DANYLO HALYTSKY LVIV NATIONAL MEDICAL UNIVERSITY

Pediatric Dentistry Department

Methodological Recommendations

Prevention of dental diseases

for preparing of specialists of the second (master) level of higher education

3rd year, 5th semester

Lviv 2022

Composed by:
Krupnyk A.-S.A.: Ph. D., Assis. Professor
Hrynyshyn O.B.: Ph. D., Assoc. Professor
Leshchuk S.Y.: Ph. D., Assis. Professor
Fur M.B.: Ph. D., Assoc. Professor
Skybchyk O.V. Assis. Professor

Chief Editor: Kolesnichenko O.V., Assoc. Prof., PhD

Reviewed by:
Chukhray N.L.: Ph. D., Assoc. Professor
Ripetska O.R. Ph. D., Assoc. Professor
Manyuk L.V. senior lecturer

Considered and approved on meeting of Pediatric Dentistry Department (protocol № , from of 2022) and Profiled Methodical Commission of Dental faculty (protocol № , from of 2022)

Methodical recommendations were discussed, re-approved and confirmed at the meeting of the Department of Pediatric Dentistry of Danylo Halytsky Lviv National Medical University

Protocol № 1 from « » _____202

Protocol № from « » _____202

Protocol № from « » _____202

Protocol № from « » _____202

Protocol № from « » _____202

Responsible for the issue
Vice-Rector for Academic Affairs, Professor M.R. Grzegotskyy

THEMATIC PLAN OF THE PRACTICAL LESSONS
Prevention of dental diseases
3rd year, 5 th term

№	Theme of the lesson	Hour
1	Introduction to the course of prevention. General issues of prevention of dental diseases: concept, purpose, methods. Instruction on safety techniques in the dental office.	2
2	Anatomical and physiological features of the structure of oral cavity organs in the age aspect. Stages of development of the maxillofacial region, formation of teeth, oral mucosa and periodontal tissues.	2
3	Algorithm of dental examination. Record dental formula. Practical familiarization of students with the technique of one-on-one examination.	2
4	Caries indices. Indices of oral hygiene (Green-Vermillion, Fedorova-Volodkinoi, Silness-Loe). Index assessment of periodontal tissue condition (CPI, RMA, RI, Schiller-Pysarev test).	2
5	Methodology of dental examination according to WHO. Dental status registration card. Cariesogenic situation in the oral cavity. Methods of its detection and elimination.	2
6	Structure and biological properties of enamel, dentine and tooth pulp. Maturation of enamel after tooth eruption. Modern ideas about metabolic processes in tooth enamel and pulp. Caries resistance of enamel	2
7	Composition and properties of oral fluid. The role of oral fluid in the processes of enamel maturation, demineralization, remineralization. Protective mechanisms of the oral cavity.	2
	Whole	**14**

THEMATIC PLAN OF THE SELF-WORK
Prevention of dental diseases
3rd year, 5 th term

№	Theme of the lesson	Hour
1	Write down the rules for using and disposing of personal protective equipment and symptoms of acute respiratory disease, COVID-19, caused by the SARS-CoV-2 coronavirus.	3
2	Stages of development of the maxillofacial region, formation of teeth, oral mucosa and periodontal tissues.	3
3	Algorithm for examining a dental patient. Peculiarities of examination in children.	3
4	Determination of caries resistance of enamel.	2
5	Indices of oral hygiene	2
6	Index assessment of periodontal tissue condition	2
7	Dental status registration card.	2
8	Cariesogenic situation in the oral cavity. Methods of its detection and	2

	teaching	
9	Describe the structure and biological properties of enamel, dentin and tooth pulp	2
10	Metabolic processes in tooth enamel and pulp	2
11	Write down the composition and properties of the oral fluid.	2
12	Describe the protective mechanisms of the oral cavity	2
	Whole	**27**

THEMATIC PLAN OF THE LECTURES

Prevention of dental diseases
3rd year, 5 th term

№	Theme of the lecture
1	Structure and biological qualities of tooth hard tissues (chemical composition, structure, mineralization). The main children dental disease.
2	Metabolic processes in the hard tissues of the tooth. Enamel permeability. Structural and functional resistance of enamel, factors determining it and methods of determination

Practical lesson№ 1

Introduction into prophylaxis course. General questions of the oral cavity diseases prevention, concept, purpose, task, methods. Instruction in prevention of accidents during work in the dental office

Aim of the lesson.To study the students the main tasks of preventive dentistry, main dental diseases.

Actuality.Prevention is a system of state, social, hygienic and medical measures aimed at ensuring a high level of health of the population and prevention of diseases.

Control of the initial level of knowledge

1. What are the tasks of preventive dentistry on your opinion?
2. What means the term ”prophylaxis”?
3. What main groups of dental instruments do you know?
4. What main oral cavity diseases do you know?

Content of the lesson

The primary goal of preventive dentistry is to maintain the oral structures in a state of optimal health for the longest period of time possible - using the simplest, most universally acceptable methods.

The major concern in preventive dentistry is to stop the plaque-caused destruction of teeth by dental caries and the loss of their support through inflammatory periodontal disease.

However, all forms of dental neglect are costly in terms of pain, ill health, financial burden, loss of man-hours, psychological damage, and waste of human resources. Preventive dentistry can help to reduce or eliminate these costs.

Preventive dentistry can:

Prevent aching and disease of the teeth, which affect health, nutrition, development, and learning.

Prevent unsightly teeth, which affect personality, adjustment, and job opportunities.

Prevent concern over bad breath, which affect interpersonal relations.

Prevent dental pain and disease, which keep people from enjoying life; this in turn affects the lives of others.

Prevent the speech impairments that derive from dental problems.

Prevent the waste of human resources due to dental neglect.

It is impossible to convince a patient of the value of preventive dentistry if the members of the office team obviously do not believe in and practice it. Therefore, it is essential that every member of the dental health team share a philosophy of preventive dentistry.

It is important for each person in the office to follow a good dental health program, which includes having all required dental work completed, a carefully followed program of personal oral hygiene, and the practice of good nutrition and recommended general health care procedures.

Although the control of plaque and its damage is the prime target of preventive dentistry, the concept is really much larger in scope and provides a wider range of sendees for the patient. It includes:

Public Health Dentistry. To reduce the incidence of tooth decay through programs such as fluoridation of the public water supply and dental health programs in the schools.

Pediatric Dentistry. To maintain the child's mouth in healthy condition and provide developmental guidance to prevent abnormalities. It also includes preventive measures such as pit and fissure sealants and starting the child on good dental health habits.

Prophylactic Dentistry. The professional removal of harmful plaque and calculus; also, to provide continued guidance in the development and maintenance of good nutrition and personal oral hygiene habits.

Dental caries and periodontal diseases have been considered to be among the most common bacterial diseases affecting humans. Millions of children and adults continue to experience caries, periodontal disease, tooth loss, and malocclusions - most of which could be prevented if only they engaged in daily oral hygiene practices, had optimal systemic and topical fluorides, and sought professional care on a scheduled basis.

Dental health education has been pursued within communities in various ways. The Health Education Authority (1996) has recommended that dental health message should be based on the following four statements;

1. Diet: reducing the consumption and especially the frequency of sugar-containing food and drink.
2. Tooth brushing: cleaning the teeth thoroughly twice every day with a fluoride toothpaste.
3. Fluoridation: requesting local water company to supply water with the optimal fluoride level.
4. Dental attendance: have an oral examination every year.

Assessing caries risk is important for all patients and the process has to be repeated at intervals. Caries-promoting factors may change between visits. It must be appreciated that primary prevention will be required in all children to maintain low caries risk status.

Primary prevention: Keeping children’s teeth healthy before disease occurs.
Individuals who do not clearly fit into high or low risk categories are not considered to be at moderate risk.
Primary prevention in children at high caries risk:

1. Behavior modification
- **dental health education advice** should be provided to individual patients at the chairside as this intervention has been shown to be beneficial;
- children should **brush their teeth** twice a day using toothpaste containing fluoride;
- the need to **restrict sugary food and drink** consumption to meal times only should be emphasized;
- dietary advice to patients should encourage the use of **non-sugar sweeteners**, in particular xylitol, in food and drink;
- patients should be encouraged to use **sugar-free chewing gum**, particularly containing xylitol, when this is acceptable;
- clinicians should prescribe **sugar-free medicines** whenever possible and should recommend the use of sugar-free forms of non-prescription medicines.
2. Tooth protection:
- **sealants** should be applied and maintained in the tooth pits/fissures of high-risk children;
- the condition of sealants should be reviewed at each check-up;
- glass-ionomer sealants should only be used when resin sealants are unsuitable;
- **fluoride tablets** (1mg F daily) for daily sucking should be considered for children at high risk of decay;
- a **fluoride varnish** may be applied every four to six months to the teeth of high caries risk children;
- **chlorhexidine varnish** should be considered as an option for preventing caries.
Consistent preventive messages should be reinforced by the dental practice team and by other health care professionals.
Secondary prevention: Limiting the impact of caries at an early stage.
Tertiary prevention: Rehabilitation of the decayed teeth with further preventive care.

The teacher should discuss the prevention tasks with the students. To carry out prevention, it is necessary:
1. study and assess the epidemiological situation in the region
2. to determine the population dental health level
3. to develop regionally oriented programs for the prevention of dental diseases
4. organize and carry out measures aimed at strengthening the resistance to diseases of the body as a whole, including the organs and tissues of the oral cavity
5. to eliminate factors contributing to the development of dental diseases
6. to evaluate the effectiveness of the dental disease prevention program.
After discussing these issues, students should learn that the main goal of prevention is the formation of healthy tissues of the oral cavity, the elimination of the causes and conditions of the occurrence and development of dental diseases, and the increase of the body's resistance to adverse environmental factors.

The teacher and students discuss the medical and economic effectiveness of dental caries prevention at the end of the lesson. Students should know that the medical

effectiveness of preventive measures is evaluated by comparing caries indicators in a certain group of children, as well as by control determination of fluoride in their saliva, urine, and enamel two years after preventive measures.

Knowledge level control

1. What is the main aim of preventive dentistry?
2. Account the possibilities of preventive dentistry.
3. What is primary prevention?
4. What risk factors of dental caries do you know?
5. What is secondary prevention?
6. What is tertiary prevention?
7. Name the dental public health method.

Practical lesson № 2

Anatomical and physiological peculiarities of the oral cavity structure in age aspect. Stages of the jaw-facial region development, teeth formation and mucous membrane (oral cavity and parodontium)

Aim of the lesson. To learn with students the peculiarities of the oral cavity structure in age aspect, anatomical structure of primary and permanent teeth in children, its formation, mucous membrane of the oral cavity and periodontium.

Actuality. For each age period, only the age-specific features of the structure of the mucous membrane, which must be taken into account in the analysis of the pathological condition, are inherent in it.

Control of the initial level of knowledge:

1. Periods of child development.
2. Anatomical and physiological peculiarities of oral cavity in children of different ages.
3. Peculiarities of maxillofacial anatomy in children of different age.
4. Terms of teeth eruption.
5. Types of resorption

Content of the lesson:

According to the current scheme of periodization (P.S. Moshchich, 1994), two stages of childhood are distinguished: in utero and postnatal. The in utero stage

includes phases: embryonic development (up to 2 months of pregnancy) and placental development (from the 3rd to the 10th month).

The postnatal stage covers the following periods:

1. Newborns - up to 3-4 weeks.
2. Infants — from 1 month to 1 year.
3. Milk teeth - from 1 to 7 years:

a) preschool — from 1 to 3 years;

b) preschool — from 4 to 7 years;

4. Junior school age — from 7 to 12 years.
5. Puberty (high school age) - from 13 to 17 years.

Considering the anatomical and physiological features of the mucous membrane, three age periods are distinguished - the newborn and breast period, the early childhood period; primary and secondary childhood period. Each age period corresponds to age-specific features of the mucous membrane structure, which must be taken into account when analyzing the pathological condition.

In newborns, the epithelium and connective tissue of the mucous membrane of the oral cavity is poorly differentiated, the integuments consist only of basal and spinous cells. The epithelium has a large amount of glycogen and RNA, the basement membrane is thin and delicate, and there are many cellular elements in the submucous layer. The mucous membrane at this age is easily vulnerable, but has the ability to regenerate.

In infancy, the volume increases and glycogen disappears in the epithelium, the level of immunobiological capabilities that appeared in the antenatal period decreases. Therefore, the mucous membrane of the oral cavity in infancy is resistant to viral and bacterial damage and is not resistant to fungal damage.

In the early childhood period, the level of immune reactions decreases and the permeability of tissues decreases, which contributes to more frequent damage by viral infection.

In the primary childhood period, the volume of the epithelium and the content of RNA and glycogen in it increases, the number of cellular elements and blood

vessels in the own layer of the mucous membrane decreases, and metabolic processes in the tissues reduced.

In the secondary childhood period, glycogen appears in the epithelium of the gums and hard palate. This age is characterized by acute and chronic inflammatory processes, which are based on allergic reactions.

T.F. Vinogradova distinguishes the following **features of the structure of the gums** in children:

1) a thin layer of keratinized epithelial cells;

2) more intense vascularization of the gums (bright red color;

3) weak density of connective tissue;

4) less pronounced graininess of the surface due to slight deepening of the epithelial papillae;

5) deeper gingival furrow;

6) roundness of the gingival margin with signs of swelling, hyperemia during teething.

Therefore, considering *the structure of the gums in the age aspect*, it should be emphasized that:

- *during the period of temporary occlusion*, the mucous membrane of the gums contains glycogen, the epithelium of the gums is thin, not sufficiently differentiated, the gingival papillae are not very deep;

-*during the period of mixed bite*, the layer of epithelium thickens, gingival papillae acquire a clearer shape, become deeper, collagen fibers are condensed, the number of cellular elements increases, the tendency to diffuse reactions decreases;

-*during the period of permanent bite,* the gums become a mature differentiated structure, the periodontium consists of collagen fibers, cellular elements, nerve fibers, blood and lymphatic vessels. At the age of 14, the formation of the periodontium is completed.

Regarding the features of the alveolar process in children, it should be noted that the ridge in children is flatter, a thin lattice plate is adjacent to the root of the tooth,

the space of the spongy substance increases, a low degree of mineralization, increased lymph and blood circulation.

Regarding the features of the cellular process in children, it should be noted that the ridge in children is flatter, a thin lattice plate is adjacent to the root of the tooth, the space of the spongy substance increases, a low degree of mineralization, increased lymph and blood circulation.

-during *the period of temporary occlusion*, the bone tissue is poorly differentiated. It is in the stage of formation, the periodontal gap is 2 times wider than in adults; cortical plates are less distinct; the tops of interdental partitions have different contours, in the area of milk molars they are always flat.

-during *the mixed dentition,* the tops of the interdental partitions look completely cut in the direction of the erupting tooth. By the time the tooth finally erupts, they acquire normal contours.

-during *the period of permanent bite*, the formed bone tissue is distinguished by clearer contours of spongy substance and compact plate.

<u>Among the features of the oral cavity of a newborn child, the following should be noted:</u>

1). the superior lip over the lower, the shape of the lips is hip-shaped, cross-banded (Pfaundler-Lushka valves) with a suction pillow on the upper lip .

2). large tongue by which the child presses the nipple during the act of sucking

3). small mucobuccal fold and bottom of the mouth, poorly expressed transitional folds.

4). the upper jaw consists of two symmetrical halves combined by a longitudinal sutures, wide and short, consisting of an alveolar process, which is located slightly just below the palate.

5). the palate is flat, with well-defined transverse folds, 4-5 cross folds are located on the palate, 2-3 pairs from which they depart from the palatine sagittal suture;

6). The lower jaw consists of two not conective partes, which are connected by connective tissue; the alveolar process is better developed than the basal, due to the presence of temporary and permanent teeth follicles.

7). The branch of the lower jaw is poorly developed, the joint process rises above the level of the alveolar process.

8). Each jaw contains 18 follicles of 10 temporary and 8 permanent teeth (6, 3, 2, 1/ 1, 2, 3, 6); the temporary teeth follicles are located on both the jaw from the labial side, rudiments of temporary teeth are deeper than the temporary teeth from the tongue side on the lower jaw and from the palate to the upper one.

9). Gingival membrane – a double fold of the mucous membrane of a comb-like shape in the frontal area of the upper and lower jaws (Roben-Mazhito fold).

Due to the growth and development of the child, changes occur in the maxillofacial system, new functions appear or existing functions are restored.

Development of teeth.

These are *the stages* of temporary and permanent teeth:

Growth:

initiation

proliferation

histodifferentiation

morphodifferentiation

apposition

Calcification

Eruption

In the development *of temporary teeth* we differentiate 5 periods: 1) The laying of teeth and internal jaw formation; 2) Eruption; 3) formation of the root and periodontium; 4) the stabilization; 5) Resorption.

The development *of permanent teeth* is characterized by 4 periods (except for the resorption period).

The laying and formation of all temporary teeth follicles occurs from 6-7 weeks of embryonic development, at 4-5 months of the antenatal period there is an intense histogenesis and mineralization of the crowns of the front temporary teeth, and at 8-9 months of the antenatal period the chewing surfaces of the temporary molars

and cervical part of temporary incisors, as well as the cusps of the first permanent molars, are formed.

From the fourth month of the antenatal period, a portion of the permanent teeth is laid and formed (6, 1, 2, 3, 4). Mineralization of the first permanent molars appear in the 1.5-2 years of the child's life. The beginning of the second permanent premolar is formed in 2 years, and the second permanent molar in 2.5 years. The beginning of the third molar is formed in 5 years.

The development of permanent and temporary teeth occurs in the same type, but at different times. During the period of completion of the development of temporary teeth in the jaw there are follicles of permanent teeth, which are in the earlier stages of formation.

Types of the teeth in both arches of primary dentition, 20 teeth in all, include 8 incisors, 4 canines, and 8 molars. Types of the teeth in both arches of permanent dentition, 32 teeth in all, include 8 incisors, 4 canines, 8 premolars and 12 molars. Each type of the tooth has a specific shape which is related to the masticatory function as well as to the part the tooth takes in speech and aesthetics.

Eruption of the primary teeth starts on the 6th -8th month of a child's life and ends at 2.5-3 years. Crown of the tooth is developed by the moment of eruption. Root of the tooth is developing and its formation is completed after the tooth eruption. It lasts 1.5-2 years in primary teeth and 3-4 years in permanent teeth.

The terms of eruption, root formation and resorption of primary teeth

Tooth	Beginning of the mineralization (in utero)	Terms of eruption (month)	Finishing of formation (years)	Beginning of root resorption (years)
I	4.5	6-8	1.5	from 5
II	4.5	8-12	2	from 6
III	7.5	16-20	4-5	from 8
IV	7.5	12-16	3-4	from 7
V	7.5	20-30	4	from 7

The terms of formation and eruption of the permanents teeth

Tooth	Terms of tooth eruption	Terms of root formation
1	6-8	10
2	8-9	10
3	10-11	13
4	9-10	12
5	11-12	12
6	6	10
7	12-13	15
8	Different	Different

Knowledge level control

1. Anatomical and physiological peculiarities of primary teeth structure.
2. Anatomical and physiological peculiarities of permanent teeth structure.
3. Anatomical and physiological peculiarities of immature permanent teeth.
4. Terms of primary and permanent teeth eruption.
5. Terms of mineralization of primary and permanent teeth.
6. Terms of root formation of primary and permanent teeth.

Practical lesson №3

Registration of the dental formula: clinical, anatomical. Methods of the dental clinical examination. Algorithm of the examination. Practical demonstration of the dental clinical examination on the student. Examining by students each others

Aim of the lesson. To study with students the methods of clinical examination of patients, registration of dental formula.
Actuality. Dental examination is an important stage of preventive work, provides an opportunity to create an information base for planning preventive care and evaluate its effectiveness.

Control of the initial level of knowledge

1. Name the steps of epidemiological examination.
2. What is palpation?
3. How many teeth are there in primary dentition?

4. How many teeth are there in permanent dentition?
5. Indicate differences between primary and permanent teeth.

Content of the lesson

At the beginning of the class, the teacher points out that the main method of detecting morphological and functional abnormalities in the development of the dentistry system is a clinical examination of the patient. Students should learn that the methodology of clinical examination includes complaints, examination, palpation, percussion and conducting additional research methods - laboratory and instrumental.

The survey.

Students should be aware that the purpose of the survey is to determine existing risk factors for dental diseases. During the survey it is necessary to identify the patient's complaints, the level of oral hygiene care, heredity, physical development of the child, timing and change of teeth, bad habits, transmitted and present diseases, as well as colds, their frequency over the year. When collecting the history of a child from parents, it is necessary to find out how pregnancy and childbirth went, the characteristics of the early development of the child, the nature of breastfeeding, transmitted diseases, the presence of chronic and systemic diseases. It is necessary to evaluate knowledge in oral hygiene, as well as care for the oral cavity. The patient should feel the doctor’s desire to help him. After considering the subject of the subjective examination (survey), the teacher with the students studies the objective examination of the dental patient which consists of examination and instrumental and additional research.

The examination is divided into general and dental. During the general examination pay attention to the emotional state, physical development, posture. Dental examination is divided into external oral examination and intraoral examination.

During the dental examination, evaluate The shape of the head and face, the symmetry of the face, the function of switching the lips, respiratory function, the

function of swallowing, bad habits, the condition of the lymph nodes, temporomandibular joint, the skin and the visible mucous.

The examination of the oral cavity is carried out in a dental chair with the use of dental instruments. The standard examination of the oral cavity is carried out in the following order: the condition of the oral cavity, examination of the mucous membrane of the oral cavity, determination of the teeth condition and dentition, bite.

During the examination of the mucobuccal fold pay attention to its depth, the severity of the lips and tongue frenulum and, the place of their attachment to the alveolar processes, the color of the mucous membrane. When examining the tooth rows pay attention to the shape of the tooth arc, take into account the number, shape, size, color and position of the teeth in the dentition. Anomalies of teeth and dental rows are revealed.

Examination of gums. Normally, papilla are well expressed, have a pink color, triangular or trapezoidal shape, tightly attached to the teeth. The bite is characterized by three characteristics: occlusion, the shape of the tooth arc, the position of individual teeth. The study of the mucous membrane involves determining its color, consistency, characteristics and localization of lesion elements. Pay attention to the size and color of the tongue, the appearance of nipples.

If necessary, the patient is sent for additional examination: radiological, laboratory, cytological and other. The auxiliary can include physical, radiological, laboratory and immunological research methods. Physical include electroodontology, trans illumination method, luminescent diagnosis, capillary reography, thermography, polarography, electromyography.

X-ray techniques are used to study bone tissue of the jaw-face area. Students should learn that in dentistry use the following methods of X-ray studies: intra-oral, external-oral X-rays, panoramic X-rays, computer tomography, contrast X-rays, telerentgenography. Laboratory methods include cytological and microbiological methods. Data obtained during the clinical examination, as well as

the results of auxiliary studies are entered in the medical card of the dental patient. Students should be aware of the need to fill out a medical card at every patient visit. It describes in detail the complaints of the patient, the data of the survey, the therapeutic and preventive measures carried out.

The results of the dental examination are recorded in the form of a dental formula. The clinical dental formula is recorded by describing first the upper jaw from right to left, and then the lower - from left to right.

According to this system, the first digit indicates the quadrant and the second digit the type of tooth within quadrant. Quadrants are allotted the digits 1 to 4 for the permanent teeth and 5 to 8 for the primary teeth in a clockwise sequence, starting at the upper right side; teeth within the same quadrant are allotted the digits 1 to 8 (primary teeth 1 to 5) from the midline backward. The digits should be pronounced separately; thus the permanent canines are teeth one-three, two-three; three-three, and four-three.

Permanent teeth

Upper right	*Upper left*
18 ; 17 ; 16 ; 15 ; 14 ; 13 ; 12 ; 11	21 ; 22 ; 23 ; 24 ; 25 ; 26 ; 27 ; 28
48 ; 47 ; 46 ; 45 ; 44 ; 43 ; 42 ; 41	31 ; 32 ; 33 ; 34 ; 35 ; 36 ; 37 ; 38
Lower right	*Lower left*

Primary teeth

Upper right	*Upper left*
55 ; 54 ; 53 ; 52 ; 51	61 ; 62 ; 63 ; 64 ; 65
85 ; 84 ; 83 ; 82 ; 81	71 ; 72 ; 73 ; 74 ; 75
Lower right	*Lower left*

The anatomical dental formula is recorded using the following designations:

Permanent teeth:

$M_3\ M_2\ M_1\ P_2\ P_1\ C\ I_2\ I_1$	$I_1\ I_2\ C\ P_1\ P_2\ M_1\ M_2\ M_3$
$M_3\ M_2\ M_1\ P_2\ P_1\ C\ I_2\ I_1$	$I_1\ I_2\ C\ P_1\ P_2\ M_1\ M_2\ M_3$

Primary teeth:

$m_2\ m_1\ c\ i_2\ i_1$	$i_1\ i_2\ c\ m_1\ m_2$
$m_2\ m_1\ c\ i_2\ i_1$	$i_1\ i_2\ c\ m_1\ m_2$

All pathological changes are recorded with conditional indications. (C - caries; P - pulpitis; Pt - periodontitis; R - root; F – filling; A- absent.

Knowledge level control

1. What methods of clinical examination do you know?
2. What types of recordings do you know?
3. Of what parts examination chart consist of?
4. What instruments are used for oral cavity examination?
5. What are the sequences of extraoral examination?
6. What are the sequences of intraoral examination?
7. What tooth charting system do you know?

Practical lesson№ 4

The main epidemiological indices of dental caries (frequency, intensity – DMF and dmf). Indices estimation of periodontal tissues state (CPI, PMA, PI, Shillera-Pisareva probe).
Hygienic indices (Green-Vermillion, Fedorova-Volodkinoyi, Sillness-Loe)

Aim of the lesson. Study the main epidemiological indices of tooth caries: intensity, increase in intensity, prevalence, reduction of caries, activity and degrees of activity of caries, levels of intensity. Teach students to determine hygiene indices. Teach students to determine periodontal indices, based on the results of the survey to identify a group of children for the prevention and treatment of periodontal diseases.

Actuality. The prevalence of caries in the population is characterized by determining the main epidemiological indicators of caries: intensity, prevalence, increase in intensity, intensity levels, reduction of caries, degree of caries activity.

To evaluate oral hygiene, the effectiveness of hygiene products, as well as determining the role of hygiene in the development of teeth hard tissues diseases and periodontium use objective hygienic indices, which reflect the quality of brushing of teeth, the number and types of dental deposits. Among the clinical methods of assessing periodontal status, a significant place belongs to indices that allow for a preliminary assessment of the condition of periodontal tissues, to determine the extent of the spread of the pathological process and the intensity of its course.

Control of the initial level of knowledge

1. What means the term "epidemiology of dental diseases"?
2. What are the main steps of epidemiological examination?
3. Name the main instruments for dental examination?
4. What are the signs of healthy dental tissues?
5. What tooth charting systems do you know?

Content of the lesson

At the beginning of the lesson the teacher underlines the importance of carrying out the epidemiological examination. The main tasks of epidemiological examination are:

1. to evaluate the frequency and intensity of the main diseases of oral cavity;
2. to reveal the prevention and treatment need;
3. to determine the quality of dental aid (sanitation quality and prevention effectiveness);
4. to compare the state of diseases occurrence in the different regions;
5. to establish the quantitative and qualitative tasks for industry connected with Dental Service.

Epidemiological examination (by WHO method) include three sequence stages:

- preliminary stage;
- examination (examination of oral cavity and recording in the combined WHO card for dental examination and determination of treatment need);
- results estimation.

Preliminary stage include formation of a group (the group consist of two dentists and a nurse) for examination. This group should master the methodic of examination and is acquainted with criteria of estimation of pathological changing in oral cavity.

Teacher underlines that the main caries indices are prevalence, intensity, increasing of caries intensity, caries activity.

At the clinical exam the number of cavities, fillings and missing teeth should be recorded. Such a recording is an estimation of the dental caries history from the time of the eruption of the first permanent molars up to the day of examination. Incipient caries lesions "white spot lesions" are usually not included. These readings provide an indices of caries prevalence and are calculated for 28 (permanent) teeth, excluding the 4 third molars. This index provides:

How many teeth have caries lesions (D).
How many teeth have been extracted (M).
How many teeth have fillings or crowns (F).
The sum of these three factors provide the DMF (T)-value.

DMF(T) and DMF(S) are used as dental caries indices to describe numerically the amount (the prevalence) of dental caries in an individual. This provides the total cumulative caries experience. They are obtained by totaling the number of Decayed (D), Missing (M) and Filled (F) teeth (T) or surfaces (S).

- Currently, we can only measures cavitated lesions.
- Using the tooth "(T)" designation, each tooth can have only one decayed or filled surface maximum. If a tooth has both a carious lesion and a filling, it is calculated as D only.
- The "M" indicator is for missing teeth. Teeth may be missing for reasons other than caries such as trauma or periodontal disease. This is especially true in older individuals where periodontal disease could be a factor.
- A DMF (T) of 28 is maximum, meaning that all teeth are affected. For example (resize new screen so that you will be able to observe both browser windows).
- D=4, M=3, F=9 means that 4 teeth are decayed, 3 teeth are missing and 9 teeth have fillings.

The DMF(T) is the total=16. It also means that 12 teeth are intact, since this index is based on a maximum of 28 teeth.

Index DMF is used for permanent dentition, index df – for primary dentition, index DMF+df – for mixed dentition.

Prevalence – an indicator of past history.

Prevalence illustrates the balance between resistance factors and caries inducing factors in the past and the present. For an adult patient, the caries prevalence usually is a result of caries activity from six years of age, when the first permanent molars appeared. If the caries prevalence is high, it means that the patient has been susceptible to the disease during a past period of time.

Prevalence is determined by one oral exam using a light, probe and mirror.

The examination is usually without x-rays. Without x-rays proximal caries are not easily found.

Prevalence is depicted in cross-sectional studies. It does not show current state of caries activity.

DMF may not portray changes in oral health. "F" can be high while "D" may be low. Increase in "F" usually means better oral health, while an increase in "D" may indicate poorer oral care.
An index is an expression of clinical observations in numerical values. It is used to describe the status of the individual or group with respect to a condition being measured. By using a number scale and a standardized method for interpreting observations of a condition, an index score can be more consistent and less subjective than a word description of that condition.

Indices using various criteria have been developed to compare the extent and severity of disease. For example, dental caries is indexed by the number of teeth or surfaces with carious lesions and fillings. An index for dental fluorosis identifies very mild, mild, moderate, or severe involvement of the enamel, ranging respectively from white spots visible only when a tooth is dry to marked brown stains with pitting.

Various factors associated with gingivitis and periodontal diseases have been used in the development of indices. Measurement criteria include recession, bone loss, pocket formation, mobility of teeth, gingival inflammation, gingi-val bleeding, and the amount and distribution of plaque and calculus.These measurements aid in the overall assessment of the oral health status.

Mastering the indicesof Fedorov-Volodkinoyin practice. We conduct painting of vestibular surfaces of 6 lower frontal teeth by solution of Shillera-Pisareva by a cotton rolls. Criteria of estimation in marks:

1 - absence of colouring
2 - colouring ¼ crowns of the tooth
3 - colouring ½ crowns of the tooth
4 - colouring ¾ crown of the tooth
5 - colouring of all surface of crown of the tooth

Formula for the calculation: ***index of hygiene*** = $\sum/6$ ($\sum$is the sum of values of marks of all teeth)

1.1-1.5 marks is a good hygiene
1.6-2.0 marks is a satisfactory hygiene
2.1-2.5 marks is an unsatisfactory hygiene
2.6-3.4 marks is a bad hygiene
3.5-5.0 marks is a very bad hygiene

Mastering the indicesof Green-Vermillion in practice. Conduct painting of vestibular surfaces 16, 11, 26 and lingual surfaces 46, 31,36 teeth by solution of Shillera-Pisareva. On the explored surfaces at first determine the dental plaque of Debris-index, and then - dental calculus of Calculus-index. Criteria of estimation:

Dental plaque (DI)	**Dental calculus (CI)**
0- no debris; 1-debris within gingival 1/3 only 2 -debris beyond gingival 1/3 but within gingival 2/3 3- debris covering most of tooth surfaces	0- no debris; 1-debris within gingival 1/3 only 2-supragingival calculus covers 2/3 surfaces of crown of the tooth, and subgingival calculus as separate conglomerates; 3 – supragingival calculus covers 2/3 surfaces crowns of the tooth and (or)

	subgingival calculus surrounds collum part of crown of the tooth.

Formula for the calculation:

$$OHI = \sum DI/n + \sum CI/n$$

where $\sum$ is sum of values; DI is the dental plaque; CI is the dental calculus; n - is the amount of the inspected teeth (6).

Estimation of values:

	OHI-S	Hygiene of oral cavity
0-0.6	low	good
0.7 – 1.6	middle	satisfactory
1.7 – 2.5	high	unsatisfactory
more than 2.5	very high	bad

Plaque Index (Silness and Loe).There is no universally accepted index for the assessment of plaque. A specific index for scoring plaque has been adapted by Loe and Silness and Loe from the PMA index of Schour and Massler. It is based on an assessment of the severity and location of soft debris aggregates in terms of scores of 0, 1, 2 and 3.

In this system the most stress is placed on the thickness of the plaque at the gingival margin area on all four surfaces of each tooth. The plaque index is computed for all surfaces—mesial, distal, oral, and vestibular—on all or selected teeth or on specific areas of all or selected teeth. This index may be employed for large-scale epidemiologic studies as well as for clinical studies of smaller groups. The assessment of the index requires a light source, gentle drying of the teeth and gingiva, a mirror, and a probe. If optimal conditions and chairside assistance are provided, approximately 5 minutesshould be sufficient time to score all the teeth. The scores of all four areas of all the teeth can then be added and divided by the number of teeth.

The Plaque Index (Pl) scores only differences in thickness of the soft deposits in the gingival area of the tooth surfaces. The index can be scored for all surfaces or selected teeth or for selected surfaces of all or selected teeth. By adding the indexes for the individual teeth and dividing by the number of teeth examined, the Pl for the individual is obtained.

0- Gingival area of tooth free of plaque; the surface is tested by running a probe acrossthe tooth surface; if no soft material adheres, then the area is considered plaque free

1 - No plaque observed in situ by the unaided eye, but plaque is made visible on the pointof a probe after the probe has been moved over the tooth surface at the entrance of the gingival crevice

2 - Gingival area covered by a thin to moderately thick layer of plaque visible to the nakedeye

3 - Heavy aeeumulation of soft matter, the thiekness of which fills the crevice producedby the gingival margin and the tooth surface

A disclosing agent is a preparation in liquid, tablet, or lozenge form which contains a dye or other coloring agent. In dentistry a disclosing agent is used for the identification of soft deposits for instruction, evaluation, and research.

When applied to the teeth, the agent imparts its color to soft deposits but can be rinsed readily from clean tooth surfaces. After staining, the deposits that can be distinctly seen provide a valuable visual aid in patient instruction. Such a procedure can demonstrate dramatically to the patient the presence of deposits and the areas that need special attention during personal oral care.

There are a number of methods for the measurement and assessment of periodontal disease.

Index of *PMA* is used for estimation of inflammatory process of gums. It is conducted by sight. Inflammations of gingival papilla (P) near one tooth estimate in a 1 mark, inflammation of marginal edge (M) - in 2 marks, inflammation of alveolar gums (A) - in 3 marks.

Calculate Index of PMA in per cents on a formula:

$$PMA = \frac{\text{sum of marks}}{3 \times \text{number of teeth}} \times 100$$

The sum of marks concernes by addition of all greatest indexes of periodontal tissues state near every tooth.

Account of teeth in age 6-11 years – 24, 12-14 years-28, 15 years and more- 30

In a period of temporal bite to 6 years - 20 teeth

Criteria of estimation:

to25% is an easy degree of gingivitis

25-50% is a middle degree of gingivitis

higher 51 % it is a heavy degree of gingivitis.

In *Russell's Periodontal Index (PI)* the condition of both the gingiva and the bone is estimated individually for each tooth in the mouth. A progressive scale that gives relatively little weight to gingival inflammation and relatively much weight to alveolar bone resorption is used for scoring. The scores from each tooth are added together, and the total is divided by the number of teeth present in the mouth. The result gives the periodontal disease index of the patient, which reflects the average status of periodontal disease in a given mouth without reference to the type or causes of the disease. The community's score is the arithmetic average of individual scores of persons examined. Such scoring tends to blur individual distinction.

Criteria

0 *Negative*—there is neither overt inflammation in the investing tissues nor loss of function because of destruction of supporting tissue

1 *Mild gingivitis*—there is an overt area of inflammation in the free gingiva circumscribing thetooth

2 *Gingivitis*—inflammation completely circumscribes the tooth but probing depthis withinnormal limits

6 *Gingivitis with pocket formation*—there is a pocket (not merely adeepened gingival sulcusbecause of swelling of the free gingivae), there is no interference with normal masticatoryfunction; the tooth is firm in its socket and has not drifted

8 *Advanced destruction uith loss of masticatory function*—the tooth may be loose, may havedrifted; may sound dull on percussion with a metallic instrument and may be depressiblein its socket

*Method of implementation theindexof CPITN.*Inspect surrounding tissues in the area of ten teeth (17, 16, 11, 26, 27, 37, 36, 31, 46, 47). Register the state only six teeth, where the pathological changes are more expressed for every pair of teeth. Register such clinical signs of periodontal diseases, as bleeding, presence above' and undergingival dental calculus and periodontal pockets. Periodontal tissues inspect by a probing method for the exposure of bleeding, presence above' and undergingival dental calculus and pathological pocket by the graduated probe.

Estimation of index is conducted in marks:

1— bleeding

2- presence of dental calculus

3- pathological pocket by a depth 4-5 mm

4- pathological pocket by a depth more than 5 mm

Sum of marks of all sextants divides on 6.

At the value of CPITN: 0 marks treatment it is not needed

1 mark - it follows to improve the individual hygiene of oral cavity

2 marks - are the necessity of professional hygiene of oral cavity

3 marks - antiinflamation therapy

4 marks – complex of treatment measures

After the theoretical part, students move to the practical part of the class. During the practical work, students examine children, fill out dental formulas, determine the intensity of caries. With the help of vital coloring determine the presence of the initial caries. And also, conduct examinations of children and each other, determine hygienic indices on patients or one on one, determine the Schiller-Pisarev test and all periodontal indices.

Knowledge level control

1. What means the term “epidemiology of dental diseases”?
2. What are the main steps of epidemiological examination?
3. Name the main instruments for dental examination?
4. What are the main caries indices?
5. How do you determine the intensity of tooth decay in temporary, mixed and permanent bite?
6. What is the spread of caries?
7. How to determine the intensity of caries?

8. How to determine the degree of caries activity.
9. Vital coloring as a method of diagnosing initial caries.
10. What are the groups of hygienic Indices?
11. How to determine the hygiene index for Green - Vermilion?
12. How to determine the hygiene index for Silness - Loe?
13. Assessment of periodontal tissue by PMA index
14. Determination of PI.
15. Determination and assessment of the DMF index.
16. Determination and assessment of the CPI index.
17. Determination and Assessment of Hygienic Index.
18. Assessment of periodontal tissue by index S. by Ramfiord.

Practical Lesson № 5

Methods of clinical examination according to WHO. Study the WHO chart. Mastering the main dental indices in WHO chart. Cariogenic situation in the oral cavity.The methods of its determination and removing.

Aim of the lesson.To study the students the methods of clinical examination on the patient, sequence, dental recording in charts and cariogenic factors of general and local action.To find out a cariogenic situation of the oral cavity.

Actuality.To teach the students the methods of epidemiological examination of patients and registration of dental indexes in the WHO chart, to differentiate the concept of carious factors of general and local character, the notion of cellular and humoral factors of both specific and nonspecific resistance.

Control of the initial level of knowledge.

1. Name the steps of epidemiological examination.
2. What is palpation?
3. How many teeth are there in primary dentition?
4. How many teeth are there in permanent dentition?
5. Indicate differences between primary and permanent teeth.
6. What are the cariogenic factors of general action?
7. What are the cariogenic factors of local action?
8. The role of saliva in the processes of mineralization and demineralization of enamel. Composition of saliva and its main features.
9. Name factors which influence on composition and features of oral liquid.
10. The role of microorganisms of oral cavity at the beginning of caries.

Content of the lesson

	Each pediatric patient should be given an opportunity to receive complete dental care. Before making a diagnosis and developing a treatment plan, the dentist must collect all information		

about the patient and evaluate general oral health.

Form used in completing the preliminary medical and dental history.

DATE_____
Child's name_____Sex____ Birth date_____ Place of birth_____
Date of last medical examination_____ Child's physician/pediatrician_____
Physician's address_____
Telephone_____

Medical history

Growth and development

		No	**Yes**
1.	Any learning, behavioral, excessive nervousness, or communication problems?		
2.	Has child had psychological counseling or is counseling being considered for the future?		
3.	Were there any complications during pregnancy or was child premature at birth?		
4.	Any problems with physical growth?		
Notes:			

Central nervous system

1.	Any history of cerebral palsy, seizures, convulsions, fainting, or loss of consciousness?		
2.	Any history of injury to the head?		
3.	Any sensory disorders? (Seeing, Hearing)		
Notes:			

Cardiovascular system

1.	Any history of congenital heart disease, heart murmur, or heart damage from rheumatic fever?		
2.	Has any heart surgery been done or recommended?		
3.	Any history of chest pains or blood pressure?		

Hematopoietic and lymphatic systems

1.	Has Your child ever had a blood transfusion or blood products transfusion?		
2.	Any history of anemia or sickle cell disease?		
3.	Does Your child bruise easily, have frequent nosebleeds, or bleed excessively from small cuts?		
4.	Is Your child more susceptible to infections than		

		other children are?			
	5.	Is there any history of tender or swollen lymph nodes or glands?			
	Notes:				

Respiratory system

1.	Any history of pneumonia, cystic fibrosis, asthma, shortness of breath, or difficulty in breathing?			
Notes:				

Gastrointestinal system

1.	Any history of stomach, intestinal or liver problems?			
2.	Any history of hepatitis?			
3.	Any history of eating disorders, such as anirexia nervosa or bulimia?			
4.	Any history of unintentional weight?			
Notes:				

Genitourinary system

1.	Any history of urinary tract infections, bladder or kidney problems?			
2.	Is the patient pregnant or possibly pregnant?			
Notes:				

Endocrine system

1.	Any history of diabetes?			
2.	Any history of thyroid disorders or other gland disorders?			
Notes:				

Skin

1.	Any history of skin problems?			
2.	Any history of cold sores (herpes) or canker sores (aphthae)?			
Notes:				

Extremities

1.	Any limitations of use of arms or legs?			

placements or other joint problems?

3.	Any problems with muscle weakness or muscular dystrophy?		
Notes:			

Allergies

1.	Is Your child allergic to any medications?		

2.	Any hay fever, hives, or skin rashes caused by allergies?		
3.	Any other allergies?		
Notes:			

Medications or treatment

1.	Is Your child currently taking any medication (prescription or nonprescription medicine? If yes, Medication(s)_____Dosage_____ Time Per Day_____ _____ _____ _____ _____ _____ _____		
2.	Has Your child ever received radiation therapy (x-ray treatment) or is it planned?		
3.	Has Your child ever received chemotherapy or is it planned?		
Notes:			

Hospitalizations

Has Your child been hospitalized?
Hospital(1)_____ (2)_____ (3)_____
Date _____ _____ _____
Reason _____ _____ _____

Immunizations

1.	Is Your child presently protected by immunization against DPT: diphtheria, whooping cough (pertussis), tetanus?		
2.	OPV: polio or poliomielitis?		
3.	MMR: measles (rubeola), mumps and German measles (rubella)?		
4.	Hepatitis B, C?		
Notes:			

Please check any of the following that Your child has now, has recently been exposed to, or has had in the past

Chickenpox (varicella)	Now	Exposed	Past
Earache (otitis)			
Eye infection (conjunctivitis)			
German measles or 3-day measles (rubella)			
Glandular fever or mono (infectious monomucleosis)			
HIV/ AIDS			
Lead poisoning			
Measles (rubeola)			

Mumps (parotitis)			
Scarlet fever (scarlatina)			
Sore throat (tonsillitis or pharyngitis)			
Substance abuse, alcoholism, drug addiction			
Tuberculosis			
Upper respiratory infection (URI) or common cold (pharyngitis, rhinitis, sinusitis, or tonsillitis)			
Veneral disease (genital herpes, gonorrhea, syphilis or other			
Notes			

Dentalhistory

1.	Does Your child have a toothache or other immediate dental problem?		
2.	Has Your child ever had a toothache?		
3.	Has Your child had any injury to the mouth, teeth or jaws (fall, blow, etc)?		
4.	Is this your child's first dental visit? If no: Date_____ Dentist_____ Reason_____		
5.	Has Your child any ever had unfavorable dental experience?		
6.	Is (was) your child nourished by nursing beyond one year of age? If yes, check: Breast__ Nursing bottle__ Both__, and to what age?__		
7.	Does Your child fail to eat a well-balanced diet? If yes, what foods or food groups are not adequate?_____		
8.	Does (or has) Your child have (or had) sucking habit beyond one year of age? If yes, check: Thumb(s)____ Finger(s)_____ Pacifier____ Other____		
9.	Does (or has) Your child have (or had) any other oral habits beyond one year of age? If yes, check: Lip biting_____ Mouth breathing_____ Nail biting____ Teeth grinding _____ Other_____		
10.	Does (or has) Your child have (or had) difficulty opening his or her mouth, or does the child's jaw sometimes lock or stick in a certain		

	position?		
11.	Does (or has) Your child have (or had) popping or clicking noises or pain during chewing or yawning?		
12.	Does (or has) Your child have (or had) frequent headaches or pain in or about ears, eyes, or cheeks?		

Dental diseases prevention

1.	How often does Your child brush?_____ time per_____		
2.	Does Your child use dental floss?		
3.	Does someone assist Your child with brushing and cleaning the teeth?		
4.	Does someone inspect for thoroughness after the procedure?		
5.	Does Your child use a fluoride toothpaste?		
6.	Has Your child ever taken a fluoride supplement or vitamins with fluorides?		

Drinking water source: City water supply_____ Name of city_____

Has a fluoride analysis been done_____

Date of analysis_____ Fluoride content_____

SIGNATURE (parent or guardian)_____

Dentist's comments

MEDICAL COSULTATION RECOMMENDED? No_____ Yes_____ Date requested_____

Purpose for consultation:

Semi-annual review of medical-dental history

If history remains essentially unchanged, sign below:

Date_____ Parent_____ Date_____ Parent_____

Date_____ Parent_____ Date_____ Parent_____

Date_____ Parent_____ Date_____ Parent_____

Oral examination record

Patient_____ Birth date_____ Chart_____

Date_____

LAST FIRST

Medical history Summary	Last history completed_____ Current medical status and medication:

<table>
<tr><td>Dental History summary</td><td colspan="2">Date of last exam_____ Last radiographs_____
Appliances:_____
Describe any present problem:

Past treatment summarized:</td></tr>
<tr><td>Extra-oral findings</td><td colspan="2">Head
Neck
Face
Lips
Hands</td></tr>
<tr><td>Intra-oral findings</td><td colspan="2">Palate and oropharynx
Airway
Tongue and floor of mouth
Buccal mucosa
Frena
Gingivae and periodontium</td></tr>
<tr><td>Plaque score</td><td colspan="2">Today’s score _____ Last score_____</td></tr>
<tr><td>Occlusion review</td><td>Facial profile:_____
Molar relationship:
<u>Permanent:</u> R L; <u>Primary :</u>R L
Unerupted - (Terminal plane)
End-to-end – Straight
Class - Mes.step
Dist.step
Primate space
Canine relationship: R L
Class ___ ___
Incisor relationship:
Overjet
_____mm
Overbite
_____%
Openbite
_____mm
Midline:Normal ___ Deviates ___
Maxilla R__ L __ mm._____
Mandible R__ L __ mm._____
Mandibular shift No__ Yes __
R____ L ____ Ant.___ mm.____
Arch length: (general impression)
Maxilla Mandible
Adequate _____
Adequate_____</td><td>TMJ and function:
<u>Opening path</u>:
Normal __
Deviating_____
<u>Closing path</u>:
Normal __
Deviating_____
<u>Opening</u>:
Normal__
Limited_____
<u>Joint sounds</u>:
None Left Right
Opening _____ _____
Closing _____ _____
Crepitus _____ _____
<u>Muscle Tenderness:</u>
None_____
Tongue Function:
Normal_____
Crossbites:

Oral habits:

Supernumerary teeth/ Congenitally missing teeth:</td></tr>
</table>

	Inadequate_____ Inadequate_____ *Eruption sequence and timing:* Normal_____ or Describe:	*Ectopic eruption:* *Other anomalies:* **Analysis recommended:** No_____ Yes_____

Hard tissue examination

CLINICAL **RADIOGRAPHIC**	**CLINICAL** **RADIOGRAPHIC**
11 / A **+** **12 / B** **13 / C** **14 / D** **15 / E** **16** **17** **18**	**21 / F** **22 / G** **23 / H** **24 / I** **25 / J** **26** **27** **28**
41 / P **42 / Q** **43 / R** **44 / S** **45 / T** **46** **47** **48**	**31 / K** **32 / L** **33 / M** **34 / N** **35 / O** **36** **37** **38**

DMF= , df= , DMF+df=

Diagnostic summary

Treatment proposed

A teacher points out that a high level of caries makes about 100% of prevalence at some regions of Ukraine and at the same time makes its different prevalence and intensity at different countries of the world and create necessary study and exposure of cariogenic factors.

Early checking of cariogenic situation promotes effective testing of prophylactic measures and promotes a high-quality treatment of caries on the initial stages of its development.

Caries is a dystrophic process of tooth hard tissues that appears under the influence of general and local factors. The combination of two factors (general and local) makes the beginning of caries process.

Basic cariogenic factors of the oral cavity are microflora of the oral cavity (especially when the hygienical state of the oral cavity is unsatisfactory),

uncontrolled use of carbohydrates, change of composition of saliva, insufficient functional loading of the tooth system. To the general cariogenic factors belong: low maintenance of fluor in a drinking-water, somatic state of a child's health, unfavorable ecological ways of residence. Cariogenic factors can have different degrees of intensity, so however much terms of the oral cavity are permanent and they depend on composition of a drinking-water, meal, functional state of the tooth-jaw system, state of organs and systems of all organism.

A cariogenic situation of the oral cavity always appears at high concentration of free hydrions (H^+), the source of which are organic acids (mainly milk) that is appeared during fermentation of carbohydrates by the microorganisms of dental plaque. The accumulation of microorganisms on the tooth surface to contribute: diminishing of self-cleaning of teeth, crowding of teeth, bad filling, prosthetic and orthodontic apparates, violations of physical and chemical properties of saliva.

Cariogenic action of microorganisms explains the beginning of dental plaque. A dental plaque adjoins closely to the tooth surface and disposes above pellicle. A dental plaque contains the same basic types of microorganisms in different correlation in most of people. Thus, streptococci (mutans, salivarius,mitis,sangvis) makes about 40% from the common amount of microorganisms of the plaque.

A number ofmicroorganisms can produce enough acid to decalcify tooth structure, particularly aciduric streptococci, lactobacilli, diphtheroids, yeasts, staphylococci, and certain strains of sarcinae. Streptococcus mutans has been implicated as one of the major and most virulent of the caries –producing organisms.

It is generally accepted that the dental caries process is controlled to a large extent by a natural protective mechanism inherent within the **saliva**. Many features of saliva have been investigated in during caries process. Considerable importance has been placed on the salivary pH, the acid-neutralizing power, and the calcium, fluoride, and phosphorus content. It has been long suggested that in addition to these features the rate of flow and the viscosity of saliva may influence on the development of caries. The normal salivary flows aids to the solution of food debris on which microorganisms thrive. In addition, the saliva manifests a variety of antibacterial and other antiinfectious features. All well-known characteristics of saliva seem somehow are relevant to the process of dental caries.

The mucous membrane of the oral cavity, saliva, include the multicomponent system of defense from the pathogenic factors of environment. The epithelium of mucous membrane shows itself a functional barrier to the microorganisms, and from its state, above all things, defense of oral cavity depends from infections. But, most value in the defense mechanism of the oral cavity is acquired by the specific and heterospecific factors of resistance. Mechanic cleaning of oral cavity takes place due to saliva flow, the use of hard meal. Saliva hinders to adhesion of microorganisms to the surface of mucous membrane of oral cavity, to hard tissues of teeth. The IgA of saliva can change metabolism of microorganisms, limit formation of colonies, reduce virulence of contagiums.

Methods of determination of cariogenic situation in the oral cavity:

1. Methods, which are based on the study of tooth environment (lactobacilli test, determination of pathogenic microflora of dental plaque, determination of pH, viscidity, buffer capacity, mineral components of saliva

2. Methods that study solubility of enamel TER-test. Teaching methodology: put the drop of a 1N solution of HCl on cleaned from the plaque, dried up, isolated from saliva vestibular surface of upper central incisor in the distance 2mm from a cutting edge. In 5 seconds wash off the acid, dry out an enamel. Put 1 drop 1% methylene dark blue on a bitten-into enamel, take off by a cotton tampon. Estimate a test on a 10-point scale. Fluoride varnish inflicted on the area of demineralization.

3. The individual risk of the development of caries is determined on the basis of estimation: rapid formation of dental plaque, level of the use of cariogenic products, the amount of initial caries.

During practical work students examine children and find out a soft dental plaque and the main features of saliva. Students solve situational tasks with the teacher.

Teacher makes conclusion at the end of the lesson. Teacher points out on student's drawbacks and their mistakes. Teacher announces the results.

Knowledge level control

1.What methods of clinical examination do you know?
2.What types of recordings do you know?
3.Of what parts examination chart consist of?
4.What instruments are used for oral cavity examination?
5.What are the sequences of extraoral examination?
6.What are the sequences of intraoral examination?
7.What tooth charting system do you know?

Practical Lesson № 6

Structure and biological qualities of enamel and dentin. Enamel maturation after tooth eruption. The resistance of enamel to caries formation.The influence on formation, mineralization, maturation of enamel with caries prevention purpose.Biological properties of the pulp. The modern idea about exchanging processes in the enamel and pulp of the tooth

Aim of the lesson.To acquaint students with the structure and biological properties of enamel and dentin, maturation of enamel after tooth eruption.

Actuality. Students master the structure and biological properties of enamel and dentin, the process of maturation of the enamel after tooth eruption.

Control of the initial level of knowledge:

1. From what tissues does tooth consist of?

2. Indicate the terms of primary teeth eruption?
3. Indicate the terms of permanent teeth eruption?

Content of the lesson

The teeth are composed of enamel, pulp-dentin complex and cementum.

Enamel is usually the only portion of a tooth that is seen clinically in a healthy mouth because it covers the anatomical crown. Enamel provides a hard surface for mastication and speech. Enamel alone is various shades of bluish white, which is seen on the incisal tips of newly erupted incisors but turns various shades of yellow-white elsewhere due to the underlying dentin. Preservation of the enamel of every tooth during a patient's lifetime is one of the goals of every dental professional. Dental professionals must take into consideration the properties of enamel when deciding the caries risk for the patients, counseling patients and communities on fluoride use, applying enamel sealants, and using and recommending polishing agents.

Chemically, enamel is a highly mineralized crystalline structure containing from **96%** inorganic matter by weight. It is the hardest substance of the human body. Hydroxyapatite, in the form of a crystalline lattice, is the largest mineral constituent and is present 90% to 92% by volume. The remaining constituents of tooth enamel are on organic content of about **1%** and water content of about **3%** by weight. Other minerals such as carbonate, magnesium, potassium, sodium, and fluoride are also present in smaller amounts.

Enamel is formed by cells called ameloblasts, which originate from ectoderm. Enamel covers the anatomical crown of the tooth and varies in thickness in different areas of a tooth.Unlike enamel, dentin and pulp are not able to be viewed clinically if the teeth and associated periodontium are healthy. Dentin and pulp make up the inner portions of the tooth and are not exposed except when certain dental pathology exists. Today all dental professionals must have an increased understanding of the histology of these two tissues.

Mature dentin is a crystalline material that is less hard than enamel. Mature dentin is by weight 70% mineralized inorganic material, 20% organic material, and 10% water. This crystalline formation of mature dentin consists of mainly calcium hydroxyapatite with the chemical formula of Ca10(PO4)6(OH)2. This calcium hydroxyapatite is similar to that found in higher percentages in enamel and in lower percentages in bone and cementum. Small amounts of other minerals are also present, such as carbonate and fluoride.

Dentin is softer than enamel when instrumented, allowing removal with hand instruments even in a healthy state, unlike enamel. Dentin also appears less dense than enamel on radiographs. Due to the translucency of overlying enamel, dentin of the tooth gives the white enamel crown its underlying yellow hue.

Types of dentin

Type	***Location/chronology***	***Description***
Peritubular dentin	Wall of tubules	Highly calcified

Intertubular dentin	Between the tubules	Highly calcified
Mantle dentin	Outer most layer	First dentin formed
Circumpulpal dentin	Layer around outer pulpal wall	Dentin firmed after mantle dentin
Primary dentin	Formed before completion of apical foramen	Formed faster and is more mineralized than secondary
Secondary dentin	Formed after completion of apical foramen	Formed slower and is less mineralized than primary
Tertiary dentin	Formed as a result of injury	Irregular pattern of tubules

Age changes in dentin.

With increased age, the diameter of the dentinal tubule becomes more arrowed because of deposition of peritubular dentin. This may be related to the decreased reactions of pulp to various stimuli with age. With age, the passageways of the tubules to the pulp are not as wide open as in youth; the stimuli have trouble being transmitted as rapidly and in large amounts. Some studies show complete obliteration of older tubules with mineralization of the associated odontoblastic processes.

The **pulp** is the most innermost tissue of the tooth. Pulp appears as a less dense area on radiographs. The main functions of the pulp are:

1) Importantly, the pulp is involved in the support, maintenance, and continued formation of dentin because of the inner layer of the cell bodies of odontoblasts remaining along the outer pulpal wall.

2) 2) Another function of the pulp is sensory, because the cell bodies associated with the afferent axons in the dentinal tubules are located among this layer of odontoblasts. The only sensation perceived by the brain when the dentin or pulp is injured is pain. Changes in temperature, vibrations, and chemical changes that affect the dentin or pulp are thus perceived only as painful stimuli.

3) Pulp also has a nutritional function for dentin, because the dentin contains no blood supply of its own. Dentin depends on the pulp's vascular supply and associated tissue fluids for its nutrition. This is accomplished by way of the tubules and their connection to the odontoblasts' cell bodies that line the outer pulpal wall.

4) Pulp has a protective function because it is involved in the formation of secondary or tertiary dentin, which increases the coverage of the pulp.

5) Pulp also has white blood cells within its vascular system and tissues; these allow triggering of inflammatory and immune responses.

Since pulp is a connective tissue, it has all the components of such a tissue: intercellular substance, tissue fluid, cells, lymphatics, vascular system, nerves, and fibers. Cells of the pulp: fibroblasts, odontoblasts, undifferentiated mesenchymal

cells, white blood cells. The fibers present in the pulp are collagen fibers and some reticular fibers.

Age changes in pulp.

With an increase in age, pulp undergoes a decrease in intercellular substance, water, and cells as it fills with an increased amount of collagen fibers. The pulp becomes more fibrotic with increased age. Also, the overall pulp cavity can be smaller by the addition of secondary or tertiary dentin.

Today all dental professionals must have a perfect understanding of the histology of these two tissues. With the advent of expanded responsibilities and increased preventive concerns for patient, all members of dental team must be able to "see" into these interesting and important areas.

Primary tooth eruption

Eruptions of the primary dentition take place in chronological order. This process involves active eruption, which is the actual vertical movement of the tooth. Active eruption of a primary tooth has many stages in the movement of the tooth. After enamel apposition ceases in the crown area of each primary or permanent tooth, the ameloblasts place an acellular dental cuticle on the new enamel surface. In addition, the layers of the enamel organ are compressed, forming the **reduced enamel epithelium (REE)**. As this formation of the REE occurs for a primary tooth, it can begin erupt into the oral cavity. To allow for the eruption process, the REE first fuses with the oral epithelium lining the oral cavity. Second, enzymes from the REE disintegrate the central portion of the fused tissues, leaving an epithelial tunnel for the tooth to erupt through into the surrounding oral epithelium of the oral cavity. This tissue disintegration causes an inflammatory response known as "teething". As a primary tooth actively erupts, the coronal portion of the fused epithelial tissues peels back off the crown, leaving the cervical portion still attached to the neck of the tooth. This fused tissue that remains near the CEJ after the tooth erupts then serves as the initial junctional epithelium of the tooth.

The primary tooth is then lost as the succedaneous permanent tooth develops lingual to it. The process involving loss of the primary tooth consists of differentiation of osteoclasts, which absorb the alveolar bone between the two teeth, and odontoclasts, which cause resorption or removal of portions of the primary's root of dentin and cementum as well as small portions of the enamel crown.

***Permanent tooth eruption*.** The succedaneous permanent tooth erupts into the oral cavity in a position lingual to the roots of the shed primary tooth. The only exception to this is the permanent maxillary incisors, which move to a more facial position as they erupt into oral cavity.

The process of eruption for a succedaneous tooth is the same as for the primary tooth. The process of the non succedaneous permanent tooth eruption is also similar, but no primary tooth is shed. Both succedaneous and nonsuccedaneous permanent teeth erupt in chronological order. A permanent tooth

often starts to erupt before the primary tooth is fully shed, and problems in spacing can arise. Preventive orthodontic therapy can avoid some of these situations.

Root Development. The process of root development takes place after the crown is completely shaped and the tooth is starting to erupt into the oral cavity. The structure responsible for root development is the **cervical loop**. The cervical loop is the most cervical portion of the enamel organ, a bilayer rim that consists of only IEE and OEE.

The cervical loop begins to grow deeper into the surrounding mesenchyme of the dental sac, elongating and moving away from the newly completed crown area to enclose more of the dental papilla tissue and form **Hertwig's root sheath**. The function of this sheath is to shape the root(s) and induce dentin formation in the root area.

Root dentin forms when **outer cells of the dental papilla** in the root area are induced to undergo differentiation and become odontoblasts. After the differentiation of odontoblasts in the root area, these cells undergo **dentinogenesis** and begin to secrete **predentin**. As in the crown, a basement membrane is located between the inner enamel epithelium of the sheath and the odontoblasts in the root area. When root dentin formation is completed, this portion of the basement membrane also disintegrates, as does the entire Hertwig's root sheath. Cells of the root sheath may become the **epithelial rests of Malassez**. These groups of epithelial cells become located in the mature periodontal ligament and can become cystic, presenting future problems.

Cementogenesis in the root area also occurs when Hertwig's root sheath disintegrates. As a result the undifferentiated cells of the dental sac come into contact with the newly formed surface of root dentin. This contact of the **dental sac** cells with the dentin surface induces these cells to become immature **cementoblasts**. The cementoblasts move to cover the root dentin area. As a result of the apposition of cementum over the dentin, the **dentinocemental junction (DCJ)** is formed. Also at that time, the **central cells of the dental papilla** are forming into the **pulp**.

Knowledge level control

1. What is the composition of enamel?
2. What is the composition of dentin?
3. What types of dentin do you know?
4. What are the peculiarities of primary teeth eruption?
5. What are the peculiarities of permanent teeth eruption?

Practical Lesson № 7

Composition and properties of oral liquid: its role in enamel maturation, demineralization, remineralization. Defense mechanism of the oral cavity

Aim of the lesson.To study with students the composition and properties of oral liquid, specific and non-specific factors of resistance.

Actuality: students' mastering of the composition and properties of the oral liquid, their influence on the processes of maturation of the enamel after eruption.

Control of the initial level of knowledge

1. What major salivary glands do you know?
2. What minor salivary glands do you know ?
3. What means the term “pure saliva”?
4. What means the term “pooled saliva”?
5. What is the composition of enamel?
6. Explain the antibacterial properties of saliva.
7. What is dental plaque?

Content of the lesson

The fluid found in the mouth is derived mainly from the *major* and *minor* salivaryglands. The major glands are the *parotid, submandibular,* and *sublingual.* Of these, the parotid elaborates a serous secretion containing electrolytes but is relatively lowin mucoid organic substances. The submaxillary has both a serous and a mucus secretion; the sublingual has a greater proportion of mucus output than the othermajor glands. The minor *palatal, lingual,buccal,* and *labial* salivary glands empty onto the lining mucous membrane of the mouth in many places - on the palate, underthe tongue, and on the inner sides of the cheeks and lips. These minor glands are mainly mucus-secreting glands.

The *pure* saliva secreted by the oral glands is sterile until it is discharged into the mouth. When it mixes with saliva fromother glands, it becomes -known, as *pooled*or *whole* saliva. Whole saliva is farther altered by additions from the periodic ingestion of food, oxygen from the air, carbondioxide from the lungs, tissue fluids entering viathegingival crevice, and release of a great variety of intracellular organics from lysed bacteria, loughed oral epithelial cells, and dissolved food fragments. It becomes even more complex by the inclusion of living cells - bacteria from the mouth that produce enzymes and other chemicals, epithelial cells sloughing from the mucous membrane, and leukocytes derived from the gingival crevice and tonsils. Both of the latter also release proteins, ions, and even radicals into the pooled saliva.

The composition of saliva varies, depending on whether it is *stimulated* or *unstimulated (resting),* (Antisialogogue: an agent, that diminishes or arrests the

flow of saliva). During the day the submandibular gland secretes the greatest proportion of the unstimulated saliva, although fhe flow rate of resting saliva is very slow for *all* of the three major glands, being as low as 0.26 mL per minute for the submandibular, 0.12 mL per minute for the sublingual, and 0.11 mL per minute for the parotid gland. Approximately 69% of unstimulated saliva is from the submandibular gland, 26% from the parotid, and 5% from the sublingual gland. The minor glands secrete about 8% of the total amount of saliva. This unstimulated flow rate is subject to a circadian rhythm, with the highest flow in midafternoon and the lowest around 4 AM. There is a considerable variation of flow between individuals under resting conditions. The flow is exceedingly low, or nonexistent, during sleep.

The protective functions of saliva are due to its *physical, chemical,* and *antibacterial* properties.

1. Physical property of saliva.

The physical effect is mainly dependent upon the water content and the flow rate of saliva. Saliva, if in a sufficient quantity, serves a cleansing function. The fluid dilutes and removes acid concentration in the dental plaque. A viscous salivais not as effective as a more fluid saliva inclearing carbohydrates. If saliva does not have access to all tooth surfaces, the cleansing and dilution potential is diminished. Bacterial acidogenesis in the dental plaque causes the pH to fall farther and to remain low longer.

2. Chemical Protection.

Tooth damage results from a drop of pHin the plaque compartment. The chemical protection afforded by the saliva minimizes the pH drop, increases the resistance ofthe tooth surface to acid attack, accelerates the return of the pH to normal, and provides the ionic environment that facilitates repair of the enamel following acidogenesis.

Sodium bicarbonate is the buffering and neutralizing constituent of the saliva. Other components serving a similar function are the phosphates, amphoteric proteins, and urea. The latter compound is broken down by the bacteria to form ammonia. Its neutralizing effectiveness probably accounts for the fact that patients with renal transplants or on hemodialysis have both an increased salivaryurea level anda reduced caries prevalence.

Another mechanism for pH control is achieved by the secretion of a protein known as *sialin,* or pH *rise factor.* This proteintends to minimize the extent of drop of the Stephan curve as well as to reduce the time necessary for the pH to return to more neutral levels.

The cationsand anions of saliva most associated with increasing the resistance of enamel to acid attack are calcium, phosphate, and fluoride. At the time of secretion, saliva is supersaturated (with calcium and phosphate) in relation to hydroxyapatite.With supersaturated solutions, there is a potential for precipitation of calcium salts. In the case of saliva, however, the calcium and phosphate do not precipitate because of the presence of aproline-rich phosphoproteins in the saliva called statherin. Statherin acts to stabilize the calcium and phosphates in the supersaturated saliva and plaque fluid. In turn, the supersaturated fluids aid in

preventing demineralization as well as promoting remineralization. Furthermore, as the fluidphase calcium and phosphate ions fall, statherin may release its bound calcium. As the secretion of calcium increases on stimulation, so does the flow of statherin. Other *proline-rich proteins* also aid in maintaining supersaturation.

3.Antibacterial properties of saliva.

The antibacterial properties of wholesaliva are due either to substances secreted by the glands or to humoral components of the body defense systemthat enter the saliva via the gingival crevice.

The most easily understood antibacterial function is performed by the secreted sulfated glycoproteins - the mucins – that serve as a trap to aggregate bacteria, which are eventually swallowed.The same mucins provide a thin lubricating film over the mucous membrane and teeth to serve as lubricants.

Four important proteins found in saliva are bacteriostatic or bacteriocidal. They are lysozyme, lactoferrin, salivary peroxidase, and secretory immunoglobulin A(sIgA). Lysozyme activity is depressed bythe presence of iron and copper. On the other hand, lactoferrin combines with iron and copper to protect the lysozyme action,while at the same time depriving bacteria of some of their essential needs for those two metals. Salivary peroxidase reacts with salivary thiocyanate in the presence of hydrogen peroxide to form the antimicrobial compound hypothiocianite, which, inturn, inhibits the capability of the bacteria to use glucose fully. Interestingly, the hydrogen peroxide is mainly a product of the plaque bacterial metabolism.

Lactoperoxidase strongly adsorbs to hydroxyapatite. As a component of the acquired pellicle, it can influence the qualitative and quantitative characteristics of the microbial population of plaque. The secretory immunoglobulin A (sIgA) is derived mainly from the minor salivary glands located strategically near and on all sides of the teeth.

The role of the body cellular and immunologic defense systems in moderating the course of the plaque diseases needs clarification. The main access that phagocytic cells and their antibacterial products have to the oral cavity is through the gingival crevice. This route may prove to have important implications on the onset and progress of periodontal disease. Conceivably, once the cellular and immunologic components are in the gingival crevice, they could influence the subgingival plaque organisms responsible for root caries and periodontal disease. It is more difficult to conceive of the humoral defense system operating in supragingival plaque.Yet there is a continual low-level flow of leukocytes into the saliva.

The immunologic defenses, despite theoretic limitations, may have an influence on dental caries. Individuals with major immunologic deficiencies have more caries than normal persons. In the vaccination of monkeys against S *mutans*, there is an increase, in-serum IgA, serum IgG, and serum IgM as the caries incidence decreases. Perhaps these three serum immunoglobulins may prove important in the control of caries. Thus on a research basis there is reason to believe that there is a linkage between humoral defenses and the plaque diseases.

How the cells and immuniglobulins exercise this potential is unclear. The development of a successful caries and possibly a periodontal disease vaccine will ultimately depend on such clarification.

The concentration of calcium and phosphate ions in the fluid bathing the tooth atthe plaque-tooth interface is extremely important, since these elements are the same as those composing hydroxyapatite crystal. If the fluid adjacent to the tooth is supersaturated with calcium and phosphorus ionsat a given pH, the enamel certainly cannot unflergo demineralization at its surface.

The saliva bathing the teeth is normally supersaturated with respect to the calcium and phosphate of enamel. The continued supersaturation of the tooth environs is possible because the plaque can concentrate both calcium and phosphate to a higher level than in saliva. The phosphate in the plaque is three times greater than the level occurring in the saliva. This is of practical importance, since the calcium and phosphate in plaque tend to be inverse to the caries score.

Enamel is the protective coat found on the visible portions of teeth above the gum line. It is the hardest substance in human body and is over 95% mineral in composition. The main structural component of the enamel is a mineral called hydroxyapatite which is chemically Ca_{10} $(P04)_6$ $(OH)_2$ and has frequent presence of carbonates and fluorides as impuritjes. Acid is produced when bacteria grow in the absence of oxygen. Such environments are formed in the pockets of teeth under bacterial films. Energy in this case is derived solely from the glycolytic process and the final product which is mostly lactic acid is secreted out of the cell. This acid reduces pH of the medium affecting the oral health of the host. The pH of dental plaque is a key factor in the balance between acid demineralisation of the teeth and the remineralisation of the initial carieslesion. Plaque pH falls each time acids accumulate in the plaque due to bacterial acid production following the consumption of fermentable carbohydrates - mainly sugars - in foods and drinks.

On the other hand, the plaque pH rises when the acids are washed out andneutralised by saliva, which contains the important buffer, bicarbonate.The pH also rises when the plaque bacteria either metabolise the acids, orproduce alkali such as ammonia from nitrogenous compounds found infoods and saliva.

Besides its role in the control of plaque pH, saliva has another function of major importance in caries- remineralasing effects. Saliva is 'supersaturated' with the ions which make up the mineral content of the teeth (calcium, phosphate and hydroxyl ions) when the pH is above a 'critical' value, about 5.5. Below this value (e.g. after an intake of sugar) the saliva and plaque is unsaturated, and the tooth dissolves. Above this value, the calcium and phosphate ions in saliva start to repair the damaged mineral crystals in the enamel - the process of remineralisation.

Dental caries is the result of an imbalance between demineralisation and remineralization. In health,loss of mineral is balanced by the reparative mechanisms of saliva. *Remineralization* is a natural process in which inorganic minerals in saliva are deposited on carious dental surfaces under appropriate conditions, restoring the mineral content of teeth. The effect of this process varies greatly among individuals depending upon enamel composition, oral health and

salivary constituents. An equilibrium always exists betweenthe solvated and solid mineral as

$Ca_{10}(P04)_6(OH)_2 \leftarrow > 10Ca^{2+} + 6PO_4^{3-} + 20H^-$

The solid crystals of the tooth mineral, called hydroxyapatite, dissolve to release calcium, phosphateand hydroxyl ions only if the latter are below saturation concentrations. If above saturation, the reaction will tend to move to the left, and any damaged crystals will be repaired by the acquisition of ions from solution.

Stimulation of saliva flow results in an increase in the washing out of acids (and sugars), and also an increase in the amount and concentration of bicarbonate buffers and of remineralising ions.The solubility of hydroxyapatite in water is extremely low. Thus it is not the dissolution of enamel that weakens the teeth surface. At lower pH, higher amounts of calcium are released from the mineralstructure as both hydroxide and phosphate concentrations are low. This explains thehigher rates of enamel demineralization at lower pH. Remineralization is essentially a reversal of the conditions that cause demineralization. Minerals from food or saliva get dissolved in carbonic acid formed momentarily from theCO_2 in breath and are deposited at the damage site of the enamel structure as the acid dissociates. However this process is naturally inefficient in recalcifying acid erodedenamel surfaces as they are always covered by a pellicle of salivary and bacterialproteins. Thus remineralization helps only if the enamel layer is intact as in a healthy individual or in the white caries lesions. These lesions are formed due to decalcificationof inner tooth material and can be treated by enhancing salivary flow (to increase remineralization) and maintaining good hygiene.

Knowledge level control:

1. Account the properties of saliva.
2. Explain the physical property of saliva.
3. Explain the antibacterial properties of saliva.
4. What is the immunologic defenses of saliva?
5. How can you determine flow rate of saliva?
6. Explain the term “demineralization”.
7. Explain the term “remineralization.