 484 p.

7. *Schluger, S.* Periodontal diseases : basic phenomena, clinical management and occlusal and restorative interrelationships / S. Schluger, R. Yuodelis, R. C. Page. 2<sup>nd</sup> ed. Philadelphia : Lea & Febiger, 1990. 759 p.

8. Publications on the topic of the lesson in dental journals, including «The Stomatologist».

**ANNOTATION TO THE PRACTICAL LESSON ON THE TOPIC  
«ADDITIONAL RESEARCH METHODS IN CLINICAL PERIODONTOLOGY»**

1. Laboratory, microbiological, immunological, morphological, biochemical and cytological research.

2. Functional methods: vacuum test to determine the gingival capillary resistance, vacuum test to determine the gingival capillary permeability, peripheral blood circulation index, biomicroscopy, dopplerography, laser-optical diagnosis of the periodontal tissue microcirculation.

**1. Laboratory, microbiological, immunological, morphological, biochemical and cytological research.**

**Laboratory diagnostic methods.** Laboratory diagnostic methods are used when there is difficulty in assessing periodontal status or in determining the treatment effectiveness properly. The goal of laboratory diagnosis is to conduct a cytological examination of the periodontal pocket with the aim of revealing microorganisms. Along with it, microbiological, biochemical and immunological examinations are used for diagnosis, selection of medicines and treatment. If the clinician has difficulties in diagnosing periodontal diseases, the deformed areas of affected tissue should be subjected to the histological analysis.

**Microbiological examination.** Microbiological examination reveals the composition of microflora in periodontal pockets, determines its sensitivity to antibiotics or other drugs and controls the treatment effectiveness. The content of periodontal pockets, oral liquid, as well as material, obtained by curettage, are used for examination. It is usually carried out before and after treatment to monitor its quality.

Microbiological diagnosis has a great importance, especially in progressive periodontitis, because periodontal disease is caused by periopathogenic microorganisms. Due to identification of bacterial enzyme activity, you can define such pathogens, as *Porphyromonas gingivalis*, *Bacteroid forsythus*, *Treponema denticole* (fig. 1).

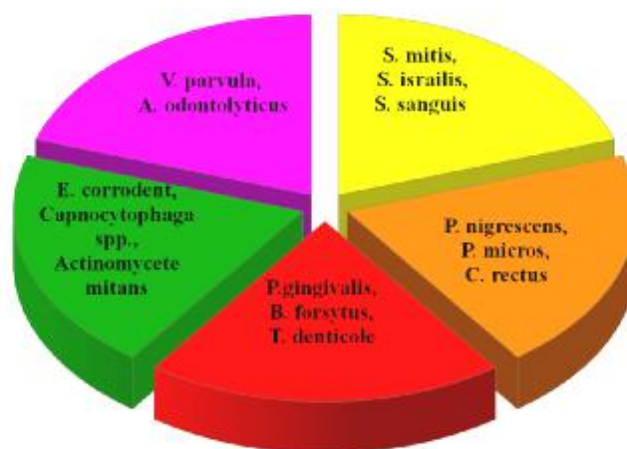


Figure 1. Periopathogenic microorganisms classification on color groups

**Immunological examination.** Immunological examination allows us to estimate the nonspecific and specific protective mechanisms of the body. Local immunity is determined by the lysozyme concentration in the mixed saliva as a nonspecific protection factor, by the concentration of immunoglobulins sIgA, IgA, IgG in oral liquid, by the vitality of cells in the periodontal pocket and by the proteolysis activity.

Identification of the immunoglobulins level allows not only to identify their secretion violations, but also to apply the quality control of the treatment.

Proteolytic activity (the activity of enzymes, that destroy proteins) is analyzed in the periodontal tissues, gingiva liquid and in the saliva. The state of the cellular nonspecific protection (state of T- and B-systems of immunity, the functional activity of polymorphonucleocytes), as well as specific protective factors (antibodies to periodontopathogenic bacteria) are evaluated by the immunological examination of the peripheral blood.

**Cytological examination.** Cytological examination is based on the structural features study of the cellular elements and cell conglomerates. The qualitative and quantitative composition of cells, particularly their color qualities, is evaluated. Dentists pay attention to the color of cytoplasm (basophilia), dystrophic and necrotic changes, phagocytosis, the presence of microbes, cells aggregation and other. The quantitative and qualitative changes in cells can testify the inflammation development, activity and direction of the pathological process growth, the level of tissues destruction. The method is simple, safe for the patient, effective and reliable. It allows you to get the results quickly, and to repeat examination if necessary. Cytological method is used to determine the treatment effectiveness. Impression smears, re-impression smears, scraping smear from the mucosa surface, periodontal pockets, erosion, ulcer, fistula, as well as punctate from the area, located in the deep-lying tissues, can be used as material for the cytological study.

**Biochemical examination.** Biochemical blood analysis is conducted in order to identify inflammation markers, changes in metabolic processes, especially in the metabolism of lipids, responsible for the blood vessels condition. The metabolism of the alveolar ridge bone tissue depends on the hormonal changes in the body, the level of calcium in the blood, as well as other external and internal causes, influencing the bone system. In this regard, the identification of hormone levels and biochemical markers of bone remodeling (parathormone, thyrocalcitonin, osteocalcin, C-terminal telopeptide of type I collagen and  $\beta$ -Cross-laps, alkaline phosphatase, D3 vitamin, calcium, glycohemoglobin, and others) levels are required for patients with chronic forms of periodontitis. It allows to detect osteopenia and osteoporosis, as well as it is used for timely correction of metabolic disorders of the bone tissue in the whole body.



**2. Functional methods: vacuum test to determine the gingival capillary resistance, vacuum test to determine the gingival capillary permeability, peripheral blood circulation index, biomicroscopy, dopplerography, laser-optical diagnosis of the periodontal tissues microcirculation.**

*Laser and ultrasound Doppler flowmetry.* These methods were developed by the Austrian physicist Christian Andreas Doppler, who put forward the hypothesis of the frequency of the electromagnetic or acoustic waves, reflected from a moving object. The presence of the reflected signal indicates the presence of blood flow in the area of the ultrasonic examination. The ultrasonic waves diffusion and reflection are the two main processes, which underline the basis of the diagnostic action of ultrasonic equipment. Doppler flowmetry is used to examine the microcirculation in normal state and in case of pathology. It allows to determine the volumetric and linear rates of blood flow in the gums and other parameters.

*The identification of the periodontal capillary pressure.* The identification of the periodontal capillary pressure (J. L. Denisova, L. A Denisov, 2012) is one of the most important factors, that determines the disorder of capillary blood flow. A special device with pneumatic compressor, which forms a pressure in the range of 20–70 mm Hg, is used to determine the capillary pressure in the periodontium. In normal condition the capillary pressure in the periodontium is about 20 mm Hg (J. L. Denisova, 2012). It is decreased to 18.3 mm Hg in case of gingival recession and increased to 28,3–35,0 mm Hg in case of chronic periodontitis.

The identification of the capillary pressure in the periodontium in the normal and pathological states is used to determine the periodontal tissues status and to plan individual treatment dosage (orthodontic, physical therapy and other procedures).

*Laser-optical diagnosis of the periodontal tissues microcirculation.* Laser-optical diagnosis of digital speckle photography (LODdsp) (S. P. Rubnikovich) has several advantages over other optical functional diagnostic methods:

1) real-time monitors the microcirculation state in the periodontal tissues and the stress-strained level of the teeth and dental prosthesis due to accelerated computer processing;

2) provides lack of compression effect on the oral cavity soft tissues due to non-contact laser application;

3) allows to conduct the cross-sectional examination of all topographical areas of the gum and the oral cavity (20×30 mm and more);

4) gives the possibility of differentiated preventive therapy for the treatment the microcirculatory disorders in the periodontal tissues;

5) is painless for the patient and safe for the doctor;

6) does not require additional protections;

7) is available for wide practical use.

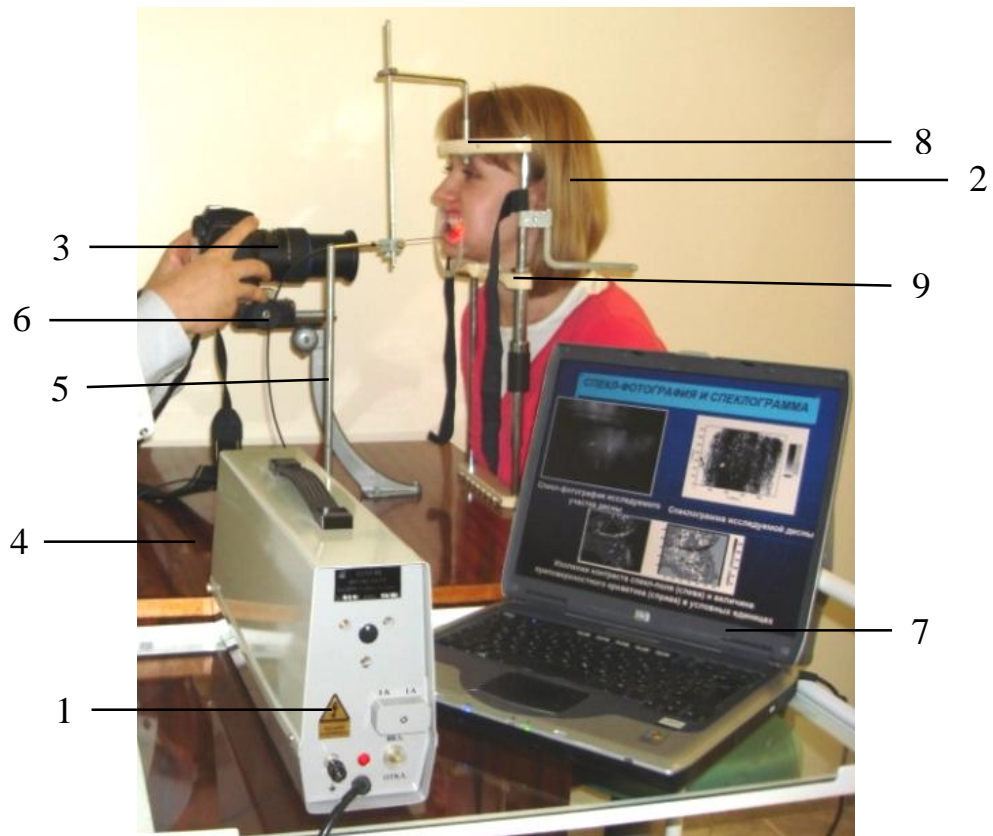
The speckle area, which consists of tiny 1–2 micron granules, is formed during the dispersal of the coherent radiation in a diffuse object. The similar speckle area is formed by the laser radiation dispersal by biological tissues. Visible coherent radiation, penetrating to the depth of 1–2 mm into the mucous membrane and skin of a person, is dispersed by the red blood cells, flowing in the smallest tissue capillaries. As a result of interference in the dispersed light, dynamic speckle area is formed, varying in space and in time as a result of the red blood cells movement. The analysis of the laser speckle areas dynamics allows the doctor to form an instant map of the speed of the red blood cells movement in the examined oral tissues.

The device for laser-optical diagnosis consists of a laser, that generates optical radiation; a light guide, pointed to the examination object, i. e. periodontal tissue, dental tissue, denture; the recording optical system is a digital CCD camera, which is connected to the computer with special software. After recording the resulting image is transferred to a personal computer (7), where it is converted in a special program with the aim of obtaining numerical characteristics of the microcirculation intensity in the tissues.

***Methodology of the laser-optical diagnosis based on digital speckle photography.*** The device for laser-optical diagnosis and treatment of periodontal tissues on the basis of digital speckle photography (fig. 2) consists of the laser (1), that generates optical radiation, with a fiber optic cable, focusing this radiation on the examination object (2) (periodontal tissue, dental tissue, denture, orthodontic equipment); a recording optical system for reproducing the reflected image on the camera (3). This camera is fixed to the table (4), using metal rails (5) and the holder with a moving base by means of external screws (6). After recording the resulting image is transferred to a personal computer (7), where it is adapted by a special program with the aim of obtaining numerical characteristics of the microcirculation intensity in the periodontal tissues.

The patient sits on a chair, his head is fixed motionlessly in the ophthalmological retainer (8), the access to the oral cavity is achieved using a dental dam retractor (9). The focus of lighting and receiving optical systems are pointed to the examined area. The distance between the focus and the gum should be 1 cm, so that there is no contact between them. The focus is oriented at obtaining the most clear image of the selected area with the subsequent registration of the microcirculation dynamics using a digital camera.

After recording, the image is transferred to a personal computer, where they are processed by special software in order to obtain numerical microcirculation characteristics. Microcirculatory status of periodontal tissues is determined by the intensity of the gum microcirculation and is calculated in conventional units with the help of computer programs, by comparing with normal indicators.



*Figure 2. Device for laser-optical diagnosis and treatment of periodontal tissues on the basis of digital speckle photography*

The use of laser-optical diagnosis will allow you to perform early diagnosis of latent manifestations of the disease, to identify indications for pathogenetic therapy and to assess the effectiveness of treatment during primary and follow-up examinations.

## Topic «CHRONIC SIMPLE MARGINAL GINGIVITIS: CLINICAL FEATURES, DIAGNOSIS METHODS»

**Motivational Characteristics.** The first clinical manifestations of simple marginal gingivitis are insignificant. This makes its diagnosis difficult, reduces the number of patients presenting to the doctor and contributes to the development of chronic disease.

Firstly the gingiva are involved into the pathological process, so you need to know the basic signs of gingivitis to be able to identify etiological and pathogenic development mechanisms, to make early diagnosis, to choose adequate tactics in treatment planning. All the above-stated factors determine the topicality of the lesson.

### **Aims of the Lesson**

**Didactic:** to motivate students to study the clinical features, the fundamentals of diagnosis and differential diagnosis of chronic simple marginal gingivitis.

**Methodical:** to teach students the methodological principles of diagnosis and differential diagnosis of chronic simple marginal gingivitis.

**Scientific:** to form the students' scientifically grounded clinical thinking in diagnosis and differential diagnosis of chronic simple marginal gingivitis.

### **Goals of the Lesson:**

<b>On completing the lesson the students MUST KNOW</b>	<b>On completing the lesson the students MUST BE ABLE</b>
1. Development mechanisms of chronic simple marginal gingivitis. 2. Classification characteristics. 3. Clinical features and diagnosis of chronic simple marginal gingivitis.	1. To diagnose chronic simple marginal gingivitis (assisted by the instructor). 2. To make the examination plan of a patient with chronic simple marginal gingivitis (assisted by the instructor). 3. To make differential diagnosis of chronic simple marginal gingivitis (assisted by the instructor). 4. To make the final diagnosis in patients with gum pathology (without assistance).*

\* Manipulation 4 in the column «MUST BE ABLE» is included into the list of final practical skills, performed without assistance.

### **Requirements for the Initial Level of Knowledge:**

1. The sequence of the dental patient examination.
2. Topography of periodontal tissues.
3. Index assessment of the gingival inflammation (GI and PMA indices, Schiller–Pisarev test and Svrakov iodine number).
4. Index assessment of oral hygiene status (Fedorov–Volodkina hygiene index, OHI-S, PHP, PLI).

### **Control Questions from the Related Disciplines:**

1. Anatomical and histological structure of the periodontium.
2. Chronic inflammation, pathogenesis, morphological aspects.
3. Immunological aspects of inflammation.
4. Biochemical aspects of inflammation.
5. Plaque microflora and its role in the development of gingivitis.
6. Interconnection of oral hygiene and periodontal status.
7. Saliva pH, secretion rate, viscosity and absorption capacity
8. Radiological characteristic of the alveolar ridge in the norm.

### **Control Questions on the Topic of the Lesson:**

1. Definition of gingivitis. classification of gingivitis (WHO 1994, L. N. Dedova 2012).
2. Unfavorable factors in the development of chronic simple marginal gingivitis. The role of general and local factors.
3. Development mechanisms of chronic simple marginal gingivitis.
4. Clinical features and diagnosis of chronic simple marginal gingivitis.
5. Hygiene indices, gingival indices, methods of periodontal tissues microcirculation determination.
6. Main and additional diagnostic tests for periodontal diseases.
7. Differential diagnosis of chronic simple marginal gingivitis.
8. Discussion of the publications on the topic of the lesson in dental journals, including «The Stomatologist».

**Tasks for the Students' Individual Work.** The student examines the patient under the supervision of the instructor, conducts a survey of patients on the topic of the lesson, evaluates the gingiva condition, its color, contour, surface structure, texture, position, bleeding, determines periodontal attachment integrity.

The student identifies and interprets OHI-S, GI, PMA indices, Schiller–Pisarev test and Svrakov iodine number, capillary resistance test. The student reports to the instructor the results of the patient's examination and records them in the dental patient's history.

### **Self-Testing of the Topic Consolidation.**

#### ***Case-studies***

**Case-study No 1.** Patient A., 22 years old, came to the dentist, complaining of gingival bleeding, when brushing his teeth, halitosis.

*From the case-history:* the patient didn't have any systemic diseases, allergic reactions were not marked, bleeding appeared two years ago. The patient visited the dentist only for teeth treatment. He had not received any recommendations concerning oral hygiene care. The patient brushed his teeth once a day before breakfast, using mostly horizontal movements.

*Clinical characteristics:* visual examination was without visible pathology, oral cavity mucosa was pale pink in color, mildly moist, the bite was neutral, labial and tongue frenov were normal. Dental plaque was found in the area of all

teeth, OHI-S = 2.8, GI = 1.2, gingiva was stagnant-hyperemic, interdental papillae were friable, increased in volume, their tops were rounded, bleeding on probing. Pathology of the periodontal attachment was not detected.

*What are the doctor's tactics in making the differential diagnosis?*

**Case-study No 2.** Patient B., 18 years old. The examination revealed objectively poor oral hygiene, crowding of teeth in the front part of the lower jaw, the presence of rough surfaces of fillings during the preventive examination. Gingiva was cyanotic, interdental papillae were swollen, their tops were rounded, bleeding on probing.

*Anamnesis:* the patient was not motivated, brushed his teeth 2 times a day, using mostly horizontal movements, did not use additional oral hygiene products. The patient was practically healthy.

*What are the doctor's tactics on the stages of diagnosis?*

### TEST QUESTIONS

**1. Inflammation of the gingiva, caused by the impact of general and local factors and proceeding without impairment of the integrity of the periodontal attachment is called \_\_\_\_\_**

**2. Specify the etiological factor in the development of the chronic simple marginal gingivitis: (1 correct answer):**

- a) local trauma;
- b) general disease (diabetes, endocrine disorders);
- c) plaque;
- d) bad habits.

**3. What is the first pre-clinical sign of the gingiva inflammation? (1 correct answer)**

- a) gingiva bleeding;
- b) increase in the gingival fluid amount;
- c) pain in the gingiva;
- d) halitosis.

**4. What is the first clinical sign of the gingivitis? (1 correct answer)**

- a) halitosis;
- b) pain in the gums;
- c) bleeding after probing the sulcus with the periodontal probe.

**5. What are the main clinical signs of gingival inflammation in case of chronic simple marginal gingivitis? (1 correct answer)**

- a) inflammatory hyperemia, cyanosis, swelling, bleeding;
- b) inflammatory hyperemia, cyanosis, swelling, gingiva epithelium desquamation;
- c) bleeding, gum recession;
- d) hyperemia, swelling, bleeding, gingiva hyperplasia.

**6. Describe the gingiva in case of chronic simple marginal gingivitis:**  
(1 correct answer)

- a) smooth, shiny, hyperemic, bleed easily;
- b) cyanotic, roller-shaped, periodically bleed;
- c) smooth, shiny, hyperemic, papilla height is increased up to  $\frac{1}{3}$  of the tooth crown;
- d) thick, pale pink and don't bleed after probing.

**7. Slight gingivitis is characterized by the GI index (H. Loe, J. Silness, 1963):** (1 correct answer)

- a) 1.2 points;
- b) 0.9 points;
- c) 0.9 %;
- d) 1.2 %.

**8. Moderate gingivitis is characterized by the GI index (H. Loe, J. Silness, 1963):** (1 correct answer)

- a) 1.8 points;
- b) 2.7 points;
- c) 1.8 %;
- d) 2.7 %.

**9. Severe gingivitis is characterized by the GI index (H. Loe, J. Silness, 1963):** (1 correct answer)

- a) 2.7 points;
- b) 3.4 points;
- c) 2.7 %;
- d) 3.4 %.

**10. Chronic severe gingivitis (PMA index (I. Schour, M. Massler, 1948, C. Parma, 1960)) is characterized by inflammation of:** (1 correct answer)

- a) the interdental gingiva;
- b) the interproximal, marginal gingiva;
- c) the interproximal, marginal, attached gingiva;
- d) the marginal gingiva.

**11. What are the priority tests for periodontal diseases diagnosis?**  
(2 or more correct answers)

- a) gingival index GI (H. Loe, J. Silness, 1963), gum capillary resistance to the vacuum, Svrakov iodine number;
- b) PMA index (I. Schour, M. Massler, 1948; C. Parma, 1960), OHI-S (J. C. Green, J. R. Vermillion, 1964), Schiller–Pisarev test (1963), periodontal pockets probing;
- c) PMA index (I. Schour, M. Massler, 1948, C. Parma, 1960), PBCI (L. N. Dedova 1981), Svrakov iodine number (1963), X-ray diagnosis;
- d) quantitative and qualitative parameters of the gingival fluid, Yasinovsky test.

**12. What are the additional tests of the periodontal diseases diagnosis?**  
(2 or more correct answers)

- a) PLI, PI, index of gingival recession, vacuum test for the gum capillary permeability;
- b) gingival index GI (H. Loe, J. Silness, 1963), gum capillary resistance to the vacuum, Schiller–Pisarev test (1963), Svrakov iodine number (1963);

c) PMA index (I. Schour, M. Massler, 1948; C. Parma, 1960), OHI-S (J. C. Green, J.R. Vermillion, 1964), probing;

d) PBCI index (L. N. Dedova, 1981), X-ray and microbiological examination.

**13. What are the parameters of the objective tests (GI (H. Loe, J. Silness, 1963), PMA (I. Schour, M. Massler, 1948, C. Parma, 1960), Schiller–Pisarev test (1963)) in chronic inflamed gums? (2 or more correct answers)**

- a) very high;      b) high;      c) medium;      d) low.

**14. Indicate the normal criteria for periodontal tissues (2 or more correct answers)**

a) PMA = 32 %, vacuum test for gingival capillary resistance is 25 seconds;

b) GI = 0.8 points, vacuum test for gingival capillary resistance is 50 seconds;

c) GI = 1.5 points, vacuum test for gingival capillary resistance is 30 seconds;

d) PMA  $\geq$  8 %, vacuum test for gingival capillary resistance is 60 seconds.

**15. What are the pathological changes in the gum in case of gingivitis? (1 correct answer)**

- a) decreased sympathetic innervation;  
b) changes in the blood vessels topography;  
c) increase in blood vessel diameter and their amount;  
d) changes of the superficial layers of the epithelium;  
e) all of the above mentioned.

**16. What parts of gingiva are inflamed in case of chronic severe gingivitis? (PMA index (I. Schour, M. Massler, 1948; C. Parma, 1960)) (1 correct answer)**

- a) papillary gingiva;  
b) papillary, marginal gingiva;  
c) papillary, marginal, alveolar gingiva.

**17. What parts of gingiva are inflamed in case of chronic slight gingivitis? (PMA index (I. Schour, M. Massler, 1948; C. Parma, 1960)) (1 correct answer)**

- a) papillary gingiva;  
b) papillary, marginal gingiva;  
c) papillary, marginal, alveolar gingiva.

**18. What indices take into account gum bleeding as a clinical sign? (2 or more correct answers)**

- a) complex periodontal index (CPI) (P. A. Leus, 1988);  
b) PMA (I. Schour, M. Massler, 1948; C. Parma, 1960);



- c) GI (H. Loe, J. Silness, 1963);
- d) CPITN (J. Ainamo et al., 1982).

**19. What are the main radiographic signs of chronic simple marginal gingivitis? (1 correct answer)**

- a) widening of the periodontal ligament space;
- b) osteoporosis of the alveolar bone interdental septum;
- c) dental hypercementosis of tooth roots;
- d) radiographic changes in the periodontal tissues are not noted.

**LITERATURE**

1. *Carranza, F. A. Carranza's Clinical Periodontology* / F. A. Carranza. 11<sup>th</sup> ed. Saunders Elsevier, 2012. 825 p.
2. *Aesthetic Periodontology* / J. L. Denisova [et al.]. Minsk : BSMU, 2015. 20 p.
3. *Egelberg, J. Periodontal examination* / J. Egelberg, A. Badersten. Copenhagen : Munksgaard, 1994. 85 p.
4. *Lindhe, J. Clinical Periodontology and Implant Dentistry* / J. Lindhe. 4<sup>th</sup> ed. Blackwell Munksgaard, 2003. 1044 p.
5. *Mueller, H. P. Periodontology. The Essentials* / H. P. Mueller. Thieme, 2004. 188 p.
6. *Perry, D. A. Periodontology for the dental hygienist* / D. A. Perry, P. Beemsterboer. 3<sup>rd</sup> ed. St. Louis, Mo. : Saunders Elsevier, 2007. 484 p.
7. *Schluger, S. Periodontal diseases : basic phenomena, clinical management and occlusal and restorative interrelationships* / S. Schluger, R. Yuodelis, R. C. Page. 2<sup>nd</sup> ed. Philadelphia : Lea & Febiger, 1990. 759 p.
8. Publications on the topic of the lesson in dental journals, including «The Stomatologist».

**ANNOTATION TO THE PRACTICAL LESSON ON THE TOPIC  
«CHRONIC SIMPLE MARGINAL GINGIVITIS: CLINICAL FEATURES,  
DIAGNOSIS METHODS»**

1. Development mechanisms of chronic simple marginal gingivitis.
2. Classification characteristics.
3. Clinical features and diagnosis of chronic simple marginal gingivitis.

**1. Development mechanisms of chronic simple marginal gingivitis.**

**Gingivitis** is an inflammation of the gum, caused by unfavorable general and local factors and proceeding without abnormality of the periodontal attachment.

*General adverse factors of gingivitis* include acute and chronic stress, systemic diseases, smoking, hypodynamia.

*Local adverse factors of gingivitis* are dental plaque, carious lesions, overhanging margins of fillings, defects of dentures, low-quality polished surfaces of fillings, tooth overcrowding, orthodontic appliances.

Dental plaque on the proximal surfaces, caused by poor oral hygiene, penetrates inside the periodontal tissues within 3–4 days, disturbing

the homeostasis. The inflammation begins, but it is not clinically detected yet. The only confirmation of the inflammation is the increase in the gingival fluid at this stage. 1–2 weeks later the first clinical symptom (gum bleeding) appears. Pathogenesis of the gum inflammation develops according to the hyperergic type at the cellular and microcirculatory levels simultaneously. Then the polymorphonuclear leukocytes become close to the epithelium. They migrate towards the dental plaque and accomplish the function of phagocytosis. At this time antibodies and other immune components are produced. Monocytes transform into macrophages and they are involved in the inflammation. Collagen fibers disorganize simultaneously with cell reaction. The connective tissue becomes swollen. The coronal part of the epithelium of the gingival sulcus becomes inflamed. As a result, disorganization processes prevail over the organization and proliferation processes. The epithelium spreads to the underlying tissue, becomes thinner, may ulcerate, but there is no epithelium attachment loss. Polymorphonuclear leukocytes, which impact the attachment, appear in the gingival sulcus.

The depth of tissue changes relates to the infiltration level of the dental plaque. The blood vessels are simultaneously involved in the pathological process. They change their topography. The diameter of the vessels and their number increases, dentogingival plexus appears, the fragility of blood vessels and the level of vascular permeability increases. The vessel wall stretches, the inflammatory exudate penetrates the vessel wall and accumulates in the gingival sulcus.

## 2. Classification characteristics

*Classification of periodontal diseases (prof. L. N. Dedova. 2012)*

<b>1. Gingivitis (K 05)</b>				
<b>1.1 Clinical course</b>	<b>1.2 Form</b>	<b>1.3 Stage</b>	<b>1.4 Prevalence rate</b>	<b>1.5 Severity</b>
1.1.1 acute (K05.0)	1.2.1 simple marginal (K05.10)	1.3.1 initial	1.4.1 localized	1.5.1 slight
1.1.2 chronic (K05.1)	1.2.2 ulcerative (K05.12)	1.3.2 early	1.4.2 generalized	1.5.2 moderate
1.1.3 recurrent	1.2.3 hyperplastic (K05.11)	1.3.3 developed		1.5.3 severe
1.1.4 progressive	1.2.4 symptomatic (K05.13, K05.08, K05.18, K069.1, B00.2)			
1.1.5 reversible				

### ***Clinical course of gingivitis:***

*Acute gingivitis* is gum inflammation, which progresses for the first time within high parameters of the objective tests.

*Chronic gingivitis* is long-lasting (more than 3 days) gum inflammation within the medium parameters of the objective tests.

*Recurrent gingivitis* is a newly emerging gingivitis, which occurs at the previous inflammation level.

*Progressive gingivitis* is inflammation, characterized by slight progression, which turns into periodontitis.

*Reversible gingivitis* is inflammation, which is eliminated within a month.

#### **Forms of gingivitis**

*Simple marginal gingivitis* is a marginal gum inflammation of microbial origin, which proceeds without dento-gingival attachment loss.

#### **Stages of clinical course**

*The initial stage* is manifested within 2–4 days, the gum is re-exposed to accumulation of dental plaque. Classical vessel vasculitis develops, the amount of gingival fluid increases.

*Early stage:* damage occurs in 4 to 7 days and continues for 21 days.

*Developed stage:* the topography of the blood vessels changes, their diameter increases, the vessel wall stretches, the level of vascular permeability increases.

#### **Prevalence rate**

*Localized gingivitis* is gum inflammation, affecting one or two teeth by visible local cause, the area from teeth 4.3 to 3.3 is excluded.

*Generalized gingivitis* is gum inflammation of all the upper and lower jaw areas.

#### **Severity degrees of gingivitis:**

- slight level: GI = 0.1–1.0; PMA is up to 33 %;
- moderate level: GI = 1.1–2.0; PMA is up to 66 %;
- severe level: GI = 2.1–3.0; PMA > 66 %.

**Sample diagnosis:** *Chronic generalized simple marginal gingivitis, developed stage, moderate severity.*

### **3. Clinical features and diagnosis of chronic simple marginal gingivitis.**

Patients complain of gum bleeding during toothbrushing, bad breath and increasing dental plaque. When this process aggravates the gum bleeding becomes permanent, it happens during biting of food or spontaneously in the morning.

The oral cavity examination of patients with the simple chronic marginal gingivitis shows, that gingiva is hyperemic, swelling, it has cyanotic discoloration, its consistency is loose, its surface structure is smooth, gingival papillae are rounded, gingival crests become thicker in form of a roller. There is bleeding on probing, the epithelial attachment is not damaged.

**Clinical signs of gingivitis:** color, gingival bleeding, surface structure, boundary, consistency, score of the gingival index, probing depth of the sulcus on each tooth surface.

**Color** — intensive rubor — a result of the vessel alteration, gum hyperemia.

**Surface structure** — smooth, glance.

**Boundary** — changing, due to edema of collagen fibers.

**Consistency** — loose, easy bleeding on touching.

**Depth of the sulcus:** no more than 3 mm (depth on probing).

Periodontal tissues index assessment is used for diagnosis. The following indices are used: OHI-S (Green, Vermillion, 1964), PLI (Silness–Loe, 1964), Fedorov–Volodkina test (1971), GI (Loe, Silness 1963), PMA (M. Massler, J. Shour, C. Parma, 1960), Shiller–Pisarev test and Svrakov iodine number (1963), vacuum probe for the gum capillary resistance (V. I. Kulazhenko, 1960), peripheral blood circulation index — PBCI (L. N. Dedova, 1981).

Gingival index GI reflects all the 6 inflammation signs.

**Topic «CHRONIC ULCERATIVE, HYPERPLASTIC  
AND SYMPTOMATIC GINGIVITIS: CLINICAL FEATURES,  
DIAGNOSIS METHODS»**

**Motivational Characteristics.** Scientists consider gingiva as a sensitive indicator of the overall body condition and as an object of local microorganisms aggression and bacterial factors local application (F. Alcouffe, 1985, F. A. Carranza, 1990; I. S. Mashchenko, 1990). Interaction between systemic and periodontal diseases is proven by numerous studies. Chronic gingivitis associated with systemic disease has a number of specific features. The complexity of its diagnosis and treatment requires the dentists' profound professional knowledge, which determines the relevance of this topic.

**Aims of the Lesson**

**Didactic:** to motivate students to learn the basics of diagnosing chronic ulcerative, hyperplastic and symptomatic gingivitis.

**Methodical:** to teach students the methodological principles of diagnosis and differential diagnosis of chronic gingivitis.

**Scientific:** to form students' evidence-based clinical thinking in the diagnosis and differential diagnosis of chronic gingivitis (ulcerative, hyperplastic, symptomatic).

**Goals of the Lesson:**

<b>On completing the lesson the students MUST KNOW</b>	<b>On completing the lesson the students MUST BE ABLE</b>
1. Chronic ulcerative gingivitis: the mechanism of development, classification characteristics, clinical features, diagnosis. 2. Hyperplastic gingivitis: the mechanism of development, classification characteristics, clinical features, diagnosis. 3. Symptomatic gingivitis: the mechanism of development, classification characteristics, clinical features, diagnosis.	1. To diagnose chronic ulcerative, hyperplastic and symptomatic gingivitis (assisted by the instructor). 2. To make the examination plan of patients with chronic ulcerative, hyperplastic and symptomatic gingivitis (assisted by the instructor). 3. To know the indications for the patient referral to the general practitioner's, dermatologist's, endocrinologist's consultation (assisted by the instructor). 4. To make differential diagnosis of chronic gingivitis (assisted by the instructor) 5. To make the differential diagnosis of the gingivitis chronic forms (without assistance)*

\* Manipulation 5 in the column «MUST BE ABLE» is included into the list of practical skills, performed without assistance.

**Requirements for the Initial Level of Knowledge:**

1. The systematic classification of periodontal diseases: ICD-DA classification (1994), L. N Dedova (2012).
2. Sequence of examining patients with periodontal disease.
3. Methods of periodontal disease diagnosis.
4. Clinical features of chronic simple marginal gingivitis.
5. Differential diagnosis of chronic simple marginal gingivitis.

**Control Questions from the Related Disciplines:**

1. The role of microorganisms in the development of chronic inflammation.
2. Gum histopathology in case of chronic inflammation.
3. The pathogenesis of the chronic inflammation in the gum.
4. Dermatoses (pemphigus, pemphigoid, lichen planus), clinical manifestations.
5. Hormonal disorders (diabetes, women’s estrogen deficiency), vitamin C deficiency, clinical manifestations.
6. Blood diseases. Clinical manifestations.
7. Alveolar bone radiological structure in the norm.

**Control Questions on the Topic of the Lesson:**

1. Clinical features, diagnosis and mechanism of development of chronic ulcerative gingivitis.
2. Clinical features, diagnosis and mechanism of development of hyperplastic gingivitis (edematous and fibrous forms).
3. Clinical features and diagnosis of symptomatic gingivitis, associated with HIV infection, dermatitis, blood diseases, endocrine disorders, diabetes, hypovitaminosis C.
4. Differential diagnosis of chronic gingivitis. X-ray image of chronic gingivitis.
5. Discussion of the publications on the topic of the lesson in dental journals, including «The Stomatologist».

**Educational Materials.**

**Differential diagnosis of the chronic gingivitis forms**

Form \ Sign	Chronic gingivitis				
	simple marginal	ulcerative	hyperplastic		symptomatic, simple marginal, ulcerative, hyperplastic, desquamative in case of dermatosis
			edematous form	fibrous form	
Complaints	Absent or complaints of gum bleeding while tooth-brushing and eating hard food	Constant gum bleeding and slight pain on palpation, bad breath	Gingiva proliferation, itching, bleeding and pain, growing when eating hard food, bad breath	Absent or complaints of unusual appearance and form of the gum	Increased sensitivity to thermal and chemical agents, feeling of «gum burning», bad breath

Form Sign	Chronic gingivitis				
	simple marginal	ulcerative	hyperplastic		symptomatic, simple marginal, ulcerative, hyperplastic, desquamative in case of dermatosis
			edematous form	fibrous form	
Anamnesis	Long-lasting mild course	Progresses from the simple marginal gingivitis	Long-lasting, slowly progressing course, is determined around dental plaque retention points (orthodontic appliances, clamps, dental crowns, tooth overcrowding, overhanging fillings margins, etc.) or it is the manifestation of general diseases and conditions (endocrine disorders, blood diseases, pregnancy, pubertant period, taking diphenyl medications, vit. C hypovitaminosis, etc.)		General disease (lichen planus, pemphigus, hormonal disorders, blood diseases, chronic infections, stress, allergic reactions, diabetes)
<b>Clinical signs</b>					
Gingiva color	Congestive hyperemia, cyanosis	Hyperemia, cyanosis	Congestive hyperemia, cyanosis	Normal or paler, than healthy areas	Bright red color
Surface structure	Smooth, glance	Ulcerated	Smooth, glance	Dense, elastic	Smooth, glance, marble appearance (erosions)
Contour	Gingival papillae tops are rounded, thickened gingival margin in the form of a roller	Scalloped gingival margin	Gingival papillae and/or marginal gingiva are increased in size, cover the dental crown		Changes are localized in the area of interdental papillae and attached gingiva, depending on the systemic affecting factor
Consistency	Loose, edematous	Loose, covered with ulcers	Loose, edematous	Dense, flexible, irregular, scalloped	Atrophic, loose
Bleeding	On probing or spontaneous	On probing or spontaneous	On probing or spontaneous	No bleeding	Or spontaneous on probing
Probing depth	Absence of the dento-gingival attachment loss	Absence of the dento-gingival attachment loss	Absence of the dento-gingival attachment loss, gingival pockets		Absence of the dento-gingival attachment loss
X-ray examination	Absence of the alveolar bone loss, compact plate of the bone tissue is not changed				

**Tasks for the Students' Individual Work.** Students see patients on the topic of the lesson under the supervision of the instructor, conduct the patient

examination, assess the gingiva condition (color, bleeding, contour, texture, position, pain) and the integrity of the periodontal attachment, determine the presence of gingival pockets. The student identifies and interpretes GI, PMA, PBCI, PI indices, Schiller–Pisarev test, Kulazhenko vacuum test and make a differential diagnosis. The results of the patient’s examination students report to the instructor and fill in the patient’s dental card.

### **Self-Testing of the Topic Consolidation**

#### ***Case-studies***

**Case-study No 1.** Patient A., 34 years old, complained of a changed form of the gingiva, discomfort and bad breath.

*Anamnesis.* The patient had been suffering from epilepsy and taking antiepileptic drugs for 10 years. The patient had had changes in the gingiva for 2 years. She was not motivated for oral hygiene. The patient brushed her teeth 2 times a day, using mostly horizontal motion.

*Clinical picture:* visual examination was without visible changes, the oral cavity mucosa was pale pink in color, moderately moist, there was deep bite, all the teeth were covered with plaque. Gingiva had normal color, it was dense, increased in volume and covered  $\frac{1}{3}$  height of the lower front teeth crowns and it was not bleeding on probing. Periodontal attachment disorders were not defined.

*What are the tactics of the doctor in making the diagnosis?*

**Case-study No 2.** Patient K., 55 years old, complained of bleeding gums, pain during toothbrushing and eating.

*Objectively:* the gingiva in the posterior part was hyperemic, bleeding on probing. The examination revealed the impairment of the epithelium integrity in the form of erosion. Bluish-pearl areas of hyperkeratosis mucosa in the form of lace were revealed on the erythematous and edematous buccal mucosa and retromolar space.

*What are your tactics in diagnosis? What additional information do you need for this?*

### **TEST QUESTIONS**

**1. Indicate the cases, when there is no gum bleeding: (1 correct answer)**

- a) chronic simple marginal gingivitis;
- b) chronic ulcerative gingivitis;
- c) hyperplastic gingivitis (edematous form);
- d) hyperplastic gingivitis (fibrous form).

**2. What is the leading factor of the occurrence of gingivitis in patients with diabetes? (1 correct answer)**

- a) plaque microorganisms;
- b) increased blood glucose level;
- c) fibroblast dysfunction;
- d) decreased blood glucose level.



**3. What other doctor consultation is necessary for patients with symptomatic gingivitis? (1 correct answer)**

- a) endocrinologist;                      c) hematologist;
- b) dermatologist;                        d) neurologist.

**4. What is the main clinical sign of chronic leukemia in the oral cavity? (1 correct answer)**

- a) the gingival margin hyperplasia;
- b) gingival recession;
- c) thick, pale pink gum.

**5. What microflora prevails during chronic ulcerative gingivitis? (1 correct answer)**

- a) specific;            b) aerobic;            c) non-specific;            d) anaerobic.

**6. What are the indications to diagnose hyperplastic gingivitis? (1 correct answer)**

- a) gingival pockets;    b) periodontal pockets;    c) periosteal pockets.

**7. What are the factors, contributing to the development of hyperplastic gingivitis? (1 correct answer)**

- a) bone diseases;                      c) cardiovascular diseases;
- b) endocrine disorders;                d) chronic respiratory diseases.

**8. What disease is the symptomatic gingivitis an early symptom of? (1 correct answer)**

- a) rheumatism;                        c) leukoplakia;
- b) dermatoses;                        d) aphthous stomatitis.

**9. What are the symptomatic gingivitis forms, according to the prevalence rate? (1 correct answer)**

- a) localized;                            b) generalized.

**10. What contributes to the hyperplastic gingivitis development? (1 correct answer)**

- a) open bite;                      b) deep bite;                      c) crossbite.

**11. What does the gingiva look like in case of hyperplastic gingivitis edematous form? (1 correct answer)**

- a) hyperemic, with the presence of areas, covered with gray plaque, easily bleeding on probing;
- b) normal color, dense, enlarged, the spherical form of the interdental papillae, covering dental crowns;
- c) enlarged, cyanotic, with a smooth surface, easily bleeding on probing, rounded tops of the interdental papillae;
- d) dense, nodular, pale in color.

**12. Match the chronic gingivitis form with its characteristics:**

	<b>Chronic gingivitis form</b>		<b>Characteristic features</b>
1	Ulcerative gingivitis	A	Develops as the outcome of an acute process and is characterized by a mild course
2	Symptomatic gingivitis	B	Develops around the abnormally located teeth, crowded teeth, as a result of the gingiva injury by overhanging fillings, dental crowns, during pregnancy, in adolescents, when using some drugs
3	Hyperplastic gingivitis	C	Is associated with systemic diseases

**13. Match the chronic gingivitis form with the patient's complaints:**

	<b>Chronic gingivitis form</b>		<b>Patient's complaints</b>
1	Hyperplastic gingivitis (edematous form)	A	An increased sensitivity to the thermal and chemical stimuli, the feeling of burning, pain when brushing teeth
2	Simple marginal gingivitis	B	Gingiva overgrowth, itching, bleeding and pain, especially when eating, bad breath
3	Symptomatic gingivitis	C	Constant bleeding, a little gingiva pain, bad breath
4	Ulcerative gingivitis	D	Absence of complaints or the gingiva bleeding (during hard food consumption, brushing teeth, etc.)
5	Hyperplastic gingivitis (fibrous form)	E	Absence of complaints or unusual gingiva type and shape

**14. Match the chronic gingivitis form with its clinical features:**

	<b>Chronic gingivitis form</b>		<b>Clinical features</b>
1	Hyperplastic gingivitis (edematous form)	A	Gingival margin and interdental papillae are covered with a dirty-gray plaque, after the removal of which the erosive bleeding surface is formed
2	Hyperplastic gingivitis (fibrous form)	B	Gingiva is enlarged, cyanotic, with a smooth surface, the rounded tops of the interdental papillae easily bleed during probing
3	Ulcerative gingivitis	C	Smooth, shiny, marble appearance (erosion)
4	Symptomatic gingivitis	D	Gingiva with regular color, dense, enlarged, cover the crowns of the teeth, not bleed on probing

**15. Match the chronic gingivitis form with its gingiva surface appearance:**

	<b>Chronic gingivitis form</b>		<b>The gingiva surface</b>
1	Hyperplastic gingivitis (fibrous form)	A	Ulcerated
2	Ulcerative gingivitis	B	Smooth, shiny
3	Symptomatic gingivitis	C	Irregular, scalloped
4	Simple marginal gingivitis	D	Smooth, shiny, marble appearance

**16. Match the chronic gingivitis form with the gingiva margin contour characteristics:**

	<b>Chronic gingivitis form</b>		<b>Gingiva margin contour</b>
1	Hyperplastic gingivitis	A	Changeable, depends on the systemic factors and factors, that are localized in the area of interdental papillae and attached gingiva
2	Ulcerative gingivitis	B	Gingival papillae and (or) the marginal gingiva are increased in size, the enlarged gingiva covers the crown of the tooth
3	Symptomatic gingivitis	C	The tops of the gingival papillae are rounded, the gingival margin is thick and has the form of a roller
4	Simple marginal gingivitis	D	Scalloped gingival margin

**17. What is the gingival overgrowth degree, when gingival papillae and gingival margin are enlarged, rounded and cover  $\frac{1}{3}$  of the tooth crown?**  
(1 correct answer)

- a) I;      b) II;      c) III;      d) IV.

**18. What is the gingival overgrowth degree, when gingival papillae and gingival margin are enlarged, rounded and cover  $\frac{1}{2}$  of the tooth?** (1 correct answer)

- a) I;      b) II;      c) III;      d) IV.

**19. What is the gingival overgrowth degree, when gingival papillae and gingival margin are enlarged, rounded and cover more than  $\frac{1}{2}$  of the tooth crown up to the teeth incisal margin and occlusal surfaces?** (1 correct answer)

- a) I;      b) II;      c) III;      d) IV.

#### LITERATURE

1. Carranza, F. A. Carranza's Clinical Periodontology / F. A. Carranza. 11<sup>th</sup> ed. Saunders Elsevier, 2012. 825 p.
2. Aesthetic Periodontology / J. L. Denisova [et al.]. Minsk : BSMU, 2015. 20 p.
3. Egelberg, J. Periodontal examination / J. Egelberg, A. Badersten. Copenhagen : Munksgaard, 1994. 85 p.
4. Lindhe, J. Clinical Periodontology and Implant Dentistry / J. Lindhe. 4<sup>th</sup> ed. Blackwell Munksgaard, 2003. 1044 p.
5. Mueller, H. P. Periodontology. The Essentials / H. P. Mueller. Thieme, 2004. 188 p.
6. Perry, D. A. Periodontology for the dental hygienist / D. A. Perry, P. Beemsterboer. 3<sup>rd</sup> ed. St. Louis, Mo. : Saunders Elsevier, 2007. 484 p.
7. Schluger, S. Periodontal diseases : basic phenomena, clinical management and occlusal and restorative interrelationships / S. Schluger, R. Yuodelis, R. C. Page. 2<sup>nd</sup> ed. Philadelphia : Lea & Febiger, 1990. 759 p.
8. Publications on the topic of the lesson in dental journals, including «The Stomatologist».

**ANNOTATION TO THE PRACTICAL LESSON ON THE TOPIC  
«CHRONIC ULCERATIVE, HYPERPLASTIC AND SYMPTOMATIC GINGIVITIS:  
CLINICAL FEATURES, DIAGNOSIS METHODS»**

1. Chronic ulcerative gingivitis: the mechanism of development, classification characteristics, clinical features, diagnosis.

2. Hyperplastic gingivitis: the mechanism of development, classification characteristics, clinical features, diagnosis.

3. Symptomatic gingivitis: the mechanism of development, classification characteristics, clinical features, diagnosis.

**1. Chronic ulcerative gingivitis: the mechanism of development, classification characteristics, clinical features, diagnosis.**

*Chronic ulcerative gingivitis* is a disease, characterized by the appearance of ulceration in the area of gingival sulcus, interdental papillae and gingival margin. The disease develops by the influence of local unfavorable factors, leading to the gum inflammation and abnormality of the epithelium integrity. The pathological process develops in the area of contact with dental plaque, often in the interdental areas and leads to ulceration of gingival papillae. Microflora is nonspecific.

*Classification of periodontal diseases (prof. L. N. Dedova. 2012)*

<b>1. Gingivitis (K 05)</b>				
<b>1.1 Clinical course</b>	<b>1.2 Form</b>	<b>1.3 Stage</b>	<b>1.4 Prevalence rate</b>	<b>1.5 Severity</b>
1.1.6 acute (K05.0)	1.2.1 simple marginal (K05.10)	1.3.1 initial	1.4.1 localized	1.5.1 slight
1.1.7 chronic (K05.1)	1.2.2 ulcerative (K05.12)	1.3.2 early	1.4.2 generalized	1.5.2 moderate
1.1.8 recurrent	1.2.3 hyperplastic (K05.11)	1.3.3 developed		1.5.3 severe
1.1.9 progressive	1.2.4 symptomatic (K05.13, K05.08, K05.18,			
1.1.10 reversible	K069.1, B00.2)			

**Explanation:**

**Clinical course** — chronic.

**Form** — ulcerative.

**Stage** — developed.

**Prevalence rate** — localized.

**Severity** — slight, moderate, severe.

**Sample diagnosis:** *Chronic localized ulcerative gingivitis in the area of teeth 2.4; 2.5, developed stage, moderate severity.*

Patients with *chronic ulcerative gingivitis* complain of pain of varying intensity, bleeding, bad breath, difficulties during eating, possible violation of the general condition (headache, weakness).

Chronic ulcerative gingivitis can be diagnosed in the area of different kinds of traumas:

- *mechanical*: dental tartar, overhanging margins of the filling, denture clamps, etc.;

- *chemical*: iatrogenic injury (acid);

- *thermal*: diathermocoagulation, etc.

The affected surface becomes covered with soft dental plaque, which is yellowish-white or grey colored and is hardly removed. The gum is clinically hyperemic, swollen. The form of the gingival margin is changed because of the gingival papillae necrosis. The slightest touch of the gum leads to a sharp pain and bleeding. There is a typical bad breath. Intermediate glands are enlarged and painful. Dento-gingival attachment is not changed.

## **2. Hyperplastic gingivitis: the mechanism of development, classification characteristics, clinical features, diagnosis.**

*Hyperplastic gingivitis* is a disease, characterized by the gingiva enlargement due to an increased number of tissue elements. Usually gum hyperplasia, which is more typical for young people, accompanied by gingivitis, is associated with dental plaque. In severe cases, the disease may occur in individuals, who underwent long-term treatment with sodium diphenylhydantoin.

Gum hyperplasia may be accompanied by catarrhal inflammation, which is caused by diverse local and systemic factors: long-lasting mechanical trauma, dental plaque, overhanging filling margins, defectively fabricated denture, abnormally erupted teeth, taking certain medications, hormonal changes and oral breathing. Common unfavorable factors reinforce the negative effect of local unfavorable factors. Hormonal disorders are an aggravating factor of the gingivitis development in pregnant women.

Hyperplastic gingivitis is morphologically characterized by the epithelium overgrowth with nucleus pyknosis and vacuolar degeneration of the spinous layer cells cytoplasm. Another characteristic is lymphoid and plasma cells infiltration with a predominant perivascular location.

### **Explanation:**

**Form** — hyperplastic.

**Stage** — developed.

**Prevalence rate** — localized, generalized.

**Severity** — slight, moderate, severe.

The severity of the hyperplastic gingivitis is determined by the extent of the gum enlargement above the tooth crown:

*slight* —  $\frac{1}{3}$  of the tooth crown;

*moderate* —  $\frac{1}{2}$  of the tooth crown;

*severe* — more than  $\frac{1}{2}$  of the tooth crown.

**Sample diagnosis:** *Hyperplastic localized gingivitis in the area of teeth 3.3–4.3, developed stage, moderate severity.*

There are 2 clinical forms of the hyperplastic gingivitis: *edematous* and *fibrous*.

Patients with the edematous hyperplastic gingivitis complain of the gingiva enlargement, bleeding while brushing teeth, stripping of the gum from the teeth, pain while eating hard food and a bad breath.

In case of edematous hyperplastic gingivitis the marginal gingiva and gingival papillae are enlarged, ball-shaped, cyanochroic, glance, smooth and bleed on probing. There is positive Lukomsky symptom or positive vasopares symptom.

Patients with the fibrous hyperplastic gingivitis complain of unusual gingiva shape, its intense itching and a bad breath. In case of fibrous hyperplastic gingivitis the marginal gingiva and gingival papillae are enlarged, pale-colored, ball-shaped, tense, their surface is rough, don't bleed on probing. There is negative Lukomsky symptom or negative vasopares symptom. The epithelial attachment is not damaged. There are gingival pockets.

Gum hyperplasia, associated with the hormonal changes, is usually diagnosed in patients with poor oral hygiene. Hyperplasia may be localized and generalized.

### **3. Symptomatic gingivitis: the mechanism of development, classification characteristics, clinical features, diagnosis.**

*Symptomatic gingivitis* is a disease, occurring on the background of systemic diseases. The symptomatic gingivitis has a pluricausal nature. It may develop on the basis of dermatoses, HIV-infection, blood diseases, diabetes, vitamin C deficiency, etc. The diagnosis of symptomatic gingivitis is to be conducted in cooperation of the general practitioner with a dentist, based on clinical examination and laboratory data (histopathological and immunohistochemical).

**Explanation:**

**Clinical course** — chronic.

**Form** — symptomatic.

**Stage** — developed.

**Prevalence rate** — generalized.

**Severity** — slight, moderate, severe.

**Sample diagnosis:** *Chronic generalized symptomatic gingivitis developed stage, severe.*

Clinical features of symptomatic gingivitis are quite common. Patients complain of gum bleeding when brushing teeth and eating, spontaneous gum bleeding, pain, changes of the gum shape, bad breath, gum sensitivity to various stimuli. The clinical picture is similar to chronic simple marginal gingivitis,

ulcerative gingivitis, ulcerative-necrotic gingivitis and hyperplastic gingivitis. The epithelial attachment is not damaged.

Patients with *dermatosis* complain of increased sensitivity to thermal and chemical stimuli, feeling of burning and pain when brushing teeth, the appearance of vesicles and erosions on the gingival surface. As a result of the increased epithelium desquamation, the gingiva becomes bright red in color, smooth as polished. You can find epithelium desquamation in some areas, that forms bleeding erosions of «raw meat» color. Damage is localized on the gingiva vestibular surface (marginal and attached gingiva). It can be diffuse or local. In the later cases, the gum gets a «mottled» appearance due to the alternation of healthy and diseased areas. The clinical picture is very similar to the catarrhal inflammation of varying intensity. Sometimes erosion and flaking layers of the epithelium are located on the not inflamed mucosa.

*In case of HIV* there is a congestive hyperemia of the marginal gingiva, gum bleeding on toothbrushing and spontaneous bleeding in severe cases.

Hyperemia of marginal gingiva is often associated with the diffuse erythema of the alveolar gum.

*In case of diabetes*, dryness in the mouth leads to marked changes in the gingiva. Catarrhal and ulcerative-necrotic lesions are diagnosed. There is gingival recession, overgrowth of granulation, abundant dental plaque, purulence from the gingival pockets and abscesses.

*In case of vitamin C deficiency*, sudden gum bleeding develops as a consequence of the collagen synthesis and capillary permeability disorders. Petechial hemorrhages appear in different parts of the mouth. Furthermore ulcerative gingivitis and stomatitis may develop.

*In case of blood diseases*, there is ulcerative gingivitis, ulcerative-necrotic gingivitis, stomatitis with early gingival bleeding. Clinical manifestations of hemorrhagic syndrome are the reason for conducting professional oral hygiene with the plaque removal.

## **Topic «CHRONIC PERIODONTITIS. CLINICAL FEATURES, DIAGNOSIS»**

**Motivational Characteristics.** The dentist should have a basic knowledge of the risk factors, the mechanism of development, clinical features, diagnosis and differential diagnosis of chronic periodontitis. The dentist should be able to make the diagnosis and prognosis, competently plan the treatment and preventive measures. This topic is relevant to the preparation of qualified specialists.

### **Aims of the Lesson**

**Didactic:** to receive manual skills of basic diagnostic criteria, typical for chronic periodontitis.

**Methodical:** to study the clinical and x-ray features of chronic periodontitis and their causal relationship with the condition of the oral cavity and the whole organism.

**Scientific:** to form a reasonable clinical thinking, while assessing the dental health level and the risk factors, leading to periodontal diseases.

### **Goals of the Lesson:**

<b>On completing the lesson the students MUST KNOW</b>	<b>On completing the lesson the students MUST BE ABLE</b>
1. The role of local and systemic factors in the development of chronic periodontitis. 2. Clinical features of chronic simple and complex periodontitis. 3. Periodontal pocket: definition, mechanism of formation, types, methods of diagnosis. 4. Furcation involvement into the pathological process: diagnosis, classification.	1. To select the appropriate form of dialogue with a patient who has chronic periodontitis (assisted by the instructor). 2. To plan the examination of a patient with chronic periodontitis (assisted by the instructor). 3. To determine the presence and levels of inflammatory and destructive processes in periodontal tissues in a patient with chronic periodontitis (assisted by the instructor). 4. To interpret the X-ray picture of the alveolar process of a patient with chronic periodontitis (assisted by the instructor).

### **Requirements for the Initial Level of Knowledge:**

1. The causes and mechanism of development of periodontal diseases.
2. Methods of the gum condition determination.
3. Objective tests characterizing the destructive processes in the periodontium.
4. Assessment of the alveolar bone tissue.
5. Differential diagnosis of chronic gingivitis.



### **Control Questions from the Related Disciplines:**

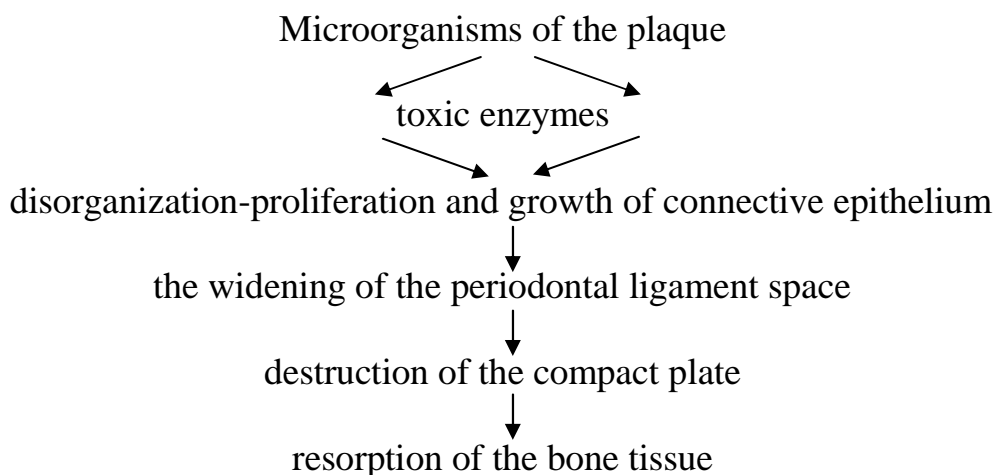
1. Anatomical and histological structure of the periodontium.
2. The phases of inflammation and morphological changes in periodontal tissues in case of inflammation.
3. The microflora of the oral cavity.
4. X-ray diagnosis in dentistry.

### **Control Questions on the Topic of the Lesson:**

1. The definition of chronic periodontitis. Classification of chronic periodontitis (ICD-DA, 1994; L. N. Dedova, 2012).
2. The role of local and systemic factors in the development of chronic periodontitis.
3. The development mechanism of chronic periodontitis.
4. Clinical manifestations of chronic periodontitis. Peculiarities of the clinical course.
5. The interpretation of indices, functional (vacuum-diagnosis and others) and laboratory diagnostic tests for chronic periodontitis.
6. Periodontal pocket: definition, types, mechanism of formation, diagnosis.
7. Determination of the level of the tooth furcation involvement into the pathological process in case of complex chronic periodontitis.
8. X-ray diagnosis of the alveolar bone in case of chronic periodontitis.
9. Differential diagnosis of chronic periodontitis.
10. Discussion of the publications on the topic of the lesson in dental journals, including «The Stomatologist».

### **Educational Materials.**

#### **The mechanism of the periodontal pocket formation**



## Differential Diagnosis of Chronic Periodontitis

Periodontitis	Etiology	Histopathology
Simple	Local irritants	Chronic inflammation of the gingiva, suprabony periodontal pocket, horizontal resorption of the inter-alveolar bone, destruction of the periodontal ligament, tooth mobility
Complex	Local irritants + occlusal trauma or disharmony	Chronic inflammation of the gingiva, infrabony periodontal pocket, vertical or angular resorption, destruction of the periodontal ligament, degenerative and necrotic changes of the vessels, tooth mobility

**Tasks for the Students' Individual Work.** For this lesson the student must learn the lecture material, the classification of periodontal diseases, the methods of assessing the gingiva condition (bleeding, color, surface structure, contour, density), integrity of the dentogingival attachment, the bone tissue of the alveolar ridge, the gingival or periodontal pocket, GI, PI indices and others, X-ray picture of the alveolar bone.

At the lesson the student conducts an examination of the dental patient, makes the differential diagnosis, plans the treatment, conducts certain stages of treatment under the supervision of the instructor. All the data of the examination and treatment should be reflected in the dental outpatient card and checked by the instructor.

### Self-Testing of the Topic Consolidation

#### *Case-studies*

**Case-study No 1.** Patient C., 53 years old, complained of gum bleeding on toothbrushing, discomfort when eating and a bad breath.

*From case-history:* Systemic, infectious diseases and allergic reactions hadn't been observed. Gum bleeding appeared more than 20 years ago. Periodically, 1 time per 2 years, the patient had received a treatment course (professional hygiene, antibiotic therapy). She had not received any advice concerning oral hygiene. The patient brushed her teeth 1 time per day, using mostly horizontal movements, did not use fluoride toothpaste.

*Clinical picture:* visual examination was without visible pathological changes. The oral mucosa was pale-pink in color, moderately moist.

Teeth 1.6, 1.5, 2.5, 2.6, 3.6, 3.7, 4.7 had been extracted; teeth 1.4, 2.4 had Class II fillings with overhanging margins near the gingival area, inadequate contact point; teeth 1.3, 2.3 had Class III dental cavities; teeth 1.7, 2.7, 4.6 had bad shaped fillings on the occlusal surface. Gingiva was cyanotic, bleeding on probing. The tops of the gingival papillae were rounded. OHI-S = 3,5, GI = 1,9.

*What are the medical tactics in diagnosis and treatment planning of the patient?*

**Case-study No 2.** Patient K., 42 years old, presented to the dentist complaining of gum bleeding on toothbrushing and a bad breath.

*From case-history:* He noticed firstly gum bleeding about 10 years ago. Periodically, the patient was treated by the dentist (calculus removal, medicines applications). Then there was a continuous improvement, but the gum bleeding continued. He rinsed the mouth with mouth-washes containing medicinal herbs (chamomile, sage). The patient had not received any advice, concerning oral care. He used different toothpastes and tooth powder, preferred hard toothbrushes. He brushed his teeth using mostly horizontal movements. General diseases and allergic reactions were not observed. The patient had such a bad habit as smoking.

*Examination:* The oral mucosa was pale-pink in color, moderately moist and there was plaque on the tongue.

Gingiva was cyanotic, bleeding on probing, the tops of the gingival papillae were rounded. OHI-S = 4,5; GI = 2,3.

*On the x-ray:* destruction of the alveolar ridge compact lamina, osteoporosis, horizontal resorption of the bone tissue up to  $\frac{1}{3}$  of the root length, periosteal pockets.

*What are the medical tactics in planning the diagnosis and treatment of the patient?*

**Case-study No 3.** Patient N., 45 years old, came to the dentist, complaining of gum bleeding on toothbrushing and spontaneous feeling of discomfort, burning when eating, «flying» pain from the cold agents.

*From case-history:* the patient presented to the dentist more than 5 years ago, professional hygiene had not been carried out. The level of oral care was low. The patient had not received any advice on oral hygiene from the doctor. Gum bleeding appeared periodically 3–4 times a year. The patient conducted self-treatment with herbal rinses.

*Objectively:* OHI-S = 2,2; GI = 2,7; I-II degrees of tooth mobility, teeth 3.1 and 4.1 had III degree of tooth mobility. The integrity of periodontal attachment was impaired in teeth 1.7, 1.6, 2.6, 3.6, 3.2, 3.1, 4.1, 4.5, 4.7, probing was accompanied by bleeding and pain. Interdental papillae in the area of teeth 1.6, 2.6, 3.1, 4.1 were swollen, bluish, bleeding on palpation. Marginal gingiva was cylindrically thickened.

*Panoramic x-ray:* on the upper jaw — horizontal resorption up to  $\frac{1}{3}$  of the tooth roots length. On the lower jaw — irregular destruction of the interdental septa up to  $\frac{1}{3}$  of the roots length, formation of the intrabony pockets in the area of teeth 3.6, 3.2, 3.1, 4.4., 4.5, 4.7, alveolar bone destruction in teeth 3.1, 4.1, 4.2 up to  $\frac{1}{2}$  of roots length. Root caries of teeth 3.6, 4.5. Osteoporosis of interdental and inter-root furcation areas of teeth 3.6, 4.6.

*What are your tactics in the diagnosis of this patient?*

## TEST QUESTIONS

**1. What is the name of the pocket, apical destructive sides of which are localized in the alveolar bone, i. e. apically to the adjacent ridge? (1 correct answer)**

- a) infrabony;
- b) suprabony;
- c) gingival;
- d) external.

**2. How is the suppuration from the periodontal pocket determined? (1 correct answer)**

- a) by means of palpation;
- b) with the help of the airstream;
- c) with the dental probe;
- d) by microscopy.

**3. What is the characteristic feature of chronic simple periodontitis? (1 correct answer)**

- a) dentine sensitivity;
- b) presence of periodontal pockets;
- c) integrity of the epithelial attachment;
- d) gingival hyperplasia.

**4. What is diagnosed in case of chronic simple periodontitis? (1 correct answer)**

- a) one osseous wall periodontal pocket;
- b) two osseous walls periodontal pocket;
- c) three osseous walls periodontal pocket;
- d) suprabony periodontal pocket.

**5. What are the characteristics of the chronic simple slight severity periodontitis? (1 correct answer)**

a)  $\frac{1}{3}$ – $\frac{1}{2}$  bone tissue resorption of interdental septum, degree I or degree II tooth pathological mobility, Class I and Class II furcation involvement, periodontal pocket depth up to 5 mm;

b) more than  $\frac{1}{2}$  bone tissue resorption of interdental septum, degree II or degree III tooth pathological mobility, Class II and Class III furcation involvement, periodontal pocket depth more than 5–6 mm;

c) less than  $\frac{1}{3}$  bone tissue resorption of interdental septum, absence of tooth pathological mobility, Class I furcation involvement, periodontal pocket depth up to 4 mm.

**6. What are the characteristics of the chronic simple moderate severity periodontitis? (1 correct answer)**

a)  $\frac{1}{3}$ – $\frac{1}{2}$  bone tissue resorption of interdental septum, degree I or degree II tooth pathological mobility, Class I and Class II furcation involvement, periodontal pocket depth up to 5 mm;

b) more than  $\frac{1}{2}$  bone tissue resorption of interdental septum, degree II or degree III tooth pathological mobility, Class II and Class III furcation involvement, periodontal pocket depth more than 5–6 mm;

c) less than  $\frac{1}{3}$  bone tissue resorption of interdental septum, absence of tooth pathological mobility, Class I furcation involvement, periodontal pocket depth up to 4 mm.

**7. What is the characteristic of the chronic simple periodontitis?**

*(1 correct answer)*

a) quick course with a rapid teeth loss at a young age;

b) long course;

c) quick progression.

**8. What are the characteristics of the chronic simple severe periodontitis? (1 correct answer)**

a)  $\frac{1}{3}$ – $\frac{1}{2}$  bone tissue resorption of interdental septum, degree I or degree II tooth pathological mobility, Class I and Class II furcation involvement, periodontal pocket depth up to 5 mm;

b) more than  $\frac{1}{2}$  bone tissue resorption of interdental septum, degree II or degree III tooth pathological mobility, Class II and Class III furcation involvement, periodontal pocket depth more than 5–6 mm;

c) less than  $\frac{1}{3}$  bone tissue resorption of interdental septum, absence of tooth pathological mobility, Class I furcation involvement, periodontal pocket depth up to 4 mm.

**9. What is the initial radiographic sign of chronic periodontitis?**

*(1 correct answer)*

a) desintegration of the cortical plates of interdental septa tops, widening of the periodontal ligament space and osteoporosis;

b) widening of the periodontal ligament space in the apical area of the tooth root;

c) bone resorption of the interdental septa up to  $\frac{1}{3}$  of the root length;

d) resorption of the bone tissue in the apical area of the tooth root.

**10. What kind of periodontal pocket is diagnosed in case of complex chronic periodontitis? (1 correct answer)**

a) external;                      b) infrabony;                      c) suprabony;                      d) internal.

**11. What kind of the bone resorption is typical for chronic simple periodontitis? (1 correct answer)**

a) horizontal;                      b) vertical;                      c) complex;                      d) combined.

**12. What are the characteristics of the chronic simple periodontitis?**

*(1 correct answer)*

a) destruction of the dento-gingival attachment with the formation of periodontal pockets;

- b) preservation of the dento-gingival attachments with the depth of the gingival sulcus more than 3 mm on probing;
- c) halitosis;
- d) localized gingival recession.

**13. What are the difficulties in assessment the depth of the periodontal pocket?** (*1 correct answer*)

- a) tartar, bleeding gums;
- b) a low level of the patient's motivation;
- c) the patient's age;
- d) the patient's gender.

**14. What causes chronic complex periodontitis?** (*1 correct answer*)

- a) local irritants;
- b) occlusal trauma;
- c) local irritants and occlusal trauma or disharmony;
- d) only general factors.

**15. What is the indicator of the inflammatory process activity in case of chronic simple periodontitis?** (*1 correct answer*)

- a) suppuration from the periodontal pocket;
- b) I degree of tooth mobility;
- c) dental plaque;
- d) appearance of the tooth sensitivity.

**16. The percussion sound of the mobile teeth in comparison with immobile teeth:** (*1 correct answer*)

- a) doesn't change;
- b) changes;
- c) changes only in patients with aggressive periodontitis;
- d) changes only in patients with symptomatic periodontitis.

**17. Suprabony periodontal pocket is a pocket, the apical destructive sides of which:** (*1 correct answer*)

- a) are inside the alveolar process, i. e. apical to the adjacent alveolar ridge;
- b) adjacent to the alveolar ridge in the root area;
- c) all the variants are correct.

**18. What indices allow to evaluate the level of periodontal tissues destruction?** (*1 correct answer*)

- a) PMA (I. Schour, M. Massler, 1948; C. Parma, 1960), GI (H. Loe, J. Silness, 1963), OHI-S (J. C. Green, J. R. Vermillion, 1964);
- b) CPITN (J. Ainamo et al., 1982), PI (A. L. Russel, 1956);
- c) PLI (J. Silness, H. Loe, 1964), PI (A. L. Russel, 1956), PBC (L. N. Dedova, 1981).

**19. Choose the periodontal index:** *(1 correct answer)*

- a) PLI (J. Silness, H. Loe, 1964);
- b) PI (A. L. Russel, 1956);
- c) PBCI — peripheral blood circulation index (L. N. Dedova, 1981).

**20. What periodontal index takes into account the depth of the periodontal pocket?** *(1 correct answer)*

- a) PI (A. L. Russel, 1956);
- b) CPITN (J. Ainamo et al., 1982);
- c) PDI (S. P. Ramfjord, 1959).

**21. What periodontal index takes into account the value of the epithelial attachment loss?** *(1 correct answer)*

- a) PI (A. L. Russel, 1956);
- b) CPITN (J. Ainamo et al., 1982);
- c) PDI (S. P. Ramfjord, 1959).

**22. Which index takes into account the level of the alveolar bone resorption or growth?** *(1 correct answer)*

- a) PI (A. L. Russel, 1956);
- b) AI (J. L. Denisova, 2012);
- c) CPITN (J. Ainamo et al., 1982).

**23. What is the prevalence of chronic periodontitis in the age group of 15 years old in the Republic of Belarus according to the CPITN code 3 (%)?** *(1 correct answer)*

- a) 14,6;      b) 7,3;      c) 23,6;      d) 25.

**24. How does the prevalence of chronic periodontitis change with the age increase?** *(1 correct answer)*

- a) it decreases;      b) it increases;      c) it doesn't change.

**25. What is the prevalence of chronic periodontitis in the age group of 35-44 years old in the Republic of Belarus according to the CPITN code 3 (%)?** *(1 correct answer)*

- a) 15;      b) 62,5;      c) 25,5;      d) 45,5.

**26. What part of the periodontium is involved into the pathological process in case of chronic generalized simple periodontitis?** *(1 correct answer)*

- a) two or three teeth of different groups;
- b) not more than 30 % of the existing teeth (up to 8 teeth);
- c) not more than 15 % of the existing teeth;
- d) more than 30 % of the existing teeth (more than 8 teeth).

**27. Which percent of teeth is involved into the pathological process in case of chronic localized simple periodontitis?** *(1 correct answer)*

- a) 45;      b) 30;      c) 15;      d) 5.

**28. What is the Class of the furcation involvement in case of 1–3 mm furcation probing? (1 correct answer)**

- a) F<sub>0</sub>;            b) F<sub>1</sub>;            c) F<sub>2</sub>;            d) F<sub>3</sub>.

**29. What is the Class of the furcation involvement in case of 7–9 mm furcation probing? (1 correct answer)**

- a) F<sub>0</sub>;            b) F<sub>1</sub>;            c) F<sub>2</sub>;            d) F<sub>3</sub>.

**30. What is the Class of the furcation involvement in case of 4–6 mm furcation probing? (1 correct answer)**

- a) F<sub>0</sub>;            b) F<sub>1</sub>;            c) F<sub>2</sub>;            d) F<sub>3</sub>.

#### **LITERATURE**

1. *Carranza, F. A. Carranza's Clinical Periodontology* / F. A. Carranza. 11<sup>th</sup> ed. Saunders Elsevier, 2012. 825 p.
2. *Aesthetic Periodontology* / J. L. Denisova [et al.]. Minsk : BSMU, 2015. 20 p.
3. *Egelberg, J. Periodontal examination* / J. Egelberg, A. Badersten. Copenhagen : Munksgaard, 1994. 85 p.
4. *Lindhe, J. Clinical Periodontology and Implant Dentistry* / J. Lindhe. 4<sup>th</sup> ed. Blackwell Munksgaard, 2003. 1044 p.
5. *Mueller, H. P. Periodontology. The Essentials* / H. P. Mueller. Thieme, 2004. 188 p.
6. *Perry, D. A. Periodontology for the dental hygienist* / D. A. Perry, P. Beemsterboer. 3<sup>rd</sup> ed. St. Louis, Mo. : Saunders Elsevier, 2007. 484 p.
7. *Schluger, S. Periodontal diseases : basic phenomena, clinical management and occlusal and restorative interrelationships* / S. Schluger, R. Yuodelis, R. C. Page. 2<sup>nd</sup> ed. Philadelphia : Lea & Febiger, 1990. 759 p
8. Publications on the topic of the lesson in dental journals, including «The Stomatologist».

#### **ANNOTATION TO THE PRACTICAL LESSON ON THE TOPIC «CHRONIC PERIODONTITIS. CLINICAL FEATURES, DIAGNOSIS»**

1. The role of local and systemic factors in the development of chronic periodontitis.
2. Clinical features of chronic simple and complex periodontitis.
3. Periodontal pocket: definition, mechanism of formation, types, methods of diagnosis.
4. Furcation involvement into the pathological process: diagnosis, classification.

#### **1. The role of local and systemic factors in the development of chronic periodontitis.**

Risk factors in the development of chronic periodontitis:

- 1) bacterial flora of the mouth;
- 2) age;
- 3) smoking;
- 4) systemic diseases:



- reduced number and function of polymorphonucleocytes;
  - hormonal disorders;
  - blood diseases (including leukemia);
  - genetic predisposition;
- 5) stress.

## **2. Clinical features of chronic simple and complex periodontitis.**

In case of simple periodontitis the dentist clinically determines chronic inflammation of periodontal tissues: hyperemia, swollen gingiva, bleeding on probing, destruction of the periodontal ligament, tooth loosening. The dentist reveals radiographically chronic inflammation of periodontal tissues: suprabony periodontal pocket, horizontal resorption of the alveolar bone.

In case of complex periodontitis the dentist clinically determines chronic inflammation of periodontal tissues: hyperemia, swollen gingiva, bleeding on probing, destruction of the periodontal ligament, tooth loosening, degenerate and necrotic changes of the blood vessels. The dentist detects radiographically chronic inflammation of periodontal tissues: infrabony periodontal pocket, vertical and angular resorption of the alveolar bone.

## **3. Periodontal pocket: definition, mechanism of formation, types, methods of diagnosis.**

*Periodontal pocket* is a pocket outside of the gingiva, penetrating deeper into the destroyed periodontal tissue.

The mechanism of the periodontal pockets formation:

1. Inflammation
2. Destruction of the interdental fibers (Sharpey's fibers), proliferation of the epithelium along the root, displacement of the epithelial attachment.

Local stimulus primarily lies in the mechanism of the periodontal pockets formation, which causes inflammation of the gingiva. Then there is a destruction of interdental fibers (Sharpey's fibers) again, which contributes to the proliferation of the epithelial attachment along the root and apical migration of the epithelial attachment. Once formed, the periodontal pocket is a focus of chronic inflammatory process.

There are different types of periodontal pockets, depending on the topography, localization, prevalence, depth of the lesion, bone tissue involvement:

- *an infrabony periodontal pocket* is a periodontal pocket in which the bottom is apical to the level of the adjacent alveolar bone;
- *a suprabony periodontal pocket* is a periodontal pocket in which the bottom is coronal to the underlying bone. This condition is associated with horizontal bone resorption;

□ *a simple periodontal pocket* is a pocket, which is located at one surface of the tooth;

□ *a compound periodontal pocket* is a pocket, which is detected at two or more surfaces of the tooth. The basis of the periodontal pocket is at the level of marginal gingiva;

□ *complex periodontal pocket* is a pocket, that covers the tooth from all its sides.

Dentists evaluate the presence of periodontal pockets using the periodontal probe. While determining the depth of the periodontal pocket, it is necessary to take into account the presence of dental plaque, bleeding on probing and painful reaction on probing.

#### **4. Furcation involvement into the pathological process: diagnosis, classification.**

Furcation is usually involved into the pathological process in case of periodontitis. This is a region of the alveolar bone in the area of the root furcation. The presence of the furcation involvement is diagnosed using the furcation probe and the x-ray. Researchers have suggested several classifications of furcation involvement into the pathological process:

<b>Class A</b>	<b>Class B</b>	<b>Class C</b>
1–3 mm	4–6 mm	7–9 mm
<b>Class I</b>	<b>Class II</b>	<b>Class III</b>
Initial involvement	Partial involvement	Complete or perforating involvement
F1	F2	F3

## **Topic «PROGNOSIS OF PERIODONTAL DISEASES. TREATMENT PLANNING OF PERIODONTAL DISEASES»**

**Motivational Characteristics.** The prognosis of periodontal diseases depends on the length and duration of the disease, indicating a possible outcome of the disease. It is an important issue, affecting the efficiency and professionalism of the planned treatment and preventive measures. The prognosis for a patient with periodontitis exists in two aspects: the general prognosis and prognosis for individual teeth. The phases of the prognosis take into account the data of the previous examination results and additional examination methods. In this regard, this topic is one of the most important steps in the synthesis of knowledge gained in previous lessons. Without mastering this topic it is impossible to study the subsequent topics.

### **Aims of the Lesson**

**Didactic:** to teach students to identify the preventive measures on the basis of the prognosis.

**Methodical:** to teach students to analyze and organize the data, obtained during the examination of the dental patient with periodontal pathology with the aim of making the diagnosis, as well as planning the treatment and preventive measures.

**Scientific:** to form clinical thinking in assessment of dental status in case of the periodontal tissues pathology with the aim of subsequent prognosis.

### **Goals of the Lesson:**

<b>On completing the lesson the students MUST KNOW</b>	<b>On completing the lesson the students MUST BE ABLE</b>
<ol style="list-style-type: none"> <li>1. Methods of examining dental patients for making diagnosis, determining the prognosis and planning the treatment.</li> <li>2. General and local factors determining the prognosis of periodontal diseases.</li> <li>3. Stages of treatment planning.</li> </ol>	<ol style="list-style-type: none"> <li>1. To systematize the data, obtained during the periodontal tissues examination in order to predict periodontal diseases (assisted by the instructor).</li> <li>2. To justify the prognosis for a patient with gingivitis and periodontitis in regard to the general prognosis and the prognosis for individual teeth (assisted by the instructor).</li> <li>3. To determine the quantity of therapeutic and preventive measures on the basis of prognosis (assisted by the instructor).</li> </ol>

### **Requirements for the Initial Level of Knowledge:**

1. Classification of periodontal diseases.
2. Methods of assessment of the gingiva condition.
3. The methods of evaluating the integrity of the periodontal attachment.
4. X-ray characteristic of normal and pathological periodontal tissues.

5. The method of determining the degree of furcation involvement into the pathological process in multirouted teeth.

**Control Questions from the Related Disciplines:**

1. Anatomical and histological structure of the periodontium.
2. Stages of inflammation, morphology of inflammation in the periodontium.
3. Basic and additional methods of examining the dental patient.
4. Radiography of the maxillofacial area.

**Control Questions on the Topic of the Lesson:**

1. Prognosis: definition, types.
2. The stages of prognosing periodontal disease.
3. Prognostic features of patients with periodontal diseases.
4. Prognostic features that characterize the prognosis of the teeth condition.
5. Prognostic features of patients with aggressive periodontitis.
6. The steps in planning the treatment of patients with periodontal diseases.
7. Discussion of the publications on the topic of the lesson in dental journals, including «The Stomatologist».

**Educational Materials.**

**Treatment planning**

Stages	Aim
1. Setting up priorities	To identify the most important dental problems in the patient (caries, periodontal disease, diseases of the mucous membrane of the oral cavity)
2. Definition of measurable goals	<ol style="list-style-type: none"> <li>1. To reduce the growth rate of caries in the patient.</li> <li>2. To normalize hygiene to a good level (OHI-S not &gt; 0.6).</li> <li>3. To reduce the gingival inflammation intensity (GI not &gt; 0.8).</li> <li>4. To reduce the depth of the periodontal pockets to the parameters of the physiological norm.</li> <li>5. In severe forms of periodontitis associated with systemic diseases, it is possible to speak about stabilization of the inflammatory process activity:               <ul style="list-style-type: none"> <li>– no recurrence;</li> <li>– reduction of inflammatory events (no suppuration of pockets or swelling of the gingiva);</li> <li>– no evidence of active process in bone tissue on the x-ray;</li> <li>– reduction of periodontal pockets growth and depth</li> </ul> </li> </ol>
3. Determination of the therapeutic and preventive measures volume on the basis of prognosis and treatment plans	At this phase it is necessary to take into account the indications and contraindications for surgical interventions, the patient’s ability and willingness to cooperate with the doctor

**Tasks for the Students’ Individual Work.** To learn the material of this lesson completely the student is to study the lecture material, to know the classification of periodontal diseases, methods of assessing the gum

condition and the integrity of the periodontal attachment; to be able to assess the gum condition (color, bleeding, contour, consistency, position, pain) and alveolar bone tissue condition; to determine the presence of gingival or periodontal pocket; to determine and evaluate GI, CPITN and PI indices.

The student conducts the examination of the dental patient, makes a differential diagnosis, determines the prognosis and confirms the diagnosis, plans the treatment, carries out the stages of treatment under the direction and supervision of the instructor. All the data of the examination and treatment should be reflected in the out-patient medical history and checked by the instructor.

**Self-Testing of the Topic Consolidation**

*Case-studies*

**Case-study No 1.** Patient N., 20 years old, presented to the dentist with complaints of mobility of some teeth.

*From case-history:* general diseases had not been identified, early loss of teeth was observed in her mother.

*During the examination:*

1/0	0/0	2/0	OHI-S
1/0	1/0	1/0	

*What additional examination methods must be applied for the final diagnosis?*

*What prognosis can be made on the basis of available data?*

**Case-study No 2.** Patient K., 50 years old, had suffered from periodontal diseases for more than 15 years.

The dentist revealed bone tissue resorption of the alveolar ridge of more than 1/2 of the roots length, mobility of teeth, the second degree of furcation involvement. The patient was unmotivated and difficult in cooperation. She believed that the result of treatment depended only the doctor’s actions.

*What is the prognosis of the periodontal disease treatment in this case?*

**Case-study No 3.** Patient S., 18 years old, asked for further treatment of periodontal disease. During the first visit, 1 month before, she had been diagnosed with chronic simple marginal gingivitis.

*During the examination:* OHI-S

2/2	1/0	2/2
2/2	1/1	2/2

*What is the prognosis of this disease?*

**TEST QUESTIONS**

**1. Does the prescription of the disease influence the prognosis of individual teeth with periodontal disease? (1 correct answer)**

- a) yes;
- b) no;
- c) yes, but only in adolescence.

**2. Does the general prognosis influence the prognosis of individual teeth with periodontal disease? (1 correct answer)**

- a) yes;
- b) no;
- c) yes, but only the prognosis of molars with furcation involvement.

**3. What factors are most important in determining the prognosis of periodontal diseases? (1 correct answer)**

- a) the amount of dental plaque and the degree of periodontal tissue destruction;
- b) the concentration of Streptococcus mutans in saliva and saliva buffer capacity;
- c) the severity of caries and the level of dental care;
- d) all of the above.

**4. How does the speed of disease progression affect the general prognosis of periodontal diseases? (1 correct answer)**

- a) does not influence patients aged 18–20 years;
- b) periodontal diseases progressing both rapidly and slowly have the same prognosis;
- c) prognosis is poor in case of a rapidly progressive periodontitis.

**5. Does the prognosis of periodontal diseases depend on the patient's trust and desire to cooperate with the doctor? (1 correct answer)**

- a) depends only at the age of 18–20 years;
- b) depends;
- c) does not depend;
- d) does not depend only at the age of 18–20 years.

**6. What prognosis is made at the first stage? (1 correct answer)**

- a) the prognosis for individual teeth;
- b) the general prognosis;
- c) the general prognosis and prognosis for individual teeth are carried out simultaneously.

**7. What factors are taken into account in determining the prognosis of individual teeth? (1 correct answer)**

- a) tooth mobility and periodontal pocket depth;
- b) furcation involvement and tooth morphology;
- c) bone destruction degree on each surface of the tooth, caries and its complications;
- d) all of the above.

**8. What factors determine a good prognosis of periodontal diseases? (1 correct answer)**

- a) loss of sufficient amount of bone, surrounding the teeth, tooth mobility, Class I furcation involvement, acceptable communication with the patient;

b) sufficient amount of bone, surrounding the teeth, sufficient control of etiological factors (plaque), adequate communication with the patient;

c) absence of bone loss, excellent state of the gingiva, the patient's full confidence in the doctor.

**9. What factors determine poor prognosis of periodontal diseases?**

*(1 correct answer)*

a) advanced bone loss, Class II and Class III furcation involvement, mobility of all the teeth;

b) the average or advanced bone loss, mobility of all the teeth, Class I and Class II furcation involvement, questionable agreement of the patient to cooperate with the doctor;

c) an advanced bone loss, a great number of extracted teeth.

**10. What factors determine a favorable prognosis? (1 correct answer)**

a) loss of sufficient amount of bone surrounding the teeth, tooth mobility, Class I furcation involvement, cooperation with the patient;

b) sufficient amount of bone surrounding the teeth, enough control of etiological factors (plaque), adequate communication with the patient;

c) absence of bone loss, excellent state of the gingiva, the patient's full confidence in the doctor.

**11. What factors determine an unfavorable prognosis of periodontal diseases? (1 correct answer)**

a) severe bone loss, Class II and Class III furcation involvement, mobility of all the teeth;

b) moderate or severe bone loss, mobility of all the teeth, Class I and Class II furcation involvement, questionable agreement of the patient to cooperate with the doctor;

c) severe bone loss, a great number of extracted teeth.

**12. What prognosis is carried out first? (1 correct answer)**

a) first of all the prognosis of individual teeth;

b) first of all the general prognosis (the disease prognosis);

c) simultaneously the general, personal and individual teeth prognosis;

d) first of all the prognosis of the patient (the personal prognosis).

**13. Disease duration ... the prognosis of the individual teeth with periodontal diseases: (1 correct answer)**

a) affects;

c) affects ... only in adolescence;

b) doesn't affect;

d) affects ... only at an old age.

**14. What influences the prognosis of rapidly progressive periodontitis?**

*(2 or more correct answers)*

a) neutrophils functional activity;

b) gingiva morphofunctional condition;

- c) elastase-inhibitory activity of blood serum and the periodontal tissues destruction degree;
- d) masticatory efficiency of the dentofacial systems.

**15. What influences the periodontal prognosis? (2 or more correct answers)**

- a) enamel pearls;
- b) the type of enamel-cementum junction;
- c) enamel projection;
- d) additional dental cusp.

**16. What are the reasons for the ultrasonic scaler application? (2 or more correct answers)**

- a) removal of tartar (scaling);
- b) curettage;
- c) gingivoplasty;
- d) correction of overhanging filling margins.

**17. What will be the prognosis of severe periodontitis in smokers, if they are quitting smoking? (1 correct answer)**

- a) good;
- b) poor;
- c) uncertain;
- d) very good.

**18. The risk of developing severe periodontitis is higher in patients with gene polymorphism: (1 correct answer)**

- a) interleukin-1 (catabolin);
- b) interleukin-2;
- c) complement-1;
- d) complement-2.

**19. On the buccal surface of which teeth is the enamel projection (promotion of enamel along the root surface in the furcation area) located most frequently? (1 correct answer)**

- a) of the first upper jaw molar;
- b) of the second upper jaw molar;
- c) of the first lower jaw molar;
- d) of the second lower jaw molar.

**20. Where is the most difficult access to furcation? (1 correct answer)**

- a) at the first upper jaw premolar;
- b) at the second upper jaw premolar;
- c) at the first upper jaw molar;
- d) at the second upper jaw molar.

**21. What is the overall prognosis in patients with moderate periodontitis in case of a controlled gum inflammation level? (1 correct answer)**

- a) favorable;
- b) uncertain;
- c) poor;
- d) questionable.



## LITERATURE

1. *Carranza, F. A. Carranza's Clinical Periodontology* / F. A. Carranza. 11<sup>th</sup> ed. Saunders Elsevier, 2012. 825 p.
2. *Aesthetic Periodontology* / J. L. Denisova [et al.]. Minsk : BSMU, 2015. 20 p.
3. *Egelberg, J. Periodontal examination* / J. Egelberg, A. Badersten. Copenhagen : Munksgaard, 1994. 85 p.
4. *Lindhe, J. Clinical Periodontology and Implant Dentistry* / J. Lindhe. 4<sup>th</sup> ed. Blackwell Munksgaard, 2003. 1044 p.
5. *Mueller, H. P. Periodontology. The Essentials* / H. P. Mueller. Thieme, 2004. 188 p.
6. *Perry, D. A. Periodontology for the dental hygienist* / D. A. Perry, P. Beemsterboer. 3<sup>rd</sup> ed. St. Louis, Mo. : Saunders Elsevier, 2007. 484 p.
7. *Schluger, S. Periodontal diseases : basic phenomena, clinical management and occlusal and restorative interrelationships* / S. Schluger, R. Yuodelis, R. C. Page. 2<sup>nd</sup> ed. Philadelphia : Lea & Febiger, 1990. 759 p
8. Publications on the topic of the lesson in dental journals, including «The Stomatologist».

### ANNOTATION TO THE PRACTICAL LESSON ON THE TOPIC «PROGNOSIS OF PERIODONTAL DISEASES. TREATMENT PLANNING OF PERIODONTAL DISEASES»

1. Methods of examining dental patients for making diagnosis, determining the prognosis and planning the treatment.
2. General and local factors determining the prognosis of periodontal diseases.
3. Stages of treatment planning.

#### **1. Methods of examining dental patients for making diagnosis, determining the prognosis and planning the treatment.**

**Prognosis of the disease** is the conclusion about the disease forthcoming development and outcome on the basis of objective data. **Medical prognosis** is a prediction of the illness or disease outcome, based on the knowledge of the pathological processes development.

The prognosis for patients with periodontal diseases exists in two aspects: overall prognosis (the prognosis of the disease) and individual prognosis (the prognosis of the patient). Sometimes the prognosis of the disease and the prognosis of the same patient may not be the same.

There are good (favorable) and poor (unfavorable) prognoses. If the disease is well known to be completely curable (most gingivitis cases), we speak about favorable prognosis (prognosis bona).

A poor, or unfavorable prognosis (prognosis mala) is made when the regular rational treatment courses do not allow to achieve a stable remission, and the tooth loss is inevitable.

Prognosis should be determined after the diagnosis and before making up a treatment plan. It is necessary to take into account the following:

1. The pathological process duration.

2. Each tooth involvement into the pathological process.
3. The patient's age.
4. The number of teeth in the patient's oral cavity.
5. If the treatment strategy can be changed in case of losing the «key» tooth during treatment. How long the «key» tooth can be preserved.
6. If it is possible to restore the defect of dentition by the denture.
7. Status of the tooth supporting structures.
8. If the patient has received any treatment before and what the reaction of the periodontium to the previous treatment was.
9. What is the oral cavity status and how can it be improved.
10. If there are parafunctions and if they can be eliminated.
11. If the patient can control the dental plaque.
12. If there are enough opportunities and the periodontologist's experience to help the patient.
13. If the doctor has enough professionalism level and qualification to guarantee the optimal treatment.

The prognosis of the disease depends on the development of new clinical medicines at the moment. At the present stage of the Periodontology development (with new technologies both pharmacological and operational application), even in case of diagnosing aggressive periodontitis and applying a timely and rational treatment, the prognosis is far from being hopeless.

## **2. General and local factors determining the prognosis of periodontal diseases.**

The following factors influence the patient's prognosis:

1. Gender.
2. Age.
3. The patient's organism resistance (reactivity). Some patients have a marked positive effect shortly after the treatment beginning, other patients have little effect regardless of the treatment intensity. Therefore, you can accurately determine the prognosis after initial pre-treatment when the doctor determines the response of the body.
4. Constitutional and personality traits (hypochondria, anxiety, a tendency to focus on fixing the painful sensations contribute to a more severe and prolonged disease course).
5. Suffered and accompanying diseases, especially diabetes, the gastrointestinal tract, cardiovascular system, blood, and thyroid diseases.
6. Susceptibility to drugs, especially such drugs as antibiotics, Trichopolium, chlorhexidine and others.
7. Professional risks.
8. Bad habits.
9. Socio-economic conditions (many high-tech methods — flap surgery, orthodontic methods are not available for certain patients).

Early detection of the disease and the patient's age affect the disease prognosis. If the patient has a continuous pathological process, it is difficult to control it.

Young people have a better prognosis than adults and elderly people. If the patient is young, the pathological process is faster and more «malignant». At the same time, reparative processes in young people are more complete, compared to older generations. Nevertheless manifestations of periodontal tissues destruction and the individual prognosis are always worse in young patients, than in older ones.

***The prognosis for the individual teeth depends on the following:*** the teeth mobility, occlusal trauma, the bone loss level, periodontal pockets (not their depth). The individual teeth prognosis depends on the periodontal pockets base, the level of frenulum attachment, degenerative changes in the pulp and the amount of roots in the tooth.

The presence of occlusal trauma destroys the periodontal tissues aggressively, resulting in the vertical resorption and intraosseous pockets formation. The dentist should take into account the amount of remaining bone: the prognosis is good, when there is a slight loss of the bone tissue.

Clinicians make the prognosis on the basis of intraosseous pockets presence. The pocket depth is not the decisive factor for the prognosis, localization of the pocket base is much more important. If the periodontal pocket base is located near the root apex, then there is a high probability of bacterial products penetration through the apical foramina, which significantly worsens the prognosis. However, if you perform a combined treatment, it is possible to achieve the pathological process stabilization. The probability of intraosseous pockets treatment depends on the bone defect contour and the magnitude of the remaining bone wall.

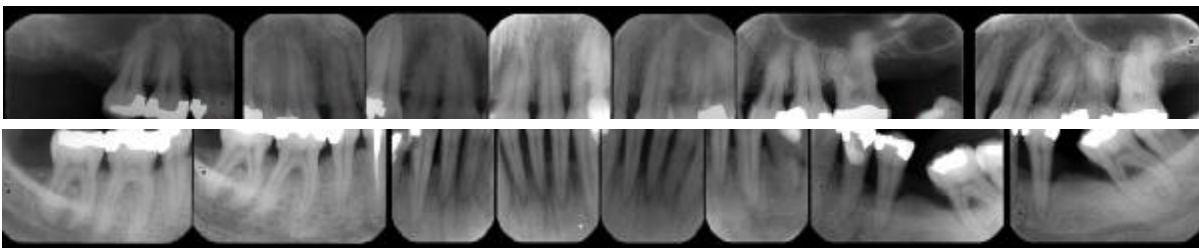
It should be noted that the prognosis of endodontically treated teeth is little different from the vital teeth prognosis. The periodontal re-attachment is likely to occur in vital than non-vital teeth because the vital tooth root recovers the attachment better.

The furcation involvement in multirouted teeth is a rather unfavorable situation, nevertheless these teeth have the advantage over single-rooted teeth, as they have additional support. However, maintaining hygienic measures with such teeth is very difficult.

If there is a possibility of prosthodontic treatment application, reconstruction of the dentition integrity, then the prognosis is good. You should take into account the «key» teeth, their compensatory ability: if they can stand the extra load as supporting elements.

To optimize the prognosis in patients with aggressive periodontitis, you should take into account the following clinical-laboratory features: gingiva morphofunctional condition, the level of the periodontal tissues destruction,

neutrophils functional activity, elastase-inhibitory activity of the blood serum,  $\alpha_1$  PI (proteinases inhibitor) activity, and  $\alpha_2$  — MG (macroglobulin) (figure 3).



*Figure 3.* Patient D., 45 years old, does not smoke, has uncontrolled type II diabetes, a genetic predisposition for periodontal diseases, high risk of periodontal disease progression

The computer program «Prognosis of Periodontal Diseases» was developed at the 3<sup>rd</sup> Department of Therapeutic Dentistry, BSMU for identification and analysis of prognostic signs of the disease by means of construction a programmed graph (J. L. Denisova, 2012).

The following prognostic criteria for the disease development were included into the program «Prognosis of Periodontal Diseases»: impaired microcirculation according to the laser and optical diagnosis (from 0 to 60 conventional units), the percentage of the alveolar bone loss, depending on the patient's age (from 0 to 100 %), the proportion of segments with bleeding on probing with the total number of segments in % (0 to 100 %), the number of segments with periodontal pockets of 5 mm depth or more (from 0 to 100 %), the number of missing teeth (from 1 to 32), the presence of dentofacial deformities (tooth migration, tooth crowding, and others) («Yes», «No»), systemic diseases (osteopenia or osteoporosis, type I, type II diabetes or IL-1 polymorphism, stress, etc.) («Yes», «No»), environmental factors such as cigarette smoking («does not smoke», «former smoker» — has not smoked over the past 5 years and over, «smokes sometimes», «smokes up to 20 cigarettes a day», «smokes more than 20 cigarettes a day», «smokes more than 40 cigarettes per day»).

Each parameter (vector) in programmed chart has its own measurement scale. All prognostic criteria are interpreted depending on the risk level of

possible disease development or progression (low, medium, high). There is a lower risk level in the central part, while there is a high risk level at the periphery. There is a zone of moderate risk level of periodontal diseases progression between them.

A comprehensive evaluation of prognostic criteria determines the individual risk level of possible disease progression, treatment, preventive measures and the frequency of visits. The program «Prognosis of Periodontal Diseases» calculates the size of the filled up part of the functional diagram in percent.

A low risk of periodontal diseases development is determined when all the parameters are within low limits of the chart or one parameter was in the category of medium risk.

An average risk level of the periodontal diseases development is determined if two parameters are in the middle sections of the chart, but not more than one parameter is in the category of high risk.

There is a high risk of the disease development when the patient has the most predictive characteristics at high limits. When the dentist calculates the parameters of the diagram area, he identifies three colors depending on the risk level. The low level corresponds to the green color, medium to yellow and high to red.

The developed method of analyzing the prognostic signs of periodontal diseases development and progression allows to determine in regard to both quality and quantity the risk level of periodontal diseases development and progression, the necessary diagnostic and treatment activities, and the dynamic monitoring frequency. It allows the dentist to inform the patient visually about the risk level of the periodontal diseases development, to conduct the monitoring of the ongoing prognostic signs and to increase the treatment effectiveness.

### **3. Stages of treatment planning.**

Currently, periodontists have come to the same opinion that in 92 % of cases gum inflammation occurs only from the local irritating factors which leads to conduct the main activities of their elimination. The treatment planning of periodontal diseases is a planned integrated system of manipulations, involving the order, sequence and timing of the implementation, aimed at restoring and maintaining oral health.

#### **I. Initial therapy.**

Hygienic measures:

- dental plaque removal;
- oral hygiene motivation and training;
- the control of the dental plaque growth.

Elimination of iatrogenic factors in the oral cavity.

Temporary splinting.

Elimination of parafunctions (bruxism).

Events on the gingival wall (curettage).

## **II. Re-evaluation of periodontal tissues.**

## **III. Orthodontic treatment.**

## **IV. Prosthodontic treatment.**

## **V. Surgical treatment.**

## **VI. Supportive periodontal therapy.**

The initial therapy consists of the elimination of etiological factors and particular irritating factors, such as dental plaque, iatrogenic factors and potentially harmful habits. Nevertheless, this stage is called «initial», it remains the most important and effective method of periodontal diseases treatment.

Hygiene measures consist of the dental plaque removal up to OHI-S = 0,5–0,6 together with the patient motivation about the need for these activities; teaching oral care, control of the plaque presence and growth. These three procedures are very important in the treatment as it is possible to make great efforts to eliminate periodontal pockets during follow-up, but it will all be in vain if the primary success of these procedures is not achieved at the beginning.

Initial therapy includes manipulations on the gingival wall or elimination of proliferative epithelial lining of the gum by the curettage method. This method has always been considered formal because it gives short-term effects. However, periodontists don't refuse this method and some international periodontists use it at the preparatory treatment stage.

During the elimination of iatrogenic factors you need to detect poor Class II, Class V, Class IV dental fillings with bad contact points and dentures with long crowns and traumatic intermediate parts.

The next step is **re-evaluation**, which evaluates the response of periodontal tissues to the activities of the preparatory phase and recording of the objective data into the patient's medical history. At this stage you should estimate the patient's oral hygiene, gingiva condition, periodontal pockets depth and the microcirculation status of the periodontium.

At the next stage, dentists carry out **orthodontic treatment** in case of dental anomalies and deformities. The position of this treatment phase is controversial in the treatment plan. Some dentists believe that it should be carried out in the early stages, other dentists believe this procedure is complicated, as it requires a lot of time (1–2 years). However, it is impossible to obtain a favorable periodontal disease prognosis and to ensure rational prosthodontic treatment, implantation, permanent teeth splinting and some surgical interventions without timely removing dental anomalies and deformities. Orthodontic treatment provides functional stimulation necessary to maintain the periodontal tissue health besides getting the occlusal adjustment.

Dentists apply **prosthodontic treatment** in case of teeth and dentition defects. This step is performed after implantation.

**Surgical treatment** with regular professional teeth cleaning within 3 months is aimed at the removal of the inflammation in periodontal pockets and the factors causing it, as well as restoration of the gingival contour and mucogingival relationships.

Radical therapy, aimed at reducing the pocket depth, has been questioned for many years. This type of surgical intervention was believed to lead to the gingival recession, dentine sensitivity and root caries. Researchers from many universities have conducted a series of clinical trials to assess the need of such interventions and their effectiveness.

These studies were firstly carried on in 1968 by a group of Michigan scientists headed by Professor Ramord. The scientists compared closed curettage and modified flap surgery according to the Widmann–Neumann method. It was determined that flap surgery resulted in the attachment regeneration even when the pockets depth was 7–12 mm. Closed curettage did not allow to achieve it, especially in the molar region. If the pocket depth was more than 4 mm, the subgingival calculus was not possible to remove without full viewing.

Swedish researchers have studied the same problem. The Swedish scientists have proved that only a proper and careful post-operative care determines the treatment outcome. If there is no perfect oral hygiene, the prognosis is unfavorable. In order to plan the surgical treatment, you need to assess the condition of the periodontal pocket, the reparative ability of the oral mucosa, the possibility of continuous professional oral care within 3 months and the patient's readiness for a long-term treatment.

**Supportive therapy** is the final stage in periodontal disease treatment. This therapy is focused on regular oral hygiene monitoring with its constant correction and detection of dental caries, fillings, occlusion and monitoring the microcirculation status in the periodontium.

Scientists have found that first disturbances occur in the microvasculature in case of periodontal diseases. Therefore, it is a sign of the periodontal tissue state, depending on the level of the pathological process, and its normalization after the whole medical treatment.

This period is the most critical for full stabilization of the periodontal regeneration process. Physiotherapy is one of the most effective methods of microcirculation normalization in the periodontal tissues.

## **Topic «INITIAL THERAPY OF PATIENTS WITH PERIODONTAL DISEASES: HYGIENIC PROCEDURES»**

**Motivational Characteristics.** Hygienic procedures enjoy priority among other activities for initial therapy of patients with periodontal diseases. The conduction of hygienic procedures has its own characteristics that require certain specific knowledge and skills.

### **Aims of the Lesson**

**Didactic:** to motivate students to study the stages of hygienic procedures in patients with periodontal diseases, methods and tools for oral professional hygiene.

**Methodical:** to teach students the methodological principles of planning hygienic procedures in patients with periodontal diseases.

**Scientific:** to form the students' scientifically grounded clinical thinking in planning, efficiency analysis of hygienic procedures in patients with periodontal diseases.

### **Goals of the Lesson:**

<b>On completing the lesson, the students MUST KNOW</b>	<b>On completing the lesson, the students MUST BE ABLE</b>
<ol style="list-style-type: none"> <li>1. Stages of hygienic procedures as a part of the initial therapy of periodontal diseases.</li> <li>2. Methods and tools, applied for professional oral hygiene.</li> </ol>	<ol style="list-style-type: none"> <li>1. To plan a sequence of hygienic procedures during initial therapy for a patient with periodontal disease (assisted by the instructor).</li> <li>2. To reveal dental calculus in a patient with periodontal disease (assisted by the instructor).</li> <li>3. To remove supragingival dental calculus up to OHI-S <math>\leq 0.3-0.6</math>.*</li> </ol>

\* Manipulation 3 in the column «MUST BE ABLE» is included into the list of practical skills performed without assistance.

### **Requirements for the Initial Level of Knowledge:**

1. The role of local and general factors in the development of periodontal diseases.

2. Diagnosis of periodontal diseases (chronic gingivitis, chronic periodontitis).

3. Motivation of the patient, teaching individual oral hygiene, hygiene control.

4. Ergonomics in Periodontology.

5. Prognosis of periodontal diseases.



### **Control Questions from the Related Disciplines:**

1. Morphological features of periodontal tissues.
2. Predisposing factors and the development mechanism of inflammatory and destructive processes in the periodontal tissues.
3. Pharmacotherapy in dentistry.
4. Definition of the notions «treatment planning», «emergency conditions», «prognosis».
5. Deontology in the work of the dentist.

### **Control Questions on the Topic of the Lesson:**

1. Characteristics of the hygienic procedures stages in the initial therapy of patients with periodontal diseases: motivation, hygiene lesson and control of dental plaque growth.
2. Steps of removing dental plaque in patients with periodontal diseases.
3. Dental calculus assessment (classification, interpretation).
4. Methods of removing dental calculus:
  - mechanical;
  - ultrasonic;
  - others.
5. Efficiency criteria of hygienic procedures stages.
6. Discussion of the publications on the topic of the lesson in dental journals, including «The Stomatologist».

**Tasks for the Students' Individual Work.** For learning this lesson the student is to study the lecture material and recommended literature. After making the diagnosis and prognosis the students begin to plan the periodontal disease treatment. The treatment plan is to be agreed with the patient. The patient's willingness to cooperate and economic opportunities should be taken into account. Planning is done individually. The practical part of the lesson is carried out on clinical patients. First and foremost is the provision of emergency periodontal treatment, if required, and then conducting further treatment according to the individual clinical case.

### **Self-Testing of the Topic Consolidation**

#### ***Case-studies***

**Case-study No 1.** Patient M., 23 years old, female, complained of gum bleeding while toothbrushing.

*Anamnesis:* she had no systemic and infectious diseases; allergic reactions were not noted. Gum bleeding appeared about a year before. Professional training of individual oral hygiene was never made. Toothbrushing was 1–2 times a day, with dominating reciprocating horizontal motions.

*Clinical picture:* external examination is without visible pathological changes. Oral mucosa is pale pink, moderately humid. OHI-S = 2.5; GI = 1.5. Teeth 2.5, 2.6, 4.7 had been extracted; teeth 1.5, 1.4 had Class II fillings with

overhanging margins, absence of contact points; teeth 1.3, 2.3 had Class III cavities; on the occlusal surfaces of the teeth 1.7, 2.7, 3.6, 4.6 there were fillings with abnormal marginal fitting. Gingiva was swollen, hyperemic, there was bleeding on probing. The tops of the gingival papillae were rounded.

*What are tactics of the dentist in making the diagnosis and treating this patient?*

**Case-study No 2.** Patient K., 32 years old, male, complained of gum bleeding while toothbrushing and a bad breath.

*Anamnesis:* he first noticed gum bleeding about 10 years ago. He went periodically to the dentist, where dental calculus was removed, applications and bandages of medications were made. There was a brief improvement, but then the bleeding continued. The patient rinsed the mouth with antiseptic mouthwash containing medicinal herbs (camomile, sage). Oral hygiene training had not been carried out. The patient brushed the teeth 1 time per day: sometimes in the morning, sometimes in the evening, with dominating horizontal motions. The patient used prophylactic toothpaste and a soft toothbrush. He was afraid to injure the gingiva because of bleeding. General diseases and allergic reactions were not noted.

*Examination of the patient.* Oral mucosa was pale pink, moderately humid. There was plaque on the tongue surface. OHI-S = 3.5; GI = 2.7.

		F		F			F	F		F		F	C	C	
8	7	6	5	4	3	2	1	1	2	3	4	5	6	7	8
	F	F	C								F		F	F	

Gingiva was swollen, hyperemic, there was bleeding on probing. Gingival papilla and marginal gingiva in the area of the teeth 2.6 and 2.7 were increased in size, consistency was friable, there was bleeding on probing. In the area of the remaining teeth the tops of the gingival papillae were rounded. In the area of teeth 3 2 1 | 1 2 3, the apical displacement of the gingival margin was up to 2 mm. There were gingival and periodontal pockets with a depth of 4–5 mm.

*X-ray examination:* destruction of compact lamina of the alveolar ridge top, osteoporosis of the interdental septum, horizontal resorption of the bone tissue up to  $\frac{1}{3}$  of the root length, suprabony pockets.

*What are tactics of the dentist in making the diagnosis and treating this patient?*

**Case-study No 3.** Patient N., 55 years old, male, complained of gum bleeding while toothbrushing, bad breath and teeth loosening.

*Clinical picture:* teeth 1.8, 1.6, 1.5, 2.6, 3.8, 3.7, 3.7, 4.6, 4.8 had been extracted. There was a filling with overhanging margins and with cementum caries on the distal surface of tooth 4.4; a Class III cavity on the proximal surfaces of teeth 1.1, 2.1; dental crowns in teeth 1.4, 1.3 and migration of the anterior teeth of the upper and lower jaws. Teeth 1.7, 1.4, 2.5, 2.7, 3.6, 3.4,

4.5, 4.7 had degree II tooth mobility, the remaining teeth had degree I tooth mobility. Gingival and periodontal pockets in the area of all the teeth were from 5 to 7 mm. Gingival papillae, marginal and alveolar gingiva was hyperemic, bleeding after being slightly touched. In the area of teeth 1.4, 1.3 gingival papillae and marginal gingiva were increased in size (cover  $\frac{1}{3}$  of the teeth crowns), loose, bleeding easily. There was an abundant amount of dental plaque. Indicators of objective tests were at the highest limits.

*X-ray*: destruction of the compact lamina of the alveolar ridge tops in the upper and lower jaws, interdental septum osteoporosis, widening of the periodontal ligament space, resorption of the bone tissue from  $\frac{1}{3}$  to  $\frac{1}{2}$  of the tooth root length. There were intrabony pockets in the area of teeth 1.7, 1.4, 2.5, 2.7, 3.6, 3.4, 4.5, 4.7, involving the furcation of teeth 1.7, 2.7, 3.6, 4.7.

*What are tactics of the dentist in making the diagnosis and treating this patient?*

**Case-study No 4.** Patient K., 24 years old, female, complained of gum bleeding while toothbrushing and gingival contour changes.

*Anamnesis*: 18 weeks pregnancy.

*Objectively*: OHI-S = 2.8; GI = 2.1. Gingival papillae were enlarged to  $\frac{1}{2}$  of the crowns length. There was gum bleeding on probing. There were precervical carious lesions, fillings with overhanging margins and gingival pockets.

*Make the diagnosis and plan the activities of the initial treatment stage.*

## TEST QUESTIONS

**1. What is the value of OHI-S index (J. C. Green, J. R. Vermillion, 1964) that proves the effectiveness of hygienic measures? (1 correct answer)**

- a) 0,7–1,6;                      b) 0,8–1,1;                      c) 0–0,6;                      d) 0,1–2,1.

**2. What is the value of GI index (H. Loe, J. Silness, 1963) that proves the effectiveness of the initial treatment stage? (1 correct answer)**

- a) 1,1–2,0;                      b) 0,2–0,8;                      c) 1,3–1,4;                      d) 2,1–3,0.

**3. Indicate the contraindication for ultrasonic removal of dental calculus: (1 correct answer)**

- a) gastrointestinal tract disease;                      c) blood disorders;  
b) locomotor system disease;                      d) hormonal disease.

**4. What instrument is used for root planing? (1 correct answer)**

- a) hand dental instruments;                      c) magnetostrictive scaler;  
b) piezoelectric scaler;                      d) sound scaler.

**5. What is the advantage of dental calculus ultrasonic removing in comparison with the manual method? (1 correct answer)**

a) quick removal of dental calculus, minimal discomfort for the patient, minimal soft tissue trauma;

- b) high quality, smooth surface of the tooth;
- c) effect of tooth whitening;
- d) absence of bleeding.

**6. When is the ultrasonic scaler used? (2 or more correct answers)**

- a) for scaling;
- b) for curettage;
- c) for gingival plastic surgery;
- d) for correction of filling overhanging margins.

**7. Gracey curettes 1/2 are designed for: (1 correct answer)**

- a) the oral surface of incisors and canines;
- b) the vestibular and oral surfaces of premolars;
- c) the vestibular surfaces of incisors and canines;
- d) the vestibular and oral surfaces of premolars and molars.

**8. Gracey curettes 3/4 are designed for: (1 correct answer)**

- a) the vestibular surfaces of incisors and canines;
- b) the oral surface of incisors and canines;
- c) the vestibular and oral surfaces of premolars;
- d) the mesial surface of premolars and molars.

**9. Gracey curettes 5/6 are designed for: (1 correct answer)**

- a) the vestibular and oral surfaces of premolars;
- b) the mesial surface of premolars and molars;
- c) the distal surface of premolars and molars;
- d) the vestibular surface of incisors and canines.

**10. Gracey curettes 7/8 are designed for: (1 correct answer)**

- a) the vestibular and oral surfaces of premolars and molars;
- b) the mesial surface of premolars and molars;
- c) the distal surface of premolars and molars;
- d) the vestibular surfaces of incisors and canines.

**11. Gracey curettes 9/10 are designed for: (1 correct answer)**

- a) the mesial surface of premolars and molars;
- b) the vestibular and oral surfaces of premolars;
- c) the vestibular and oral surfaces of molars, as well as hard-to-reach areas of the root surface;
- d) the vestibular surfaces of incisors and canines.

**12. Indicate the correct sequence of events at the initial stage of periodontal diseases complex treatment: (1 correct answer)**

- a) iatrogenic factors elimination in the oral cavity;
- b) dental plaque removal up to the OHI-S = 0.5–0.6 with a thorough motivation of the patient about the need for these activities;
- c) control of dental plaque growth;

d) oral hygiene training.

1) a, b, c, d;

2) b, d, c, a;

3) c, b, a, d.

**13. What does the initial therapy of patients with periodontal diseases include?** (2 or more correct answers)

a) emergency care;

b) carrying out professional oral hygiene;

c) correction of fillings and dentures;

d) the final restoration of the dentition integrity.

**14. Indicate the correct sequence of stages in the planning of chronic periodontitis treatment:** (1 correct answer)

a) supportive periodontal therapy;

b) initial therapy;

c) re-evaluation of periodontal tissues;

d) surgical treatment;

e) prosthodontic treatment;

f) orthodontic treatment.

1) a, b, c, d, e;

2) b, e, c, a, d;

3) c, b, e, a, d.

**15. Indicate the correct sequence of stages in the treatment of complex chronic periodontitis:** (1 correct answer)

a) surgical treatment;

b) initial therapy;

c) orthodontic treatment;

d) supportive periodontal therapy;

e) re-evaluation of periodontal tissues.

1) a, b, c, d, e;

2) b, e, c, a, d;

3) c, b, e, a, d.

**16. Indicate the correct sequence of stages in the treatment of chronic gingivitis:** (1 correct answer)

a) initial therapy;

b) orthodontic treatment;

c) supportive periodontal therapy;

d) re-evaluation of periodontal tissues.

1) a, b, c, d;

2) a, d, b, c;

3) c, b, a, d.

**17. Indicate the correct sequence of stages in the treatment of hyperplastic gingivitis: (1 correct answer)**

- a) surgical treatment;
  - b) initial therapy;
  - c) orthodontic treatment;
  - d) supportive periodontal therapy;
  - e) re-evaluation of periodontal tissues.
- 1) a, b, c, d, e;
  - 2) b, e, c, a, d;
  - 3) c, b, e, a, d.

**18. What is conducted at the preliminary stage of the periodontal diseases treatment? (2 or more correct answers)**

- a) periodontal abscess treatment;
- b) motivation;
- c) professional hygiene;
- d) gingival plastic surgery.

**19. What are the characteristics of the temporary dental splint? (2 or more correct answers)**

- a) it does not injure the soft tissues;
- b) it does not create areas for dental plaque accumulation;
- c) it is firmly fixed to teeth;
- d) it finally restores the dentition integrity.

**20. What are the objectives of the temporary splinting at the preliminary stage of treatment? (2 or more correct answers)**

- a) it provides rest for the periodontal tissues;
- b) it prevents teeth migration;
- c) it preserves the teeth with the degree III tooth mobility for a maximum time period;
- d) it reallocates the masticatory load.

**21. What are the obligatory components of toothpastes for patients with the chronic gingivitis? (1 correct answer)**

- a) medicinal herbs extracts, calcium gluconate;
- b) medicinal herbs extracts, antiseptics;
- c) potassium and sodium pyrophosphates, calcium bicarbonate;
- d) saltpeter, sodium citrate and magnesium chloride.

**22. What kind of toothbrush do the dentists recommend to patients with dental crowding? (1 correct answer)**

- a) a toothbrush with soft bristles;
- b) a mono- or little beam toothbrush as an additional device;
- c) a toothbrush with stiff bristles;
- d) bristle stiffness does not matter.

## LITERATURE

1. *Carranza, F. A. Carranza's Clinical Periodontology* / F. A. Carranza. 11<sup>th</sup> ed. Saunders Elsevier, 2012. 825 p.
2. *Aesthetic Periodontology* / J. L. Denisova [et al.]. Minsk : BSMU, 2015. 20 p.
3. *Egelberg, J. Periodontal examination* / J. Egelberg, A. Badersten. Copenhagen : Munksgaard, 1994. 85 p.
4. *Lindhe, J. Clinical Periodontology and Implant Dentistry* / J. Lindhe. 4<sup>th</sup> ed. Blackwell Munksgaard, 2003. 1044 p.
5. *Mueller, H. P. Periodontology. The Essentials* / H. P. Mueller. Thieme, 2004. 188 p.
6. *Perry, D. A. Periodontology for the dental hygienist* / D. A. Perry, P. Beemsterboer. 3<sup>rd</sup> ed. St. Louis, Mo. : Saunders Elsevier, 2007. 484 p.
7. *Schluger, S. Periodontal diseases : basic phenomena, clinical management and occlusal and restorative interrelationships* / S. Schluger, R. Yuodelis, R. C. Page. 2<sup>nd</sup> ed. Philadelphia : Lea & Febiger, 1990. 759 p.
8. Publications on the topic of the lesson in dental journals, including «The Stomatologist».

### ANNOTATION TO THE PRACTICAL LESSON ON THE TOPIC «INITIAL THERAPY OF PATIENTS WITH PERIODONTAL DISEASES: HYGIENIC PROCEDURES»

1. Stages of hygienic procedures as a part of the initial therapy of periodontal diseases.
2. Methods and tools, applied for professional oral hygiene.

#### **1. Stages of hygienic procedures as a part of the initial therapy of periodontal diseases.**

Hygienic measures in patients with periodontal diseases are carried out in a certain sequence. They include:

- motivation of the patient;
- selection of the appropriate home hygiene tools and the training to use them;
- control of dental plaque growth;
- consistent and thorough removal of dental plaque.

During the first visit, the doctor examines the oral cavity, evaluates the condition of the teeth, periodontium and oral hygiene with the use of OHI-S (Green–Vermillion), PHP (index of the oral hygiene effectiveness) hygiene indices.

The doctor shows the patient dental plaque on his teeth with the help of dental instruments and dental plaque indicators.

During the same visit, the doctor conducts a conversation with the patient about the role of dental plaque in the development of dental caries and periodontal diseases, conducts selection of individual oral hygiene appliances, gives recommendations for the oral care and conducts professional teeth cleaning.

During the second visit the patient comes to the doctor with the recommended hygiene appliances. The doctor determines the state of the oral hygiene, if needed, the doctor conducts the correction of toothbrushing technique on the model and directly in the oral cavity, demonstrates the technique of using interdental appliances. The doctor removes the remaining dental plaque.

During the following visit, the doctor controls the toothbrushing improvement, if it's necessary, corrects the oral hygiene.

During each visit, the dentist conducts a thorough removal of plaque and remaining dental tartar (supragingival dental plaque), especially in inaccessible dental surfaces.

## **2. Methods and tools, applied for professional oral hygiene.**

*Stage I. Dental plaque assessment (dental plaque localization and quantity).*

Dentists use the additional lighting for it. Determination of periodontal pocket depth and subgingival dental calculus, furcation involvement is performed using a periodontal probe.

*Classification of dental plaque (WHO, 1995)*

### **K03.6 Deposits [accretions] on teeth**

***Includes:*** staining of teeth NOS

K03.60 Pigmented film

Black

Green

Orange

K03.61 Due to tobacco habit

K03.62 Due to betel-chewing habit

K03.63 Other gross soft deposits

Materia alba

K03.64 Supragingival calculus

K03.65 Subgingival calculus

K03.66 Dental plaque

K03.68 Other specified deposits on teeth

K03.69 Deposits on teeth, unspecified

Orange pigmented dental plaque is localized on the oral and vestibular surfaces of the anterior teeth. It is created by special chromogenic microbes (*Sentra marcescens*, etc).

Green pigmented dental plaque is located on the vestibular surface of the upper incisors. It is found mostly on the milk teeth. The occurrence of this kind of dental plaque on the teeth is associated with specific bacteria and fungi — *Licren clentalis*.

Black pigmented dental plaque is located on the lingual surfaces of the teeth closer to the gingival margin, firmly attached to the tooth surface.



It is often found in women even with good hygiene. It is formed by *Bacteroides melaninogenicus* and other chromogenic bacteria.

Accretions on the teeth due to using tobacco look like dark brown accretions, products of tobacco smoke, firmly attached to the enamel cuticle and are difficult to remove.

Accretions due to chewing betel look like bright black pigmented accretions.

Other extensive soft accretions (soft dental plaque) are accumulations microbes, their metabolic products, epithelium, proteins, lipids, saliva and etc.

Supragingival calculus is a soft substance, calcified by saliva minerals.

Subgingival calculus is a consequence of long-term dental plaque accumulation, resulting in gum hyperplasia or recession.

*Stage II. Anesthesia.*

Dentists apply local or sometimes general anesthesia for removing dental plaque.

*Stage III. Preoperative treatment.*

Antiseptic debridment of the gingival margin and the precervical area of the teeth with non-irritating medicines using an injector or sprayer.

*Stage IV. Scaling and root planing.*

*Mechanical dental plaque removal.* Scaling is a scraping of the dental plaque, its waste products from the surface of the dental crown and root of the tooth.

Root planing is a smoothing of the root surface in the area of dental cementum and dentine.

*Physical method of dental plaque removal.* Dental plaque can be removed with ultrasonic devices.

*A chemical method of dental plaque removal.* The chemical method allows to remove the pigmented dental plaque. For this purpose, the dentists use low concentrations of sulfuric, trichloroacetic, lactic, ascorbic acids, etc.

*Stage V. Polishing of the tooth surfaces (crowns and roots).*

After removal of calculus (dental scale), the dentist should polish hard dental tissues and fillings with abrasive polishing pastes.

*Stage VI. Fluoridation and covering the teeth with medicines to prevent sensitivity.*

Polished surfaces of the crown, cervical part of the tooth and root of the tooth are to be coated with fluoride varnishes or special solutions.

*The effectiveness criteria of the preliminary stage activities.* After the preparatory activities the dentist must assess the state of oral hygiene, periodontal pockets and the microcirculation of the periodontal tissues.

**Topic «INITIAL THERAPY OF PATIENTS WITH PERIODONTAL DISEASES: PECULIARITIES OF DENTAL TISSUES RESTORATION IN PATIENTS WITH PERIODONTAL DISEASES»**

**Motivational Characteristics.** Dentists eliminate iatrogenic factors and restore dental tissues after performing professional hygiene during the preliminary treatment of patients with periodontal diseases. The student must learn a number of specific features of dental tissues restoration in patients with periodontal diseases. The knowledge of these features will allow to perform easily the most important stages of treatment patients with periodontal diseases.

**Aims of the Lesson**

**Didactic:** to motivate students to learn how to perform restoration in patients with periodontal diseases.

**Methodical:** to teach students the methodological principles of the planning the stages of dental tissues restoration in patients with periodontal diseases.

**Scientific:** to form the students’ scientifically grounded clinical thinking for planning and restoring dental tissues in patients with periodontal diseases.

**Goals of the Lesson:**

<b>On completing the lesson the students MUST KNOW</b>	<b>On completing the lesson the students MUST BE ABLE</b>
1. The main features of carious cavities preparation for dental tissues restoration in patients with periodontal diseases. 2. The sequence of actions for the restoration of the contact point and the shape of the tooth crown in patients with periodontal diseases.	1. To plan the stages of dental cavities preparation and tooth restoration in a patient with periodontal disease (assisted by the instructor). 2. To plan the stages of restoring the contact point and the shape of the tooth crown in a patient with periodontal disease (assisted by the instructor). 3. To evaluate the quality of tooth restoration in a patient with periodontal disease (assisted by the instructor).

**Requirements for the Initial Level of Knowledge:**

1. The role of local and general factors in the development of periodontal diseases.
2. The diagnosis of periodontal diseases.
3. The symptoms of periodontal diseases.
4. The prognosis of periodontal diseases.
5. Hygiene procedures during initial therapy treatment of periodontal diseases.
6. Ergonomics in Periodontology.

### **Control Questions from the Related Disciplines:**

1. The morphological features of periodontal tissues.
2. The phases of inflammation in the periodontal tissues.
3. Material science in dentistry.
4. The stages of dental cavities preparation.
5. Deontology in the work of a dentist.

### **Control Questions on the Topic of the Lesson:**

1. The choice of filling materials for dental restoration procedure in patients with periodontal diseases.
2. Characteristics of the initial stages of the carious lesion in patients with periodontal diseases.
3. The features of the operative area isolation during the restorative procedure in patients with periodontal diseases.
4. Restoration of the contact point and the shape of the tooth crown in patients with periodontal diseases.
5. The restoration procedure in patients with periodontal diseases.
6. Efficiency criteria of the quality of dental restorative procedure in patients with periodontal diseases.
7. Discussion of the publications on the topic of the lesson from dental journals, including «The Stomatologist».

**Tasks for the Students' Individual Work.** The student should learn the lecture material and the recommended literature. After making the diagnosis and prognosis the students begin to plan the treatment of periodontal diseases. The treatment plan should be agreed with the patient. The willingness of the patient to cooperate and his economic opportunities are taken into account. Planning is done individually.

The practical part of the lesson is carried out on clinical patients. The first and foremost is the provision of treatment of periodontal emergencies, if required, and then conducting further treatment according to the individual clinical situation.

### **Self-Testing of the Topic Consolidation**

#### ***Case-studies***

**Case-study No 1.** Patient K., 34 years old, complained of gum bleeding on toothbrushing.

*Anamnesis:* The patient had no general and infectious diseases, allergic reactions were not noted. Gum bleeding appeared about a year ago. Professional instruction on individual oral hygiene had never been made. Toothbrushing was done 1–2 times a day with dominating horizontal motions.

*Clinical picture:* external examination was without visible pathological changes. Oral mucosa was pale pink, moderate humid. OHI-S = 2.6; GI = 1.6, PI = 3.2. Teeth 2.8, 2.4, 4.8 had been extracted; teeth 2.5, 1.4 had Class II

restorations with overhanging margins and absence of contact points; teeth 1.1, 2.2, 1.3, 2.3 had Class III carious cavities; teeth 3.4, 3.5, 4.4 had carious lesions in the cervical area of the tooth, teeth 1.7, 2.7, 3.6, 4.6 had restorations on the occlusal surface with an incorrect anatomical shape. Gingiva was swollen and hyperemic, there was bleeding on probing. The tops of the gingival papillae were rounded.

*What are the tactics of the dentist in the diagnosis and treatment of this patient?*

**Case-study No 2.** Patient K., 22 years old, female, complained of gum bleeding while toothbrushing (in the area of teeth 2.6 and 2.7), accumulation of food between teeth.

*Anamnesis:* she first noticed gum bleeding about 2 months ago. She had been already directed to the dentist 12 months before. The dentist renovated two Class II cavities in teeth 2.6 and 2.7 with restoration of the contact point. The patient was motivated, maintained individual oral hygiene, brushed her teeth regularly 2 times a day, used dental floss. General diseases and allergic reactions were not noted.

*Examination of the patient.* Oral mucosa was pale pink, moderate humid. OHI-S = 0.5; GI = 0.9. Gingiva was of a pink color, dense, did not bleed after probing. Gingival papillae and marginal gingiva in the area of teeth 2.6 and 2.7 were increased in size, its consistency was friable, there was bleeding on probing.

*X-ray examination:* pathological changes in the alveolar bone were not detected. There was an impairment of the compact lamina density on the alveolar crest top in the area of the interdental septum between teeth 2.6 and 2.7, osteoporosis of the interdental septum, widening of the periodontal ligament space.

*What are the dentist's tactics in the diagnosis and treatment of this patient?*

**Case-study No 3.** Patient M., 65 years old, male, complained of gum bleeding while toothbrushing, bad breath and teeth loosening.

*Clinical picture:* teeth 2.7, 1.6, 1.5, 2.4, 3.8, 3.7, 4.6, 4.8 had been extracted. Tooth 4.4 had a filling with overhanging margins and caries of the cementum on the distal surface. There were Class III cavities on the proximal surfaces of teeth 1.1 and 2.1. There were crowns on teeth 1.4, 1.3 and migration of the anterior teeth of the upper and lower jaws. Teeth 1.7, 1.4, 2.5, 2.7, 3.6, 3.4, 4.5, 4.7 had degree II tooth mobility, the remaining teeth had degree I tooth mobility. The gingival and periodontal pockets were from 5 to 7 mm in the area of all the teeth. The gingival papillae, marginal and alveolar gingiva was hyperemic, swollen, bleeding after being touched slightly. In the area of teeth 1.4, 1.3, gingival papillae and marginal gingiva were increased in size (covered 1/3 of the teeth crowns), loose, easy bleeding. There was abundant dental calculus. OHI-S = 2.6; GI = 1.6; PI = 3.2.

*X-ray examination:* compact lamina destruction of the alveolar ridge tops on the upper and lower jaws, bone osteoporosis of the interdental septum, widening of the periodontal ligament space, bone tissue resorption from  $\frac{1}{3}$  to  $\frac{1}{2}$  of the tooth root length, there were intrabony pockets in the area of teeth 1.7, 1.4, 2.5, 2.7, 3.6, 3.4, 4.5, 4.7, involving the furcation of teeth 1.7, 2.7, 3.6, 4.7.

*What are the dentist's tactics in the diagnosis and treatment of this patient?*

### TEST QUESTIONS

**1. When are the treatment of carious defects and restorative procedures in patients with periodontal diseases planned? (1 correct answer)**

- a) during initial therapy;
- b) during the re-evaluation of the periodontal tissues;
- c) during orthodontic treatment;
- d) during surgical treatment.

**2. What are the indications for the filling replacement or correction? (2 or more correct answers)**

- a) rough surface, overhanging margin of the filling;
- b) absence of contact point with the adjacent tooth and disturbance of the marginal fit;
- c) color matching;
- d) premature contact with the opposing tooth in the area of the filling.

**3. Choose the characteristics of the carious process in Class II and Class IV cavities in patients with periodontal diseases: (1 correct answer)**

- a) combined damage of the crown and root areas;
- b) damage only of the crown area;
- c) damage of the tooth root;
- d) damage of the incisal margin and tooth tuberculum.

**4. What instruments should be used for the preparation of proximal tooth defects in patients with periodontal diseases? (1 correct answer)**

- a) an elongated bur;
- b) a shortened bur;
- c) dental excavators;
- d) enamel chisels.

**5. What should be used for a clear visualization of the carious defect boundaries in patients with periodontal diseases when performing restoration? (2 or more correct answers)**

- a) Rubber Dam;
- b) a clamp, which pushes the gingiva;
- c) a retraction cord;
- d) cotton rolls.

**6. What is used for the operative area isolation during the restoration procedure of carious defects in patients with periodontal diseases? (1 correct answer)**

- a) Rubber Dam;
- b) a mouth retractor;
- c) a retraction cord;
- d) cotton rolls.

**7. What material is it recommended to use for restoration of carious cavities on the proximal surfaces, which extend to the contact point and occlusal surface of the tooth in patients with periodontal diseases? (2 or more correct answers)**

- a) hybrid composite materials;
- b) nano-filled composite materials;
- c) dental cements;
- d) organically modified ceramics.

**8. What additional appliances are to be used for making restorations of proximal defects in patients with periodontal diseases? (2 or more correct answers)**

- a) elongated contour metal matrix, matrix holder, rings;
- b) elongated contour plastic matrix, clamps;
- c) shorter metal, plastic, composite matrix;
- d) elongated contour combined matrix, wedges.

**9. Indicate the instruments the dentist applies for shaping, grinding and polishing the proximal surfaces of restorations in patients with periodontal diseases: (2 or more correct answers)**

- a) metal strips with different dispersity;
- b) plastic strips with different dispersity;
- c) special oscillating tools;
- d) carborundum stones.

**10. What criteria are used for evaluation of the restoration quality in patients with periodontal diseases? (2 or more correct answers)**

- a) anatomical shape;
- b) marginal fit;
- c) surface;
- d) the presence of ledge.

#### LITERATURE

1. Carranza, F. A. Carranza's Clinical Periodontology / F. A. Carranza. 11<sup>th</sup> ed. Saunders Elsevier, 2012. 825 p.
2. Aesthetic Periodontology / J. L. Denisova [et al.]. Minsk : BSMU, 2015. 20 p.
3. Egelberg, J. Periodontal examination / J. Egelberg, A. Badersten. Copenhagen : Munksgaard, 1994. 85 p.
4. Lindhe, J. Clinical Periodontology and Implant Dentistry / J. Lindhe. 4<sup>th</sup> ed. Blackwell Munksgaard, 2003. 1044 p.
5. Mueller, H. P. Periodontology. The Essentials / H. P. Mueller. Thieme, 2004. 188 p.
6. Perry, D. A. Periodontology for the dental hygienist / D. A. Perry, P. Beemsterboer. 3<sup>rd</sup> ed. St. Louis, Mo. : Saunders Elsevier, 2007. 484 p.

7. Schluger, S. Periodontal diseases : basic phenomena, clinical management and occlusal and restorative interrelationships / S. Schluger, R. Yuodelis, R. C. Page. 2<sup>nd</sup> ed. Philadelphia : Lea & Febiger, 1990. 759 p.

8. Publications on the topic of the lesson in dental journals, including «The Stomatologist».

**ANNOTATION TO THE PRACTICAL LESSON ON THE TOPIC  
«INITIAL THERAPY OF PATIENTS WITH PERIODONTAL DISEASES:  
PECULIARITIES OF DENTAL TISSUES RESTORATION IN PATIENTS  
WITH PERIODONTAL DISEASES»**

1. The main features of carious cavities preparation for dental tissues restoration in patients with periodontal diseases.

2. The sequence of actions for the restoration of the contact point and the shape of the tooth crown in patients with periodontal diseases.

**1. The main features of carious cavities preparation for dental tissues restoration in patients with periodontal diseases.**

*The choice of dental filling materials for dental restoration in patients with periodontal diseases.* The choice of the type of dental filling materials in patients with periodontal diseases (especially when the dental filling material is in contact with the gingiva) should be carried out taking into account the oral hygiene level, the microflora nature and the severity of the disease. All dental filling materials are acceptable in case of chronic gingivitis and chronic periodontitis of mild severity, however, the preference should be given to dental amalgam and composite materials. The use of microfilling and hybrid composite filling materials is justified in case of moderate and severe chronic periodontitis.

*Characteristics of the stages of carious cavities preparation in patients with periodontal diseases.* Class II and Class V caries usually occurs with the damage of the tooth crown and root areas in patients with periodontal diseases. The stages of cavity preparation in these cases conform to the common principles of preparation of dental tissues carious defects. Classical preparation of proximal defects using the elongated bur implicates the opening of the decay cavity (opening of the proximal contact), removal of overhanging margins, necrectomy. The weakened surfaces of the tooth should be removed not less than 2 mm high. Enamel margins are to be beveled and smoothed. Medical treatment of cavities should be undertaken after the stages of preparation. It is recommended to use 0.5–2 % aqueous chlorhexidine solution (for example «Consepsis») for this purpose.

*Features of the operative area isolation during the teeth restoration in patients with periodontal diseases.* Rubber Dam should be used to isolate the dental operative area in patients with periodontal diseases. It is necessary to place a clamp on the tooth, which retracts its gum and allows the dentist to visualize clearly the borders of the carious lesion. The dentist can use

the retraction cord for this purpose as well, if you work without Rubber Dam. The retraction cord is to be inserted under the gum, using a special tool (a pack) before the preparation of the cavity.

## **2. The sequence of actions for the restoration of the contact point and the shape of the tooth crown in patients with periodontal diseases.**

*The restoration of the contact point and the shape of the tooth crown in patients with periodontal diseases.* Dentists recommend to use hybrid, microhybrid (traditional and condensible), nanofilled composite materials, as well as organically modified ceramics for restoration of proximal cavities, which extend to a contact point and occlusal surface.

The restoration of proximal defects in patients with periodontal diseases requires application of extra long contouring metal, plastic or combined matrix, matrix holders, rings, fixators and wedges. However, it should be remembered that none of the matrix systems provide a tight adaptation over the tooth surface and prevent excessive insertion of filling material.

The filling of the cavity, located near the gingiva, is conducted using active or passive methods. Dentists use special tools (for example, «Optra Contact») or prepolymerized composite inlays to restore the contact points of large decay cavities.

*Finishing dental restorations in patients with periodontal diseases.* The stage of grinding and polishing of the restorations is extremely important, as well-finished restorations can not create conditions for accumulation of food debris and adhesion of pathogenic microorganisms. A smooth surface of restorations is comfortable for the patient's self-care. For these purposes the following instruments should be applied: the finishing knives, plastic discs, diamond burs, 12–30-edged tungsten carbide burs, ceramic composite tools of aluminium abrasive grain, rubbers and silicone polishers, brushes, felt polishers and polishing pastes of different abrasivity. You should choose burs with small working parts and secure end for the removal of overhanging margins of restoration while working in the subgingival area. Dentists apply metal and plastic strips with different dispersion, special oscillating tools (for example, «Profin Lamineer», «Intensive» files) for shaping, grinding and polishing the proximal surfaces of the restoration. It is important to polish occlusal and proximal surfaces, contact points, as well as to create the correct boundary of buccal and oral surfaces when finishing the restoration. If the bending of the surface is insufficient, the food bolus will cause injury to the marginal gingiva. If the bending of the surface is excessive, there is a difficulty in the self-purification of the tooth. The distance between the maximum point of bending of the vestibule-oral surfaces and the epithelial attachment point is 0.75 mm from the lingual surface and 0.50 mm from the vestibular surface in the lower premolars and 1.00 mm in the lower molars.



***Efficiency criteria of the tooth restoration quality in patients with periodontal diseases.*** Evaluation of the restoration quality effectiveness in patients with periodontal diseases is carried out directly after the treatment, shortly after the treatment and when the patient is followed-up. Quality indicators of dental restorations are: absence of patient's complaints and the highest «A» grades, according to the USPHS criteria: anatomical form, marginal fit, marginal staining, surface and colors matching. Dentists determine the presence/absence of a contact point, the overhanging margins of the filling on the proximal surfaces and in the subgingival area by means of probing, using dental floss and the radiographic method. Absence of inflammation of the interdental gingiva in the area of the restored teeth contact surfaces is determined clinically.

**Topic «COMPLEX TREATMENT OF PERIODONTAL DISEASES.  
PHARMACOTHERAPY»**

**Motivational Characteristics.** The management of periodontal diseases is complex and includes the use of medications. In order to choose the appropriate medication, it is important to know the modern protocols of treatment, indications, contraindications, possible side effects and complications.

**Aims of the Lesson**

**Didactic:** to learn that the treatment plan should be based on the patient's general health and the periodontal disease stage.

**Methodical:** to be able to apply relevant knowledge of the treatment protocol in Periodontology.

**Scientific:** to be able to use the science-based approach in planning the treatment of patients with periodontal diseases and provide effective and appropriate patient management.

**Goals of the Lesson:**

<b>On completing the lesson the students MUST KNOW</b>	<b>On completing the lesson the students MUST BE ABLE</b>
1. The role of local medicinal therapy in the treatment of periodontal diseases. 2. Science-based approaches to the choice of medicines for the treatment of patients with periodontal diseases. 3. Mistakes and complications in the use of medications.	1. To choose medications for the treatment of periodontal diseases (assisted by the instructor) and to justify their choice. 2. To perform application and instillation of medications (assisted by the instructor). 3. To apply medicamental dressing to the patient with a periodontal disease (assisted by the instructor). 4. To evaluate the effectiveness of the periodontal disease treatment course (assisted by the instructor).

**Requirements for the Initial Level of Knowledge:**

1. Risk factors for the periodontal diseases development.
2. Diagnostic procedures and special tests to be used for evaluating patients with periodontal diseases.
3. Prognosis and treatment strategies of periodontal diseases.

**Control Questions from the Related Disciplines:**

1. Anatomical and histological features of the periodontium structure.
2. Stages of inflammation development in the periodontal tissues.
3. Oral microbiology, its role in physiology and pathology.
4. Pharmacological groups of medications.

### Control Questions on the Topic of the Lesson:

1. The role of medicines application in the treatment of periodontal diseases. Science-based approaches to the medicines choice for the treatment of patients with periodontal diseases.

2. Medications used in Periodontology: characteristics, indications, contraindications.

3. Routes of medication administration in the management of periodontal diseases.

4. Mistakes and complications in the medications application.

5. Discussion of the publications on the topic of the lesson from dental journals, including «The Stomatologist».

### Educational Materials.

#### Local treatment of periodontal diseases

Stages of the process	Local treatment		
	Etiological	Pathogenetic	Symptomatic
Alteration Exudation	antiseptics, antibiotics, sulfanilamides, antiviral, antimycotic, antiprotozoals	enzymes, steroidal and nonsteroidal anti-inflammatory, vitamins	anesthetics, hemostatics
Prolifiration	antiseptics	stimulators of tissue regeneration, sclerosing agents	

**Tasks for the Students' Individual Work.** In order to comprehend completely the topic, the student should revise test questions from the related disciplines and possess prior knowledge. During the practical sessions, the students see patients with topic-related diseases. The student is to examine the patient, conduct a differentiated diagnosis, design a disease management plan and perform all the treatment steps under the instructor's supervision. All aspects of examination, diagnosis and dental treatment must be recorded in the patient's dental history and checked by the clinical instructor.

### Self-Testing of the Topic Consolidation

#### Case-studies

**Case-study No 1.** Patient M., 40 years old, complained of teeth mobility and difficulty eating.

*Clinical examination:* OHI-S = 2.4, pronounced gum inflammation (GI = 2.5), periodontal pockets, degree II and degree III teeth mobility.

*Describe the steps of diagnosis and treatment.*

**Case-study No 2.** Patient G., 28 years old, complained of sore gums when eating, bad breath and gingival bleeding.

*Medical history:* smoked for 10 years, poor oral hygiene, had frequent colds.

*Clinical examination:* significant amount of calculus, gingival margins were covered with a greyish membrane, gingiva was red, swollen, bleeding occurred on probing, OHI-S = 2.1, GI = 2.3.

*Describe the steps of diagnosis and treatment.*

## TEST QUESTIONS

**1. What principle should the pharmacotherapy planning of periodontal diseases be based on? (1 correct answer)**

- a) possibility of applying locally-administered medication;
- b) individualized approach to each patient, taking into account dental status and inflammation level;
- c) application of medicines of different pharmacological groups;
- d) exclusive application of herbal-based medicines.

**2. What group of medicines is prescribed for the local pathogenetic treatment of periodontal diseases at the stage of exudation? (1 correct answer)**

- a) antiseptics;
- b) local anesthetics;
- c) medicines stimulating tissue regeneration
- d) nonsteroidal anti-inflammatory medicines.

**3. What group of medicines is prescribed for the local pathogenetic treatment of periodontal diseases at the stage of proliferation? (1 correct answer)**

- a) antiseptics;
- b) medicines stimulating tissue regeneration;
- c) local anesthetics;
- d) enzymes.

**4. What group of medicines is prescribed for the local etiotropic therapy of periodontal diseases at the stage of alteration? (1 correct answer)**

- a) nonsteroidal anti-inflammatory medicines;
- b) medicines stimulating tissue regeneration;
- c) enzymes;
- d) antiseptics.

**5. What group of medicines is prescribed for the local symptomatic treatment of periodontal diseases at the stage of alteration? (1 correct answer)**

- a) antiseptics;
- b) local anesthetics;
- c) anticoagulants;
- d) nonsteroidal anti-inflammatory medicines.

**6. What type of treatment requires application of antiseptics in the management of periodontal diseases? (1 correct answer)**

- a) etiological;
- b) pathogenetic;
- c) symptomatic;
- d) palliative.

**7. What helps the medicine to penetrate deeper into periodontal tissues? (1 correct answer)**

- a) irrigation;
- b) instillations (into periodontal pocket);
- c) vacuum darsonvalization;
- d) gingival dressing;
- e) medicated gingival dressing.

**8. Select the antimicrobial medicines: (1 correct answer)**

- a) antiseptics;
- b) antibiotics;
- c) enzymes;
- d) anti-inflammatory;
- e) antiprotozoal;
- f) probiotics;
- g) metabolism medicines.

- 1) c, g;
- 2) a, b;
- 3) a, b, e, f;
- 4) d, g.

**9. What type of treatment requires application of nonsteroidal anti-inflammatory medicines in the management of periodontal diseases? (1 correct answer)**

*(1 correct answer)*

- a) etiological;
- b) pathogenetic;
- c) symptomatic;
- d) palliative.

**10. What type of treatment requires application of local anesthetics in the management of periodontal diseases? (1 correct answer)**

- a) etiological;
- b) pathogenetic;
- c) symptomatic;
- d) palliative.

**11. What type of treatment requires application of enzymes in the management of periodontal diseases? (1 correct answer)**

- a) etiological;
- b) pathogenetic;
- c) symptomatic;
- d) palliative.

#### LITERATURE

1. Carranza, F. A. Carranza's Clinical Periodontology / F. A. Carranza. 11<sup>th</sup> ed. Saunders Elsevier, 2012. 825 p.
2. Aesthetic Periodontology / J. L. Denisova [et al.]. Minsk : BSMU, 2015. 20 p.

3. *Egelberg, J.* Periodontal examination / J. Egelberg, A. Badersten. Copenhagen : Munksgaard, 1994. 85 p.
4. *Lindhe, J.* Clinical Periodontology and Implant Dentistry / J. Lindhe. 4<sup>th</sup> ed. Blackwell Munksgaard, 2003. 1044 p.
5. *Mueller, H. P.* Periodontology. The Essentials / H. P. Mueller. Thieme, 2004. 188 p.
6. *Perry, D. A.* Periodontology for the dental hygienist / D. A. Perry, P. Beemsterboer. 3<sup>rd</sup> ed. St. Louis, Mo. : Saunders Elsevier, 2007. 484 p.
7. *Schluger, S.* Periodontal diseases : basic phenomena, clinical management and occlusal and restorative interrelationships / S. Schluger, R. Yuodelis, R. C. Page. 2<sup>nd</sup> ed. Philadelphia : Lea & Febiger, 1990. 759 p.
8. Publications on the topic of the lesson in dental journals, including «The Stomatologist».

**ANNOTATION TO THE PRACTICAL LESSON ON THE TOPIC  
«COMPLEX TREATMENT OF PERIODONTAL DISEASES. PHARMACOTHERAPY»**

1. The role of local medicinal therapy in the treatment of periodontal diseases.
2. Science-based approaches to the choice of medicines for the treatment of patients with periodontal diseases.
3. Mistakes and complications in the use of medications.

**1. The role of local medicinal therapy in the treatment of periodontal diseases.**

Medications in Periodontology are applied at all stages of treatment. They are effective only in combination with adequate oral hygienic measures. Medications in Periodontology are prescribed according to the inflammatory phase and the mechanism of the medicine action.

Local medical treatment in Periodontology has etiological, pathogenetic and symptomatic effects.

***Forms of the medicamental products used in Periodontology:***

- solutions;
- tinctures;
- decoctions;
- ointments;
- gels;
- medicated films;
- tablets.

***Methods of pharmaceuticals application for treatment of periodontal diseases:***

- rinsing, oral baths;
- irrigations;
- applications;
- instillations (in periodontal pocket);
- gingival bandage;

- use of physical agents (physiotherapy using pharmaceutical substances).

***Properties and importance of gingival dressings :***

- isolation (from irritants);
- assistance in long-term preservation of pharmaceutical agents;
- prevention of the medicine elimination (from dissolution in the gingival fluid);
- gingival dressing shouldn't irritate, compress gingival tissues.

**2. Science-based approaches to the choice of medicines for the treatment of patients with periodontal diseases.**

***Etiological treatment.*** These groups of medical agents are used to eliminate the microbial etiology and contributing risk factors of periodontitis: antiseptic agents, antibiotics, anti-protozoal, antifungal and antiviral drugs.

***Antiseptics.*** **Antiseptics** are antimicrobial agents, devoid of antimicrobial action selectivity (active against most microorganisms, protozoa and fungi, do not cause resistance development). Antiseptics are used as etiologic treatment of all inflammatory periodontal diseases and during all stages of the inflammatory process.

The following factors should be taken into consideration while prescribing antiseptics:

- concentration;
- frequency rate of application;
- term running;
- side effects;
- adaptation of microorganisms.

The following antiseptics are used in Periodontology: chlorhexidine digluconate, miramistin, mukosanin, hydrogen peroxide, povidone-iodine etc.

***Chlorhexidine.*** The ability of chlorhexidine to adhere to the dental pellicula and oral mucosa prolongs its antiplaque effect. Chlorhexidine gluconate is used in dentistry as a 0.12–0.2 % mouthwash, applied in a volume of 15 ml for 30 seconds. Chlorhexidine has a wide spectrum of action and can be more efficient in the prevention and treatment of different infections: bacterial, mycotic and viral infections.

***Hydrogen peroxide.*** The mechanism of antimicrobial action is the release of oxygen. Pathogenic effects are seen in gram-positive as well as gram-negative organisms.

***Miramistin, Mucosanin*** are new generation antiseptics. They have a wide spectrum of action and can be more efficient in the prevention and treatment of bacterial, mycotic and viral infections.

***Antibiotics.*** Topical application of antibiotics to the gingival surface does not affect the entire body as oral antibiotics. Antibiotics in combination with scaling and root planing are very effective for periodontal treatment.

The following antibiotics are used for the local treatment: *tetracycline*, *lincomycin* and others.

Variants of local applications of antimicrobial medicines in Periodontology:

□ *Atridox* is a doxycycline gel that conforms to the gingival surface and then solidifies. Over the next few days it releases the antibiotics.

□ *Elyzol* is a gel or strip, applied to the gingiva that is composed of metronidazole. This agent has unique actions, that are effective against parasites as well as bacteria.

□ *Perio Chip* is a chip, that is placed into the gum pocket after scaling. Over time, it slowly releases chlorhexidine, a powerful bacteria-killing antiseptic.

□ *Minocycline microspheres* (Arestin) involve antibiotic contained tiny capsules, which are applied to the gingiva after scaling and root planing.

□ *Actisite* is a thin strip similar to dental floss, which contains tetracycline hydrochloride. It should be temporarily inserted between the tooth and gingiva. (Using multiple strips may be more beneficial than using a single strip).

**Antiprotozoal agents.** *Metronidazole* (Flagyl, Trichopol, Klion) is an antiprotozoal medicine, commonly used for the treatment of periodontal diseases. It has unique actions that are effective against parasites as well as bacteria. A gel or a strip, containing Metronidazole, can be applied to the gingiva, placed into the periodontal pockets, used in the form of gingival bandages. Metronidazole is very often used in combination with Chlorhexidine in the form of gels, ointments, films and solutions.

**Pathogenic treatment.** The following groups of chemotherapeutic agents are used for pathogenic treatment: proteolytic enzymes, anti-inflammatory (steroid and non-steroid), anticoagulants, sclerosing agents, stimulators of tissue-regeneration and vitamins.

**Enzymes.** Enzymes have anti-inflammatory and anti-edematous action, dissolve tissue necrosis and fibrinous exudates. Enzymes are recommended for the treatment of ulcerative gingivitis and periodontitis, especially in cases of pus exudate and abscess formation. Enzymes are not recommended for chronic periodontal processes with slow development. Enzyme solution is prepared right before use (*ex tempore*). Commonly used enzymes are: *Trypsin*, *Chymotrypsin*, *Terrylitin*, *Lizoamidaza*, *Ribonuclease* and *Deoxyribonuclease*.

**Anti-inflammatory steroid medicines.** Anti-inflammatory steroid medicines have anti-inflammatory, desensitizing, anti-allergic, anti-edema effect, have antitoxic and immunosuppressive properties. They are not administered for sluggish process, pus exudate and abscess formation. The following corticosteroid creams are used in Periodontology: 1% *hydrocortisone*, 0.5% *prednisolone*, «*Ftorocort*», «*Lorinden*», «*Depersolone*», «*Gioxison*» and others.



Side effects: worsening of the condition (if steroid medicines are abruptly stopped), development of skin and membrane mucous atrophy (due to prolonged use of glucocorticosteroids), delayed wound healing. Creams, containing glucocorticosteroids, are contraindicated in case of pregnancy, tuberculosis, viral and fungal infections or ulcerations.

**Anti-inflammatory non-steroid medicines.** The main mechanisms of **anti-inflammatory non-steroid** medicines action are: normalization of capillary permeability and microcirculation processes, inhibition of the activity of certain enzymes, involved in the formation of inflammatory mediators, a stabilizing effect on the lysosomes membrane and cytostatic effects. The following medications are used in periodontal disease treatment: 5 % *butadione cream*, 1–2 % *dimexide solution*, *salicylic acid cream* and others. Contraindications: individual intolerance, 1<sup>st</sup> and 2<sup>nd</sup> trimester of pregnancy.

**Medications stimulating regeneration processes.** Medications stimulating regeneration processes are used in the proliferation phase:

□ **Vitamins (A, E, PP).**

□ **Solcoseryl** contains a free protein extract of calf blood, that possesses a metabolic function in the tissue. Solcoseryl enhances reparative and regenerative processes, contributes to activation of aerobic metabolic processes and oxidative phosphorylation, increases oxygen consumption in vitro and stimulate the transport of glucose into the cells.

□ **Methyluracil** has anti-inflammatory and regenerative action, enhances cellular and humoral immunity.

□ **Reparaef-1 and Reparaef-2** — stimulators of tissue regeneration and reparation. Application of the ointment in patients with erosive and ulcerative lesions of the oral mucosa helps to reduce pain, inflammation, erythema, to activate significant epithelization and more rapid healing.

**Herbal medical agents.** Herbal medical agents have anti-inflammatory, anti-allergic, antiseptic, hemostatic and healing properties. Commonly used tinctures, extracts and decoctions of *Camomile*, *Echinacea*, *Calendula*, *St.-John's Wort*, *Plantago*, *Kalanchoe*, *Aloe*, *Eucalyptus*, *Nettle*, *Viburnum*, *Tussilago farfara* (*Coltsfoot*), *Milfoil*, *Sage*, *Sweet flag* and different combinations of herbs.

**Sclerosing agents.** Sclerosing agents can be applied, using injectable and non-injectable methods. Injectable method means the irritant solution injection into the gingival papilla. *Lidase*, 40 % *Glucose*, 25 % *Calcium chloride*, 70 % *Alcohol* and *Calcium chloride electrophoresis* are commonly used for this kind of treatment.

Non-injectable method means the sclerosing agent application to the gum or into the periodontal pockets. *Tinctures of Celandine*, *Calendula*, *Eucalyptus*, *Propolis*, *Maraslavin*, *Vagothyl*, 1 % *alcohol solution of Chlorophyllipt* can be used for this kind of treatment.

**Symptomatic treatment.** The goals of symptomatic treatment are to eliminate pain, to stop gum bleeding, to reduce dentine sensitivity and to treat halitosis.

**Local anesthetics.** Topical anesthetics: *10 % lidocaine spray, gels and creams that contain anesthesin, trimecaine*. Injectable anesthetics: *different articaine solutions*.

**Hemostatic agents (coagulants):** medications used to prevent or stop bleeding. They include *hydrogen peroxide, alustat, hemostatic sponge and aminocaproic acid*.

**Anti-halitosis** medication reduce the number of anaerobic bacteria. These bacteria break down proteins at a very high rate and odorous volatile sulphur compounds (VCSs) are released. They are antiseptics and products that neutralizing any chemicals that cause bad breath (*chlorhexidine, triclosan, cetylpyridinium chloride, essential oils, hydrogen peroxide, zinc chloride*).

### **3. Mistakes and complications in the use of medications.**

#### **Mistakes:**

- Medication treatment started without prior oral hygiene procedures.
- Indications and contraindications are not considered.
- Administration protocol is not followed.
- Recommended frequency and length of treatment is not adhered to.
- The patient's personal and medical history is not considered.
- The stage of inflammation and specific clinical features are not considered.
- Inadequate concentration of the medication.

#### **Complications and side effects:**

- Allergic reactions (including anaphylaxis).
- Absence of expected improvement.
- Development of drug resistance.
- Trauma of the surrounding tissues (chemical, thermal or mechanical).
- Side effects.

## **Topic «ORGANIZATION OF THE PERIODONTAL DISEASES PREVENTION»**

**Motivational Characteristics.** Significant prevalence of periodontal diseases among the population and severe consequences they lead to (multiple teeth loss, functional disorders of speech, chewing and psycho-emotional state of a person) determine the relevance of these diseases prevention. In preparation for the lesson the students will gain new knowledge and consolidate the previously obtained knowledge in the sphere of periodontal diseases prevention.

### **Aims of the Lesson**

**Didactic:** to motivate the students to understand the priority areas of periodontal diseases prevention in the work of the dentist.

**Methodical:** to teach the students to plan preventive measures and to estimate the effectiveness of the periodontal diseases prevention.

**Scientific:** to teach the students science-based approaches to the prevention of periodontal diseases.

### **Goals of the Lesson:**

<b>On completing the lesson the students MUST KNOW</b>	<b>On completing the lesson the students MUST BE ABLE</b>
<ol style="list-style-type: none"> <li>1. Planning of prevention.</li> <li>2. Events at each level of prevention.</li> <li>3. Oral hygiene motivation and instruction.</li> <li>4. Assessment of prophylaxis efficiency on the public and individual level.</li> </ol>	<ol style="list-style-type: none"> <li>1. To plan activities of the periodontal diseases prevention for a particular patient (assisted by the instructor).</li> <li>2. To speak professionally about the importance of oral hygiene in the periodontal diseases prevention (without assistance).*</li> <li>3. To be able to carry out preventive measures (motivation, training oral hygiene, professional hygiene) (without assistance).</li> <li>4. To remove supragingival dental plaque up to index OHI-S <math>\leq 0.3-0.6</math> (without assistance).*</li> <li>5. To estimate the quality of preventive measures (assisted by the instructor).</li> </ol>

\* Manipulations 2 and 4 in the column «MUST BE ABLE» are included into the list of final practical skills performed without assistance. Manipulations 1 and 5 in the column «MUST BE ABLE» are included into the list of final practical skills, assisted by the instructor.

### **Requirements for the Initial Level of Knowledge:**

1. To determine the disease prevalence and intensity among the population.
2. The role of health education among the population.
3. Methods of individual oral hygiene in case of periodontal diseases.
4. Methods of professional oral hygiene in case of periodontal diseases.

5. Main and additional facilities for oral hygiene in case of periodontal diseases.

6. Plaque growth control.

**Control Questions from the Related Disciplines:**

1. Anatomical and histological structure of periodontal tissues.

2. Microbiological flora of the oral cavity, its role in the norm and in case of pathology.

3. Biochemical composition of the saliva.

4. The role of plaque in the occurrence of periodontal disease.

**Control Questions on the Topic of the Lesson:**

1. Periodontal diseases prevention: definition, basic notions (epidemiology, risk factors, predisposing to the occurrence and development of periodontal disease).

2. Organization forms of periodontal diseases prevention.

3. The purpose of primary, secondary and tertiary periodontal disease prevention.

4. Measures at the different levels of periodontal disease prevention (mass, group, individual).

5. Methods and means of periodontal disease prevention.

6. Methods and means of health education.

7. Methods and means of oral hygiene.

8. Estimation the effectiveness of periodontal diseases prevention.

9. Discussion of the publications on the topic of the lesson from dental journals, including «The Stomatologist».

**Educational Materials**

**The approximate scheme of the basic steps in planning periodontal diseases prevention**

Activity steps	Means and conditions	Self-control criteria
1. Dental examination: 1.1 Determining the status of the oral cavity and periodontium (index score). 1.2 Identifying the risk factors of periodontal diseases. 2. Planning preventive measures for a particular patient. 3. Implementation of prevention programmes — determination of the observation time. 4. Prevention efficacy evaluation.	Examination chart, dental instruments	1. State of oral cavity hygiene, dental anomalies, architectonics of oral cavity, iatrogenic factors. 2. Discussion with the patient. 3. Regular visits to the dentist, control and correction of oral hygiene. 4. The patient’s subjective feelings and objective research data (OHI-S, GI), attachment level

## Activities at different levels of organization in periodontal diseases prevention

### Levels of prevention organization

Individual	Group	Mass
Identification of the disease risk factors. Conversations about the causes of the diseases. Dental hygiene education. Professional hygiene	Conversations about oral hygiene, healthy nutrition. Motivation for regular visits to the dentist. Information about the importance of the risk factors of periodontal diseases	Promoting a healthy lifestyle (performances on radio and television)

### Prophylaxis

Primary	Secondary	Tertiary
Providing conditions for normal formation and functioning of periodontium (nutrition, healthy lifestyle). Teaching oral care skills. Regular monitoring by the dentist for early detection of periodontal diseases risk factors	Maintaining a good level of oral hygiene. Removing traumatic factors. Periodontal disease treatment	Minimizing the possible impact of the existing diseases on the patient's overall health, i. e. surgical removal of the periodontal pockets infection, rehabilitation of the retaining and the chewing periodontal functions

**Tasks for the Students' Individual Work.** For a complete comprehension of this lesson the student must revise the questions from related disciplines. The student must know the pathogenesis, prognosis of periodontal diseases; must be able to form an approximate scheme of professional hygiene basic steps; must be able to make a plan of motivation to the oral cavity hygienic care.

### Self-Testing of the Topic Consolidation

#### *Case-studies*

**Case-study No 1.** Patient N., 23 years old, had come to the dentist, complaining of an aesthetic defect, the patient visited the dentist irregularly, the last visit was 2 years ago. Patient N. smoked, brushed his teeth once a day in the morning before eating. He had incomplete knowledge about the role of oral hygiene. The visual examination revealed: pigmented coating on  $\frac{1}{2}$  part of the front teeth crowns. Bluish color of the gingiva, swelling of the gingival papillae and marginal gingiva, bleeding on probing, probing depth = 1.7 mm.

A more detailed study: OHI-S = 1.9, GI = 1.8.

*What are the dentist's tactics in planning the preventive measures?*

**Case-study No 2.** Patient N., 21 years old, dental examination revealed the presence of carious cavities.

OHI-S = 1.7, GI = 1.4.

*What are the dentist's tactics in planning the preventive measures?*

**Case-study No 3.** Patient A., 19 years old, complained of calculus on the exposed roots of the lower front teeth. He had received information on oral care from the dentist, but brushed his teeth irregularly and visited the dentist rarely.

The examination revealed the following: a small vestibule, short frena, plaque, gingival recession up to 3 mm in the region of teeth 3.1 and 4.1. OHI-S = 1.8, GI = 1.6.

*What are the dentist's tactics in planning the preventive measures?*

### TEST QUESTIONS

**1. The complex of measures aimed at preventing the development of periodontal diseases and their complications is called** \_\_\_\_\_

**2. What are the objectives of the periodontal disease primary prevention? (1 correct answer)**

- a) minimizing exposure to risk factors;
- b) prevention of the disease progression;
- c) prevention of the disease occurrence;
- d) maintaining the existing level of health.

1) a, b;

2) a, c;

3) a, d;

4) c, d.

**3. Measures aimed at the prevention of the disease are related to the \_\_\_\_\_ prevention.**

**4. The system of measures aimed at rehabilitation by saving the organs and tissues functionality is called \_\_\_\_\_ prophylaxis.**

**5. What is the prevalence of periodontal diseases among the population aged 25–44 years in the Republic of Belarus in the period 2005–2006?**

*(1 correct answer)*

- a) 55 %;      b) 85 %;      c) 92,5 %;      d) 98 %.

**6. What is the compulsory component of the periodontal diseases prevention program? (1 correct answer)**

- a) sanitation;
- b) medical therapy;
- c) oral hygiene;
- d) timely prosthodontics.

**7. Development of the patient's motivation to maintain their health is called \_\_\_\_\_**

**8. What index is used to determine the hygiene effectiveness?**  
(1 correct answer)

- a) OHI-S;      b) PHP;      c) PLI;      d) GI.

**9. Find the matching variant of the toothpaste component with its cleansing action:**

- |                       |                        |
|-----------------------|------------------------|
| 1) cleansing;         | A) sodium bicarbonate; |
| 2) anti-inflammatory; | B) chamomile extract;  |
| 3) hemostatic;        | C) chlorhexidine;      |
| 4) antimicrobial;     | D) aminopterin;        |
| 5) desensitizing.     | E) zinc citrate.       |
- a) 1A;  
b) 2B;  
c) 2D;  
d) 3E;  
e) 3C.

**10. Where is it not recommended to use dental floss?** (1 correct answer)

- a) above the level of the cementum-enamel junction;  
b) below the level of the cementum-enamel junction;  
c) at the level of the cementum-enamel junction;  
d) within the enamel of the tooth;  
e) in case of gingivitis.

**11. When should interdental brushes be used?** (2 or more correct answers)

- a) if there are no spaces between the teeth;  
b) in the presence of a slightly increased interdental spaces;  
c) in the presence of bridges;  
d) in the presence of single crowns.

**12. What should the direction of the scaler related to the tooth be?**  
(1 correct answer)

- a) horizontal;      c) perpendicular;  
b) vertical;      d) at an acute angle.

**13. Determine the correct sequence of dental plaque removal methods:**  
(1 correct answer)

- 1) polishing;  
2) tartar removal;  
3) remineralizing solutions application;  
4) antiseptic treatment;  
5) anesthesia.
- a) 1, 2, 3, 4, 5;      c) 5, 4, 3, 2, 1;  
b) 4, 5, 2, 1, 3;      d) 5, 1, 2, 4, 3.

**14. What index determines the thickness of plaque? (1 correct answer)**

- a) PHP;
- b) OHI-S;
- c) PLI;
- d) Fedorov–Volodkina index.

**15. Make the algorithm of controlled toothbrushing in the correct sequence: (1 correct answer)**

- 1) recommendations to the patient for the correction of hygienic care deficiencies;
  - 2) treatment of the patient's teeth with the coloring tool to identify the hygienic index, demonstration to the patient the concentrations of plaque;
  - 3) brushing by the patient in his usual manner;
  - 4) reassessment hygiene index, estimation of cleaning efficiency.
- a) 1, 2, 3, 4;
  - b) 2, 3, 4, 1;
  - c) 2, 1, 3, 4.

#### LITERATURE

- 1. *Carranza, F. A. Carranza's Clinical Periodontology* / F. A. Carranza. 11<sup>th</sup> ed. Saunders Elsevier, 2012. 825 p.
- 2. *Aesthetic Periodontology* / J. L. Denisova [et al.]. Minsk : BSMU, 2015. 20 p.
- 3. *Egelberg, J. Periodontal examination* / J. Egelberg, A. Badersten. Copenhagen : Munksgaard, 1994. 85 p.
- 4. *Lindhe, J. Clinical Periodontology and Implant Dentistry* / J. Lindhe. 4<sup>th</sup> ed. Blackwell Munksgaard, 2003. 1044 p.
- 5. *Mueller, H. P. Periodontology. The Essentials* / H. P. Mueller. Thieme, 2004. 188 p.
- 6. *Perry, D. A. Periodontology for the dental hygienist* / D. A. Perry, P. Beemsterboer. 3<sup>rd</sup> ed. St. Louis, Mo. : Saunders Elsevier, 2007. 484 p.
- 7. *Schluger, S. Periodontal diseases : basic phenomena, clinical management and occlusal and restorative interrelationships* / S. Schluger, R. Yuodelis, R. C. Page. 2<sup>nd</sup> ed. Philadelphia : Lea & Febiger, 1990. 759 p.
- 8. Publications on the topic of the lesson in dental journals, including «The Stomatologist».

#### ANNOTATION TO THE PRACTICAL LESSON ON THE TOPIC

##### «ORGANIZATION OF THE PERIODONTAL DISEASES PREVENTION»

- 1. Planning of prevention.
- 2. Events at each level of prevention.
- 3. Oral hygiene motivation and instruction.
- 4. Assessment of prophylaxis efficiency on the public and individual level.

#### 1. Planning of prevention.

There are primary, secondary and tertiary prevention levels.

**Primary prevention** is a disease prevention methods of system, identifying and eliminating periodontal diseases risk factors and carrying on the population oral hygiene education.



*Secondary prevention* is periodontal diseases prevention due to maintenance of a good level of oral hygiene and timely elimination of the factors, contributing to plaque accumulation.

*Tertiary prophylaxis* is a complex of actions, referred on aftertreatment of the patient: elimination of the chronic infection, periodontal pockets.

## **2. Events at each level of prevention.**

There are individual, group and mass prevention levels.

The general action at all three levels consists of hygienic knowledge of the periodontal diseases prevention: the role of oral hygiene, a healthy lifestyle, a balanced diet and necessity to avoid bad habits.

The group and individual levels imply improvement of the oral care skills.

The individual level implies regular visits to the dentist for examination of the dental status, detection of the periodontal diseases risk factors and their elimination, hygienic actions.

## **3. Oral hygiene motivation and instruction.**

*Motivation* is the development of the patients' willingness to maintain health of the periodontium and the whole oral cavity.

In the course of motivation it is important to make a dialogue with the patient, to provide all the information on his/her illness. It is necessary to be guided by the principles of presentation, sequence and systematic explanation.

The dentist gives thorough instructions on oral hygiene (on the method of teeth and gingiva care, frequency, duration and technique of cleaning and on individual oral hygiene agents) using visual aids.

## **4. Assessment of prophylaxis efficiency on the public and individual levels.**

Important criteria of the prophylaxis efficiency assessment at the public level are the dynamics of periodontal diseases prevalence and intensity and the patients' involvement into the prophylaxis programme.

Oral hygiene efficiency assessment is made by OHI-S, PLI and PHP indices at the individual level.

Evaluation of the gingival involvement in the inflammatory process is made by using gingival indices such as GI, PMA and Myulleman bleeding index.

## CONTENTS

Diagnosis and Treatment of Proximal Caries on the Anterior Teeth. Selection of the Appropriate Dental Filling Materials .....	3
Root Caries in Patients with Gingival Recession: Classificational Characteristics, Mechanism of Development, Clinical Features, Diagnosis, Treatment Approaches.....	12
Internal Root Resorption. Clinical Features, Diagnosis, Treatment Plan .....	24
Ergonomics in Periodontology .....	32
Periodontal Tissues, Determination of their Status .....	42
Examination Plan of Patients with Periodontal Diseases .....	55
Additional Research Methods in Clinical Periodontology.....	70
Chronic Simple Marginal Gingivitis: Clinical Features, Diagnosis Methods .....	83
Chronic Ulcerative, Hyperplastic and Symptomatic Gingivitis: Clinical Features, Diagnosis Methods.....	92
Chronic Periodontitis. Clinical Features, Diagnosis .....	103
Prognosis of Periodontal Diseases. Treatment Planning of Periodontal Diseases .....	114
Initial Therapy of Patients with Periodontal Diseases: Hygienic Procedures.....	127
Initial Therapy of Patients with Periodontal Diseases: Peculiarities of Dental Tissues Restoration in Patients with Periodontal Diseases.....	137
Complex Treatment of Periodontal Diseases. Pharmacotherapy .....	145
Organization of the Periodontal Diseases Prevention .....	154

Учебное издание

**Дедова Людмила Николаевна**  
**Денисова Юлия Леонидовна**  
**Даревский Вячеслав Иосифович и др.**

**БОЛЕЗНИ ПЕРИОДОНТА**  
**4 КУРС**

**PERIODONTAL DISEASES**  
**4<sup>TH</sup> YEAR**

Учебно-методическое пособие

На английском языке

В 2 частях

**Часть 1**

Ответственная за выпуск Л. Н. Дедова  
Переводчики: И. Ю. Абедковская, Н. И. Росеник, Л. Ю. Махнис  
Компьютерная верстка Н. М. Федорцовой

Подписано в печать 25.11.14. Формат 60×84/16. Бумага писчая «Снегурочка».  
Ризография. Гарнитура «Times».  
Усл. печ. л. 9,42. Уч.-изд. л. 8,45. Тираж 50 экз. Заказ 521.

Издатель и полиграфическое исполнение: учреждение образования  
«Белорусский государственный медицинский университет».  
Свидетельство о государственной регистрации издателя, изготовителя,  
распространителя печатных изданий № 1/187 от 18.02.2014.  
Ул. Ленинградская, 6, 220006, Минск.