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"NORTH OSSETIAN STATE MEDICAL ACADEMY"
Ministries of Health of the Russian Federation**

DEPARTMENT OF CHILDREN'S DISEASES №2



**EDUCATIONAL AND METHODOLOGICAL RECOMMENDATIONS
OF DISCIPLINE PEDIATRICS**

Part I

Vladikavkaz, 2020

The methodical recommendations for out-of-class independent work for students of discipline pediatrics was approved at the meeting of the Department of Children's Diseases No.2 dated November 25, 2020, protocol No4.

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ORIGINATORS:

PhDs in Medicine. **S.K. Karyeva**, MD, **Z.D. Kaloeva**, PhDs in Medicine. **K.M. Dzilikhova**, PhDs in Medicine. **Z.Yu. Sozaeva**, PhDs in Medicine. **I.G. Gussoeva**, PhDs in Medicine. **Z.K. Dzhagaeva**.

REVIEWERS:

Department chair of children's diseases No. 1 FGBOU of VO SOGMA of the Russian Ministry of Health of MD, professor T.T. Borayeva.

Department chair of children's diseases No. 3 FGBOU of VO SOGMA of the Russian Ministry of Health of MD, professor A.B. Kasokhov.

Class in a subject:
"PHYSICAL AND PSYCHOMOTOR DEVELOPMENT OF CHILDREN".

ORGANIZATION AND PRINCIPLES OF WORK OF CHILDREN'S HOSPITAL

I. Scientific and methodical justification of a subject.

As to future organizers of health care knowledge of the device, work, the anti-epidemic mode of children's hospitals is necessary for students of medical faculty. Knowledge of features of the anamnesis and an objective research of children of early age will broaden professional horizons of future doctor since many diseases of adults have the sources at children's age.

II. Purpose of activity of students on occupation:

The student has to know:

- structure of a children's hospital;
- the types of the help rendered by children's hospitals;
- anti-epidemic actions for prevention of a drift of an infection and an intrahospital infection;
- indications for hospitalization;
- features and value of the anamnesis in pediatrics;
- features of objective inspection of the child and additional methods of a research (X-ray analysis, ECG, FKG, ultrasonography, laboratory methods, etc.);
- basic rules of care for the healthy and sick child.

The student has to be able:

- to make the plan of anti-epidemic actions for prevention of a drift of an infection in children's hospital;
- to be able to collect the anamnesis at mother and the child taking into account age;
- to give an assessment of the anamnesis of life and a disease;
- to take care for the healthy child of early age and the patient taking into account pathology.

III. Content of training:

1. Children's hospitals (types, features of the device, mode).
2. Prevention of a drift of an infection and intrahospital infections.
3. Hospitalization of the child (indications, rules of registration).
4. Value of the anamnesis in pediatric practice.
5. Features of inspection of the child. An objective research, additional and laboratory

methods of a research in pediatrics.

6. Features of care for the patient and healthy child.

IV. Educational material security.

1. Visual aids: tables, schemes, multimedia presentations, videos, audiogramma.
2. Educational medical documentation (case histories, laboratory researches, roentgenograms).
3. Technical means of training.
4. Literature.

V. The list of the recommended literature.

1. Propaedeutics of children's diseases / to N.A. Geppa. – M.: GEOTAR-media, 2009. – 464 pages.
2. Propaedeutics of children's diseases/T. V. Kapitan. – M.: MEDpress-inform, 2009. – 656 pages.
3. Propaedeutics of children's diseases/Ampere-second. Kalmykova. – M.: GEOTAR-media, 2010. – 920 pages.
4. Pediatrics: The textbook for medical schools. Under the editorship of N.P. Shabalov. – SPb: SpetsLit, 2006. – 895 pages.
5. Children's diseases: the textbook / under the editorship of A.A. Baranov. – M.: GEOTAR-media, 2009. – 1008 pages.
6. A.V. Mazurin, I.M. Propedevtik's Baneberries of children's diseases. – Volume, 2009. – 505 pages.
7. Z.D. Kaloyeva, K.M. Dzilikhova, S.K. Karyaeva, etc. Background diseases of children of early age. Manual for students. – Vladikavkaz, 2011. – 64 pages.
8. Z.D. Kaloyeva, K.M. Dzilikhova, S.K. Karyaeva, etc. Technique of a research of the child. The study guide for students. – Vladikavkaz, 2011. – 51 pages.
9. Lectures on pediatrics.
10. Methodical instructions for out-of-class work of students 4 courses of medical faculty on discipline "Pediatrics".

VI. List of questions for check of initial level of knowledge:

1. The anamnesis, its role in diagnostics.
2. The anamnesis of life, value of factors of external and internal environment in forming of pathological process.

3. Anamnesis of a disease, its basic rules of collecting.

VII. List of questions for check of final level of knowledge:

1. Features of collecting the anamnesis in pediatrics.
2. Influence of environmental factors on the antenatal and post-natal periods of development of the child.
3. Features of the anamnesis of life of the child during various age periods (a neonatality, chest age, the pubertal period, etc.).
4. Factors which need to be considered when collecting the anamnesis at mother and directly at the child.
5. Features of an objective research of the child.
6. The additional methods applied in pediatrics, their feature.
7. The main differences of the device and the mode of hospitals for adults and children.
8. What factors are considered at distribution of sick children on chambers?
9. Indications for hospitalization of mothers.
10. Anti-epidemic actions for prevention of a drift of an infection in children's hospital.

Information block.

By the form, the medical care and the system of the organization of work provided to the volume and character the children's hospital can be:

- a) on a profile – the general, multi-type or specialized;
- b) on the system of the organization – integrated or not integrated with polyclinic;
- c) on activity volume - various categorization (koyechky power).

Multi-field interdistrict and municipal hospitals on 300 beds, are planned for delivery of health care to the children's population of one city or large rural areas on the main and narrow clinical profiles (8-12 specialties). Multi-type – generally hospitals, incorporate not less than 10-12 specialized departments and provide highly skilled medical care to children.

Specialized hospitals (tubercular, cancer, infectious diseases, psychiatric and other diseases hospitals and clinics) provide to the children's population medical care on the corresponding profiles. Radius of their action is defined by local bodies of health care depending on incidence of the population and extent of development of network of these hospitals.

FEATURES OF THE ORGANIZATION OF THE STATIONARY HELP TO CHILDREN

Departments of a children's hospital will be organized on 40-60 beds with the isolated sections on 20-30 of beds. Chambers of a hospital are formed on age and the nature of diseases. Depending on age allocate the following chambers: for premature, for newborns, for children of

chest age, for children of younger age, for children of advanced age. Norms on one bed in children's non-infectious departments are 6, in infectious – 6.5 sq.m, in departments of recovery treatment – 7 sq.m. In departments for children of preschool and school age of chamber have to be small – with number of beds no more than four. It is reasonable to have the glazed partitions between chambers in order that the personnel could watch a condition of children and their behavior. In department, rooms for mothers in bliz of chambers for babies and also the room for decantation of breast milk are surely allocated.

Feature of a children's hospital is the mode providing a complex not only medical, improving and sanitary and hygienic, but also educational actions taking into account anatomo-physiological and age features of a children's organism.

PHYSICAL AND PSYCHOMOTOR DEVELOPMENT OF CHILDREN

I. Scientific and methodical justification of a subject:

From a position of the preventive direction of our medicine and introduction of the unified methods of general medical examination of the population on 5 groups of health gains special practical value pediatric orientation of students of medical faculty. Students have to seize ability to estimate the level of physical, psychological and sexual development of the patient of any age as important criteria of the state of health. To define medical tactics in a specific case. Especially it is important for the doctors working with teenagers (teenage offices of polyclinic, the medical commissions, etc.).

II. Purpose of activity of students on occupation:

The student has to know:

- anatomo-physiological features of nervous system of children on the life periods;
- morfo-functional features of skin, hypodermic fatty tissue, bone and muscular systems;
- main stages and mechanisms of sexual development of children;
- options of the pubertal period;
- periods of life of children, anatomo-physiological features of age pathology;
- key indicators of psychological development of children in age aspect; somatometric and somatoscopic criteria of physiological development and modern requirements to their assessment;
- options (physiological and pathophysiological) physical and sexual development of teenagers.

The student has to be able:

➤ on the basis of objective survey to give an assessment to the psychological (intellectual) level of development of the patient of any age (compliance, lag, advancing in relation to passport age) by the following criteria:

- motive static reactions, sense bodys;

- conditioned, unconditioned reflexes, development of the speech, memory, ability to thinking, neurologic status (tendon jerks, meningeal symptoms).

➤ to perform the general objective inspection and to define type of the somatic constitution;

➤ to conduct the main anthropometrical researches and to give an individual assessment of physical development (level, harmony degree);

➤ to determine the "tooth" age (compliance, lag, advancing of passport age);

➤ to give a complex assessment of level of somato-biological ripeness (good, satisfactory, unsatisfactory);

➤ in puberty age on the basis of objective survey to give an assessment of sexual development in relation to passport age;

➤ to reveal the pathophysiological signs, boundary with norm, which are options of the pubertal period, to give them a clinical assessment, to define medical tactics;

➤ to define group of health on the basis of complex assessment of results of objective survey;

➤ to reveal risk factors on indicators of physical, sexual development, to define the general medical tactics of dispensary observation.

III. Content of training:

1. Morfo-funktsionalnye features of central nervous system at children of early age.
2. Characteristic of unconditional reactions.
3. Terms and dynamics of development of sense bodys, conditioned reflexes.
4. Development of the speech.
5. Main stages of development of motive and static abilities.
6. Criteria for evaluation of psychological development (psychophysiological maturity) of children of preschool age.
7. Criteria for evaluation of a psychophysiological condition of school students.
8. Periods of life of children, main physiological characteristic.
9. Main neurologic indicators.
10. Somatometrichesky indicators of physical development, assessment methods.
11. Somatoskopichesky indicators of physical development, assessment methods.
12. Types of the somatic constitution.

13. Concept "tooth" age, assessment.
14. Concept "bone" age, assessment.
15. Stages of forming of a floor.
16. Indicators of sexual development, assessment.
17. Biological age, evaluation criteria.
18. Main criteria of the state of health, group of health.
19. Options of physical development, dispensary tactics.
20. Options of sexual development, clinical assessment, dispensary tactics.

IV. Educational material security.

5. Visual aids: tables, schemes, multimedia presentations, videos, audiogramma.
6. Educational medical documentation (case histories, laboratory researches, roentgenograms).
7. Technical means of training.
8. Literature.

V. List of references:

1. Propaedeutics of children's diseases / to N.A. Geppa. – M.: GEOTAR-media, 2009. – 464 pages.
2. Propaedeutics of children's diseases/T. V. Kapitan. – M.: MEDpress-inform, 2009. – 656 pages.
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9. Lectures on pediatrics.

10. Methodical instructions for out-of-class work of students 4 courses of medical faculty on discipline "Pediatrics".

VI. Questions for independent preparation:

1. What means the term "physical development"?
2. What indicators of physical development are estimated at children?
3. How standards of indicators of physical development in children of different age groups are calculated?
4. What is "acceleration"? What factors influence its speed?
5. What does acceleration differ from the accelerated development caused by overfeeding in?
6. What is "tooth" age in what parameters it is estimated at children?
7. What formulas of calculation of number of milk and second teeth do you know?
8. Give definition to a concept "bone" age on what criterion it is estimated.
9. List key indicators of sexual development by what criteria are estimated.
10. What is meant psychological development?
11. In what parameters the psychological development is estimated?
12. What morfo-functional features of central nervous system at children of early age do you know?
13. Call average terms and dynamics of development of sense bodys in children.
14. Call the main stages of forming of speech skills.
15. Main stages of development of motive and static abilities.
16. Main criteria of the state of health.
17. What groups of health do you know?

Information block.

PHYSICAL DEVELOPMENT OF CHILDREN.

Physical development of the person is understood as set morphological and functional features of an organism in their interrelation.

Intensively proceeding processes of growth and maturing of a children's organism define its special sensitivity to environmental conditions. Features of climate, domestic conditions, a day regimen, the nature of food and also the postponed diseases considerably affect physical development of children. Rates of physical development are influenced by also hereditary factors, a somatotype, metabolic rate, an endocrine background of an organism, activity of enzymes of blood and secretion of digestive glands.

In this regard the level of physical development is considered to be a reliable indicator of health.

At assessment of physical development of children consider the following indicators:

1. Morphological: length and body weight, a thorax circle, and children up to three years have a head circle.
2. Functional indicators: vital capacity of lungs, animal force of hands, etc.
3. Development of muscles and muscle tone, condition of a bearing, musculoskeletal system, development of a hypodermic and fat layer, turgor of fabrics.

Body length.

The indicator of length of a body is the most stable in comparison with other indicators of physical development. The greatest growth rate is noted in the first three months of life of the child (tab. 1).

At the correct development of the child the body length increase in a month can fluctuate from +1 to -1 cm.

For the second year of life the increase of length of a body makes 11-12 cm, for the third year of life – 8 cm, for the fourth – 6 cm. By four years growth of the child reaches 100 cm. Further (up to 10 years) for definition of an increase of length of a body it is possible to use a formula: length of a body of the child $R = 100 \text{ cm} + 6(n - 4)$, where n – number of years, 6 – an average annual increase of length of a body, see. The most intensive growth is observed in 5-7 years and in the period of the beginning of puberty.

Body weight.

It is a labile indicator which can change under the influence of constitutional features, neuroendocrine and somatic disturbances, it also depends on the exogenous reasons (food, the mode).

The most intensive increase of body weight of the child is noted on the first year of life and in the pubertal period.

The body weight of the child by 4 - 4.5 months doubles, by a year trebles. Rate of increase in body weight at children after a year weakens and averages 2 kg. annually.

The expected body weight of the child up to 10 years can be calculated by a formula:

$P = \text{the body weight of the child in 1 year} + 2 \text{ kg} \times (n - 1)$,

where P – the expected weight, n – number of years.

The body weight of the child **10 years are more senior** it is possible to define by I.M. Vorontsov's formula: the body weight of children is more senior than 10 years = age $\times 3$ + the last figure of number of years.

Table 1.

Increase of length and body weight at children of the first year of life.

Age, month.	Body length increase in 1 month, see.	Increase body lengths for the expired period, see.	Body weight increase in 1 month, gr.	Body weight increase for the expired period, gr.
1	3	3	600	600
2	3	6	800	1400
3	2.5	8.5	800	2200
4	2.5	11	750	2950
5	2	13	700	3650
6	2	15	650	4300
7	2	17	600	4900
8	2	19	550	5450
9	1.5	20.5	500	5950
10	1.5	22	450	6400
11	1.5	23.5	400	6800
12	1.5	25	350	7150

Circle of the head and thorax.

At the birth *a circle of the head* of the full-term children of 33-37.5 cm, it should not exceed a thorax circle more, than on 1-2 cm. In the first 3-5 months the monthly increase makes 1-1.5 cm, and then 0.5-0.7 cma month.

Calculation of a circle of the head for children of the first year of life is made on a formula: surrounding goal. in **6 months** makes **43 cm**, for each missing month about **1.5 cm** are taken away, for everyone the subsequent increases on **0.5 cm**.

By a year the circle of the head increases by 10-12 cm and reaches 46-48 cm. The circle of the head of the child at the age of 1-3 years increases by 1 cma year. From 4 years the head circle annually increases by 0.5 cm. By 6 years it is equal to 50-51 cm, and for all next years increases by 5-6 cm.

Thorax circle at newborn 33–35 cm. The monthly increase on the first year of life averages 1.5-2 cm. By a year the circle of a thorax increases by 15-20 cm, then the intensity of increase of this indicator decreases, and to preschool age the thorax circle on average increases by 3 cm, and in school – by 1-2 cma year.

Calculation of a circle of a breast for children of the first year of life is made on a formula: surrounding gr. in **6 months** makes **45 cm**, for each missing month **about 2.0 cm** are taken away, for everyone the subsequent increases on **0.5 cm**.

The *Perednezadny* size of a thorax at most of the full-term newborns is less than cross size or is equal to it. At the end of the first year of life the cross size begins to exceed *perednezadniya* and the shape of a thorax begins to approach the adult's configuration, i.e. to be flattened.

For assessment of proportionality of development of the child it is possible to use some anthropometrical indexes.

Chulitskoy index: 3 circles of a shoulder + a hip circle + a shin circle – body length at children till 1 year equal 25-20 cm, and in 2-3 years – 20 cm, in 6-7 years – 15-10 cm.

Erisman's index: the circle of a thorax exceeds semi-growth at children till 1 year on 13.5-10 cm, in 2-3 years – on 9-6 cm, in 6-7 years – on 4-2 cm, in 8-10 years – is 1 cm more or 3 cm less.

The individual assessment of physical development is carried out by comparison of anthropometrical indicators of the child to the standards and standards developed especially for this region taking into account ethnic origin of the child and klimatogeografichesky conditions of accommodation.

Proportions of a children's body

Assessment of proportions of a children's body is of great importance for judgment of correctness of development of the child. Separate parts of a body of the child grow unevenly, and, therefore, also ratios between them change with age: for example, for the entire period of growth length of the lower extremities increases approximately by 5 times, length of upper extremities – by 4 times, trunks – by 3 times, and head height – only twice.

Height of the head of the newborn is about $\frac{1}{4}$ total lengths of a body, at 2-year-old – $\frac{1}{5}$, at 6-year-old – $\frac{1}{6}$, at 12-year-old – $\frac{1}{7}$ and at the adult – $\frac{1}{8}$.

For a fruit, and partly for the newborn, some relative underdevelopment of a front part of a skull in comparison with well developed cranial is characteristic. Clearly outstanding frontonasal roller and some underdevelopment of a mandible it is characteristic of the face of the newborn.

The correct assessment of features of his thorax is of great importance for characteristic of physical development of the child. The Perednezadny size of a thorax at most of the full-term newborns is less than cross diameter or is equal to it; within 1 year of life, even at children, weak at the birth, cross diameter begins to prevail over perednezadny: the first doubles by 6 years, the second – only by 14-15 years.

At the full-term newborn child the circle of a breast is 2-4 cm less than a head circle. At very strong newborns they are equal, and rather very seldom the circle of a breast exceeds a head circle. Already during the first half of the year of life the circle of the head is compared to a breast circle, and in the next years the circle of a breast exceeds a head circle approximately on so many centimeters, how many years to the child.

Children of early and preschool age have a constant ratio between perimeters of extremities and a thorax: the trebled circle of a shoulder is equal to a breast circle; the sum of circles of a hip and shin equals the trebled circle of a shoulder and a circle of a breast. Existence of these ratios indicates normal fatness of the child and the correct development in it of the muscular device.

Sexual development

Sexual differences in indicators of physical development are significant only with approach of puberty. The life period when the growing organism reaches biological puberty, is called pubertal and is characterized by emergence of secondary sexual characteristics. Time of emergence of the last depends on the state of health, food, climatic conditions and genetic features. At girls the external manifestations of signs of sexual development are noted in 8 years, at boys is in 9-10 years (tab. 2).

Table 2.

Terms of emergence of secondary sexual characteristics.

Age / years	Boys	Girls
10 years	AxP_{00}	$MeMaAxP_{0000}$
11 years	AxP_{00}	$MeMaAxP_{0000}$ or expressiveness of one - two indicators in a stage 1 or 2
12 years	AxP_{00}	$MeMaAxP_{0111} - MaAxP_{222}$ or expressiveness of one - two indicators in a stage 1 or 2
13 years	$AxP - AxP_{0011}$ or expressiveness of one indicator in a stage 1, and another 0	$MeMaAxP_{0-1222} - MeMaAxP_{2333}$ or expressiveness of one - two indicators in a stage 2 or 3;
14 years	$AxP - AxP_{1122}$ and expressiveness of one indicator in a stage 1 and another 2	$MeMaAxP_{2-3333}$ expressiveness of one - two indicators in a stage 2; existence of regular monthly
15 years	AxP_{33} or expressiveness of one of indicators in a stage 1	$MeMaAxP_{3333}$ or expressiveness of one of indicators of a stage 2
16 years	$AxP_{33} - AxP_{34}$	$MeMaAxP_{3333}$

Symbols of development of secondary sexual characteristics in girls:

1. Development of mammary glands (Ma – mammae):

Ma_0 – a children's nipple;

Ma_1 – a peripapillary circle is given over skin level;

Ma₂ – a peripapillary circle of the big sizes, together with a nipple forms a cone, gland is given over skin level a little;

Ma₃ – gland is raised, the nipple and a peripapillary circle keep a cone form;

Ma₄ – a nipple rises over a peripapillary circle, gland takes the same forms and the sizes, as at the adult woman.

2. Emergence of hair on a pubis (R – pubis):

P₋₀ lack of hair;

R₋₁ single short hair;

P₋₂ hair on the central part of a pubis more dense, long;

R₋₃ hair long, dense, curling on all triangle of a pubis;

P₋₄ the hair located on all area of a pubis pass to hips, dense, curling with characteristic horizontal border.

3. Development of hair in the axillary hollow (And – axillaris):

Ah₀ – lack of hair;

Ah₁ – single hair;

Ah₂ – hair hollows, more dense on the central site;

Ah₃ – hair dense, long on all muscular area.

4. Formation of menstrual function (Me):

Me₀ – lack of periods;

Me₁ – 1 - 2 periods by the time of survey;

Me₂ – irregular periods;

Me₃ – regular periods;

Symbols of development of secondary sexual characteristics in boys:

1. Development of hair on a pubis:

P₋₀ lack of hair;

P₋₁ separate direct hairs;

P₋₂ more thick curly hair, upper bound horizontal;

P₋₃ dense pilosis on a pubis and beginning in the direction to a navel;

P₋₄ dense pilosis towards a navel and on the internal surface of hips.

2. Development of hair in the axillary hollow:

And₀ – lack of hair

And₁ – separate direct hairs

And₂ – hair curly, but rare

And₃ – dense pilosis, hair curly, pigmentation of a front axillary fold.

Boys have data on a heterophonia (V)_{0,1,2}, development of pilosis of the person (F)_{0,1,2,3}, development of an Adam's apple (L)_{0,1,2} are considered in case of lag or advancing of sexual development.

Psychological development

From the moment of the birth the full-term child has a number of congenital, or unconditioned reflexes. Sucking, swallowing, blinking, cough, sneezing, acts of urination, defecation and some other belong to them. They carry out organism adaptation to the environment and until the end of the first year of life are exposed to significant evolution.

Congenital reactions in the form of unconditioned reflexes quite provide existence of the child only in the first days of life. Further the main in activity of the child are the acquired reflexes providing the necessary level of interaction of an organism with external environment.

At the end of the first and at the beginning of the second month of life at the child a number of simple, elementary conditioned reflexes is formed. At the end of the third month of life at him it is possible to develop already compound, differentiated reflexes indicating development of analizatorny function of a cerebral cortex.

Development of higher nervous activity, i.e. acquisition of conditioned reflexes, on the first year of life goes rapidly. The child is much easier, than the adult, forms conditioned connections with the environment, and they at the child are steadier. Rather quickly children get habits, skills of behavior which in the subsequent remain for the rest of life.

The huge role in behavior of the child is played by the speech. Forming of the speech is caused by formation of function of a sensor system and functional maturing of a brain.

It is important to remember that development of the speech is also a product and result of communication of the child with the adult, result of educational activity.

Development and education of the child consists of a certain schedule of life (mode), of instilling in it of necessary skills, creation of conditions which would provide the correct development of its movements, speeches would contribute to the correct physical development, vigorous, cheerful mood.

In table 3 indicators of psychological development of children of the first year of life on months are provided.

Table 3.

Age, month.	Development indicators
0	Holds under review a moving subject (step tracking). To age of 1 month holds under review motionless a subject.

1	Focuses a look on a motionless subject. Begins to trace a moving subject smoothly. Listens to a sound, the adult's voice. Lying on a stomach, tries to lift and hold the head.
2	It is long focuses a look on the face of the adult or on a motionless subject. It is long watches a moving toy or the adult. Turns the head at a long sound, lying on a stomach rises and shortly holds the head. Says separate sounds.
3	Focuses a look in vertical position on the face of the adult speaking with it or a toy; a revival complex with it. Several minutes lie on a stomach, leaning on forearms and having highly raised the head. With support under mice strong plants the feet, bent in hip joints. Holds the head in vertical position on the adult's hands. Considers and tries to take the hanging toy.
4	Recognizes mother, rejoices her. Finds eyes an invisible source of a sound. Loudly laughs in response to the address. Takes the hanging toy. Holds with hands a breast of mother or a small bottle during feeding.
5	Distinguishes close people from strangers (differently reacts). Learns mother's voice, distinguishes strict and tender intonation, the address to him. Accurately takes a toy from the adult's hands, holds a toy in a hand. Long lies on a stomach, leaning on palms of the straightened hands, turns over from a back on a stomach, exactly steadily costs with support under mice. Long melodiously "babbles". Eats semi-dense food from a spoon.
6	Differently reacts to a personal and others' name. Takes toys, being in any situation, and long is engaged in them. Turns over from a stomach on a back. Moves, rearranging hands and creeping. Says separate syllables (beginning of babble). Well eats from a spoon, removing food lips. Drinks from a cup. Toy knocks, swings, shifts it. Well creeps (much, quickly). On the question "where?" finds a look the subject which is constantly in a certain place (for example, hours, a doll). Long murmurs, repeatedly says the same syllables.
7	Imitates actions of the adult with toys. Itself sits down, sits and lays down. Holding a barrier, itself gets up, costs t falls. Crosses, holding a barrier. Performs in advance studied simple operations ("pat-a-cake", "give the handle"). Loudly, accurately and repeatedly says various syllables. Eats a bread crust which holds. Dance tunes of the movement under a dance tune music (if with the child are engaged). Works with objects differently, depending on their properties (rolls, opens,

8	rattles). Passes from a subject to a subject, slightly adhering for them hands. Knows the name, turns around for call. Itself holds a cup from which drinks. Treats jumping on a pot calmly. Independently at the request of the adult performs the studied operations (opens, takes out, puts). Enters on a high surface and descends from it. Goes with support by both hands forward. At a request "give" finds among other toys and gives familiar objects. Imitates the adult, repeats after him new syllables which are not in his babble.
9	Selective attitude towards children. Removes and dresses rings with big openings on a core. Costs independently without support. Takes the first independent steps. The first generalizations in the understood speech: at a request finds any ball, a doll. At the request of the adult performs the studied operations (feeds, drives a doll). Pronounces the first words – designations, for example: "give", "mother".
10	Learns a familiar face in the photo. Distinguishes two contrast forms of objects. Stretches to other child a toy, accompanies it with laughter or babble. Transfers the actions studied with one subject on another. Goes independently (without support). Understands names of objects, actions, names of adults, carries out instructions: bring, find, give, put back. Understands a word it "is impossible". Pronounces 5-10
11	facilitated words.
12	

Tasks for independent preparation:

1. Solve situational problems.
2. Carry out anthropometry of the child of the first year of life, estimate its physical development.
3. Solve tasks of test control.

Situational tasks

Task No. 1

Calculate the must parameters of physical development of the child of 5 months if at the birth: body weight – 3500 gr, growth – 50 cm, a head circle – 36 cm, a breast circle – 34 cm.

Task No. 2

The child of 3 years, up to 6 times a year is ill ORZ, growth - 95 cm, weight – 11 kg. Level of psychological development corresponds to age. There are no chronic diseases

Task: Define group of health. Prove your conclusion.

Task No. 3

Determine the age of the child on the level of psychological development if he learns a voice of mother or loved one, distinguishes intonations of a voice, accurately takes a toy from the adult's hands, holds it, turns over from a back on a stomach, steadily costs with support, long melodiously babbles, eats thick porridge from a spoon.

Task No. 4

Determine the age of the child on the level of psychological development if he understands the short story by the adult, answers simple questions on the story, at communication uses three-word offers, selects for a sample or a request of the adult of 3 contrast colors, can step through objects, partially put on the prepared clothes.

Task No. 5

Artur D., 12. Sexual formula $Ax P_{00}$

Task: Estimate sexual development.

Task No. 6

Katya E. 12 years. Sexual formula $Ma Ax P Me_{3332}$

Task: Estimate sexual development.

Test control.

1. Average length of a body of the newborn child is:
a) 30 cm. b) 40 cm. c) 45 cm. d) 50 cm.
2. The average weight of the newborn is:
a) 2500 gr. b) 3500 gr. c) 4500 gr. d) 5000gr.
3. At the birth a head circle in relation to a breast circle usually:
a) it is less b) it is more c) same
4. The monthly increase in growth in the second quarter of 1 year of life makes:

- a) 3 cm. b) 1 cm. c) 2.5 cm. d) 1.5 cm.
5. The monthly increase of body weight of the child in the first half of the year of life makes near:
- a) 1000 gr. b) 200 gr. c) 800 gr. d) 400 gr. e) 300 gr.
6. Monthly increase in the sizes of the head in the first half of the year of life is approximately:
- a) 2.0 cm. b) 1.0 cm. c) 2.5 cm. d) 0.5 cm. e) 1.5 cm.
7. The monthly increase of body weight of the child in the second half of the year of life makes near:
- a) 200 gr. b) 400 gr. c) 800 gr. d) 300 gr. e) 1000 gr.
8. Monthly increase in the sizes of a breast in the second half of the year of life of the child is approximately:
- a) 0.5 cm. b) 2.0 cm. c) 1.5 cm. d) 1.0 cm. e) 2.5 cm.
9. In what parameters assessment of physical development of the newborn child is made?
- a) anthropometrical b) organism maturity degrees
c) to a condition of food c) to presence of congenital defects
d) everything listed above
10. At what age do the first milk teeth on average appear?
- a) 3 months. b) 5 months. c) 8 months. d) 6 months. e) 10 months.
11. At what age second teeth are cut through?
- a) 1 year b) 3 years c) 6 years d) 8 years e) 10 years
12. On what signs the level of sexual development of girls is estimated?
- a) growth b) weight c) pilosis of the axillary hollow
d) beginning of periods e) change of a timbre of a voice
e) development of a mammary gland g) everything listed above
13. On what signs the level of sexual development of boys is estimated?
- a) growth b) weight c) pilosis of the axillary hollow
d) development of an Adam's apple e) change of a timbre of a voice
e) pilosis of the person g) everything listed above
14. In what age does the child begin to keep a head?
- a) since the birth b) since 1 month. c) since 2 months. d) since 3 months. e) since 4 months.
15. At what age at girls do mammary glands begin to develop?
- a) 9 years b) 10 years c) 12 years d) 14 years e) 16 years
16. From what age does the child begin to creep actively?
- a) since 5 months. b) since 7 months. c) since 9 months. d) since 10 months. e) in a year

17. From what age can the child independently turn over from a back on a stomach?
 a) since 2 months. b) since 3 months. c) since 5 months. d) since 7 months. e) since 9 months.
18. From what age does the child independently cost and takes the first steps without support?
 a) since 12 months. b) since 6 months. c) since 10 months. d) since 11 months.
 e) since 8 months.
19. At what age does the child begin to distinguish strangers from the?
 a) since 5 months. b) since 1 month. c) since 3 months. d) since the birth e) since 7 months.
20. At what age does the child begin to drink from a cup?
 a) since 3 months. b) since 4 months. c) since 5 months. d) since 6 months. e) since 8 months.
21. From what age does the child begin to say separate syllables?
 a) since 3 months. b) since 4 months. c) 5 months. d) 6 months. e) 8 months.
22. At what age can the child independently put on and be clasped?
 a) since 1 b) since 4 years c) since 2 years d) since 3 years e) since 5 years
23. How the resistance of an organism is defined?
 a) durations of diseases b) to number of acute diseases in a year
 c) weights of diseases
24. Group of health to which it is possible to carry the child of the adenoid disease which transferred two SARS and two aggravations within a year:
 a) I c) III
 b) II d) IV
 e) V

Class in a subject:

"GENERAL SURVEY OF THE HEALTHY AND SICK CHILD. FEATURE ANATOMO-FIZIOLOGICHESKIE, TECHNIQUE OF THE RESEARCH AND ASSESSMENT OF THE CONDITION OF SKIN, HYPODERMIC FATTY TISSUE, LYMPH NODES AND BONE MUSCULAR SYSTEM".

I. Scientific and methodical justification of a subject:

The doctor of any profile as many experts, especially narrow profile, in the daily practice will survey not only adult patients, but also children has to own a technique of inspection of the

child. It concerns in particular, dermatologists, hematologists, traumatologists and orthopedists, etc. In this plan knowledge of morphological and functional features of skin, hypodermic cellulose, lymphatic system, a bone muscular system and their influence on pathology at children of early age is very important.

II. Purpose of activity of students on occupation.

The student has to know:

- morphological features of skin, hypodermic cellulose, lymphatic, bone muscular systems at children of early age;
- features of function of skin and lymphatic system at children of early age;
- influence of morfofunktsionalny features of skin, hypodermic cellulose, lymphatic system, bone and muscular systems on pathology of early age;
- methods of tool and laboratory researches of skin, hypodermic cellulose, lymphatic, bone, muscular systems at children;
- mechanisms of regulation of phosphorus-calcium exchange at children;
- the main symptoms of damage of skin, hypodermic cellulose, lymphatic, bone and muscular systems at children.

The student has to be able:

- to collect the anamnesis of life, revealing at the same time existence at the child of pathology of skin, hypodermic cellulose, lymphatic, bone and muscular systems;
- to conduct an objective research:
 - a) skins;
 - b) hypodermic cellulose;
 - c) lymphatic system;
 - d) skeletal system;
 - e) muscular system;
- in the presence the child has pathologies from the systems stated above to pay attention to it and to give an assessment.

III. Content of training:

1. Morfo-funktsionalnye features of skin at children of early age.
2. Features of pathology of skin at children.
3. Features of hypodermic cellulose, the structure and function of lymphatic system at children of early age and influence of these features on pathology.

4. Anatomic features in the structure of a skull, backbone, thorax, long tubular bones and their influence on pathology at children.
5. Morfofunktsionalny features of the structure of a bone tissue at children.

IV. Educational material security.

1. Visual aids: tables, schemes, multimedia presentations, videos, audiogramma.
2. Educational medical documentation (case histories, laboratory researches, roentgenograms).
3. Technical means of training.
4. Literature.

V. List of references:

1. Propaedeutics of children's diseases / to N.A. Geppa. – M.: GEOTAR-media, 2009. – 464 pages.
2. Propaedeutics of children's diseases/T. V. Kapitan. – M.: MEDpress-inform, 2009. – 656 pages.
3. Propaedeutics of children's diseases/Ampere-second. Kalmykova. – M.: GEOTAR-media, 2010. – 920 pages.
4. Pediatrics: The textbook for medical schools. Under the editorship of N.P. Shabalov. – SPb: SpetsLit, 2006. – 895 pages.
5. Children's diseases: the textbook / under the editorship of A.A. Baranov. – M.: GEOTAR-media, 2009. – 1008 pages.
6. A.V. Mazurin, I.M. Propedevtik's Baneberries of children's diseases. – Volume, 2009. – 505 pages.
7. Z.D. Kaloyeva, K.M. Dzilikhova, S.K. Karyaeva, etc. Background diseases of children of early age. Manual for students. – Vladikavkaz, 2011. – 64 pages.
8. Z.D. Kaloyeva, K.M. Dzilikhova, S.K. Karyaeva, etc. Technique of a research of the child. The study guide for students. – Vladikavkaz, 2011. – 51 pages.
9. Lectures on pediatrics.
10. Methodical instructions for out-of-class work of students 4 courses of medical faculty on discipline "Pediatrics".

VI. List of questions for check of initial level of knowledge:

1. Histologic structure of skin.

2. Main functions of skin.
3. Histologic structure of lymph nodes.
4. Functions of lymph nodes.
5. Semiotics of the main damages of skin, hypodermic cellulose and lymph nodes.
6. Technique of a research of skin, hypodermic cellulose and lymph nodes.
7. Histologic structure of bone and muscle tissue.
8. Semiotics of the main defeats of bone and muscular systems.
9. Technique of a research of bone and muscular systems.

VII. List of questions for check of final level of knowledge:

1. On what signs it is possible to determine the pre-natal age, examining the newborn's skin?
2. Histologic features of skin at children of a younger age group.
3. Features of growth of hair and nails at children.
4. When do also sweat glands begin to function grease?
5. What is syrovidny lubricant?
6. What changes of a condition of skin can be noted at children in the first days of life?
7. What elements of rash do you know?
8. What role of brown fatty tissue in heat production?
9. How with age does the composition of fatty tissue and its distribution, sexual distinctions at children change?
10. How to distinguish puffiness from consolidation of hypodermic fatty tissue. A concept about a sclerema and a scleredema.
11. What is turgor and as it is defined?
12. Call terms of closing of fontanels and a formula of a teething at children.
13. Features of phosphorus-calcium exchange at children.

Information block.

ANATOMO-FIZIOLOGICHESKIE OF FEATURE OF SKIN

In the child's skin, as well as at the adult, distinguish epidermis and a derma between which the basal membrane is located. Epidermis consists of the superficial thin corneal layer provided by 2-3 rows poorly connected among themselves and constantly exfoliated epithelial cells and also a basal layer in which there is a growth of the cells of an epithelium providing replenishment of keratotic elements. The derma, or actually skin, consists of papillary and reticular parts with underdeveloped connective tissue, elastic and muscular elements. The adult

has a good development of connecting and elastic fabrics of a basal membrane provides close connection of layers of skin. At children's age, especially at newborns, a basal membrane very gentle and friable that defines weak communication between epidermis and a derma.

Skin of newborns and children of the first year of life has well developed network of capillaries. Sebaceous glands actively function already during pre-natal development, plentifully excreting the secret forming curdled lubricant which covers the child's body at the birth. The sweat glands created by the time of the birth within the first 3-4 months function insufficiently and have the underdeveloped removing channels closed by epithelial cells. Further maturing of structures of sweat glands, the autonomic nervous system and the thermoregulatory center in central nervous system provides sweating process improvement.

FUNCTIONAL FEATURES OF SKIN

Functions of skin are very diverse. The most important is ***the protective function*** preserving an organism against adverse external effects (mechanical, chemical, infectious, etc.). Protective function is performed also a pigment by melanin which protects an organism from surplus of ultraviolet rays. At newborns and children of early age in connection with poor development of a corneal layer, low activity of local immunity this function is developed insufficiently that defines lighter vulnerability of skin.

The subtlety of a corneal layer, existence of well developed vascular system of skin provide the increased ***rezorbtsionny function*** of skin. At the same time ***the secretory function*** connected with sweating is developed not enough. The contraindication to use of some ointments, creams, pastes as instead of therapeutic perhaps all-toxic action is based on it. For the same reasons the danger of penetration of an infection through the uninjured skin at children of early age is much bigger, than at the senior children.

Temperature-controlled function of skin is developed poorly as formation of the centers of temperature regulation happens only by 3-4 months, sweat glands function insufficiently. Thereof easily there is an overheating or overcooling of the child.

Respiratory function of skin is one hundred times stronger, than at adults. It is provided with abundance of a blood capillary network, a thin layer of epidermis, a peculiar structure of a vascular wall that allows to diffuse quite easily to gases through a vascular wall. The statement is lawful: newborns "breathe" skin. Pollution of skin switches off it from breath process that has an adverse effect on health of the healthy child, worsens a course of the disease.

The listed functional features demand the most strict observance of rules of an asepsis at skin care, creations of optimum temperature condition, daily bathing.

Sensitive function. In the first month of life in connection with underdevelopment of organs of sight and hearing the child "learns" mother's hands by means of tactile perception. Not less important and the fact that identification of almost all reflexes of the newborn is connected with irritation of integuments.

Synthetic function of skin. Skin actively participates in chromogenesis of melanin and antirachitic vitamin D under the influence of ultraviolet radiation and also synthesizes enzymes and biologically active agents.

SKIN RESEARCH TECHNIQUE

Assessment of a condition of integuments includes studying the anamnesis, survey, a palpation. At the same time it is necessary to consider that the isolated damage of skin practically does not meet at children, and the available skin changes in many respects reflect a condition of other bodies and systems.

Therefore the careful research of skin has great practical value in diagnosis of many diseases of children's age.

SURVEY

Inspection of integuments is begun with careful survey of skin of a hairy part of the head, a neck, then a trunk, natural folds, inguinal and rumps, extremities, palms, soles, interdigital intervals. At survey pay attention:

- on skin color and its uniformity;
- on presence of rashes or other pathological signs (peeling, hems, a hyperpigmentation, ecchymomas), their expressiveness, localization and prevalence;
- on a condition of the vascular system of skin – existence, localization and expressiveness of the venous drawing.

Enanthesis occurs in children often, they are various and have great diagnostic value. Rash conditionally is divided into primary and secondary. Carry the rash developing on not changed skin to primary. Distinguish bespolostny rash (spot, a papule, a node, a blister, a hillock) and band, filled with serous, hemorrhagic or purulent contents (bubble, a bubble, a pustule). Secondary rashes develop as a result of evolution of primary elements (scale, a hyperpigmentation, a depigmentation, a crust, an ulcer, an erosion, a hem, lichenification, an atrophy).

By quantity distinguish single elements, not plentiful and plentiful rash. The size of elements is determined in millimeters or centimeters, measuring the most developed and prevailing elements. The shape of elements can be rounded, oval, wrong, star-shaped, etc. Note the clearness or blurring of edges. Special attention is paid to color of rash. Inflammatory rash has

a red shade – from light pink to cyanotic-crimson. Hemorrhagic rash changes color in the course of evolution, becoming consistently blue, violet, purple, yellow.

It should be noted features of secondary elements of rash: character and localization of peeling, time of falling away of crusts, etc.

PALPATION

Palpate skin consistently from top to down warm and clean hands, with extra care in sites of its damage in order to avoid unpleasant feelings at the child.

The elasticity is determined by capture of skin pleated big and index by fingers in places with the least expressed hypodermic fat layer – on the front surface of a thorax under edges, on the back of the hand, in an elbow bend. The elasticity of skin is considered normal if the skin fold finishes right after an *otnyatiya* of fingers, without leaving a white strip. The gradual *raspravleniye* of a skin fold or emergence on its place of a white strip demonstrates decrease in elasticity of skin.

At a research of skin use also a number of the additional receptions allowing to judge a condition of her vascular system. For assessment of the tone of vessels of skin depending on the nature of neurovegetative reactions of the child define a dermographism. For this purpose carry out by a finger-tip strokes with small pressing on skin of a breast or a stomach with the subsequent assessment of responses (skin color, expressiveness, speed of emergence and disappearance of a dermographism). Normal the dermographism is provided by strokes of pink color, several seconds keep. The white dermographism demonstrates prevalence of synpaticotonic reactions; pink or red, remaining slightly longer – about a vagotonia; mixed (pink or red with the white roller on the periphery) – about vascular dystonia.

For the purpose of definition of a condition of a wall of vessels of skin at suspicion on their increased fragility use a sign of bandage and pinch.

SEMIOTICS OF DAMAGE OF SKIN

Pallor of skin – one of the changes of skin in children's age which are often observed at survey. In combination with pallor of conjunctivas and mucous membranes the heavy anemia is followed by pallor of skin.

The pallor can appear also in a serious chronic illness of internals, in particular kidneys, in some heart diseases, chronic intoxication, bleedings, a hypothyroidism, vegeto-vascular dystonia with the phenomena of a vascular spasm, at development of shock because of redistribution of blood in an organism.

Hyperaemia as a physiological state can arise under the influence of high and low temperatures, at hyperphrenia, mechanical irritation of skin. Such hyperaemia is temporary and is usually limited to one or several areas.

Icteric coloring arises owing to the increased concentration of bilirubin in blood and is combined with an ikterichnost of mucous membranes and scleras. As a rule, jaundice is a pathological symptom though can meet and as a borderline case at a physiological hyperbilirubinemia of newborns from the 3rd to the 10th day of life. At the senior children the viral hepatitis is the most frequent reason of jaundice, is more rare – other pathology of a liver (for example, congenital family not hemolytic jaundices like Kriglera-Nayar, the Cudgel Jones).

Jaundice is observed at disturbances of passability of bilious ways (their atresia, an obturation parasites or a stone).

Cyanosis develops at fall of the contents of oxyhemoglobin and increase in the restored hemoglobin in capillary blood.

This symptom, first of all, is noticeable on sites of skin with thin epidermis, small quantity of a pigment and well developed capillary network (nail beds, lips, lobes of ears, a nose tip, a mucous membrane of an oral cavity).

Distinguish the total cyanosis taking all body surface, and regional, appearing on certain sites of skin. Total cyanosis can be sign of the increased content in blood of the child of pathological forms of hemoglobin, at injury of central nervous system (disturbance of cerebral circulation, a spasm, asphyxia), breath disturbances (an atelectasis, a croup, hit in airways of a foreign body, pheumothorax), in heart diseases.

Regional cyanosis can be shown by blue discoloration of a nasolabial triangle (in pneumonia, bronchitis, bronchial asthma, other diseases of a bronchopulmonary system) or a Crocq's disease. The last takes distal parts of the body – a tip of a nose, language, a lobe of ears, lips, brushes and feet and is sign of cardiovascular insufficiency, for example, in heavy carditises, dekompensirovanny heart diseases.

Vascular changes. In hydrocephaly the expressed venous network on a hairy part of the head appears. At increase in bronkhopulmonalny lymph nodes, capillaries in zone VII of a cervical vertebra (Frank's symptom) extend. The expressed venous drawing in the form of "the head of a jellyfish" is formed in a zone of arrangement of a liver in its cirrhosis or at developments of stagnation in the system of a portal vein. Sometimes skin capillaries form the so-called vascular asterisks like "spider" which are slightly acting over skin level. Usually they appear in chronic diseases of a liver, cirrhosis, are quite often combined with the red ("hepatic")

palms and groans caused by a capillaritis. It is sometimes hard to distinguish them from teleangiectasias.

ANATOMO-FIZIOLOGICHESKIE OF FEATURE OF P/ZH OF CELLULOSE

Hypodermic cellulose consists of separate lipoblasts – the adipocytes located in the form of a fat accumulation (deposits). Thickness of fat deposits not in all places is identical. In a forehead, a nose the fat layer is expressed poorly, and on centuries and skin of a scrotum is absent at all.

Especially well fat layer is developed on buttocks and soles. Here it performs mechanical function, being an elastic laying. Degree of an adiposity depends on age, type of a constitution, fatness. Fatty tissue is the good thermoinsulator.

The hypodermic fat layer is better expressed at the full-term newborns. Premature children of its subjects have less, than prematurity degree is more.

Feature of hypodermic fatty tissue of a fruit and the newborn is brown fatty tissue. The main function of brown fatty tissue is so-called nesokratitelny thermogenesis, i.e. the heat production which is not connected with muscular contraction. With age the ability of brown fatty tissue to heat production decreases. At starvation at first white fatty tissue disappears and only at big terms and extent of starvation – brown. Therefore children with dystrophy easily freeze.

Besides, at newborns and children of chest age in hypodermic cellulose the sites of fabric of embryonic character having both zhironakaplivayushchy, and krovoobrazuyushchy function remain.

RESEARCH TECHNIQUE

An assessment of a hypodermic fat layer is given on the basis of the following data:

SURVEY

At survey define extent of development and correctness of distribution of a hypodermic fat layer. Surely emphasize sexual distinctions as at boys and girls the hypodermic fat layer is distributed differently: at boys – uniform, at girls from 5-7 years, and especially during puberty, fat accumulates in hips, a stomach, buttocks, a thorax in front.

PALPATION

Objectively thickness of a hypodermic fat layer for children of the first 3 years of life is defined as follows:

- on a stomach – at the level of a knaruzha navel from it (norm of 1-2 cm);
- on a trunk – under a clavicle and under a shovel (norm of 1-2 cm);
- on extremities – on the posteroexternal surface of a shoulder (norm of 1-2 cm) and on the internal surface of hips (norm of 3-4 cm).

For children 5-7 years are more senior thickness of a hypodermic fat layer is determined by four skin folds.

- over a biceps (norm of 0.5 cm);
- over a triceps (norm of 1 cm);
- over an axis of an ileal bone (norm of 1-2 cm);
- over a shovel – a horizontal fold (norm of 1.5 cm).

At a palpation of a skin fold it is necessary to pay attention to consistence of a hypodermic fat layer. It can be flabby, dense and elastic.

The turgor of soft tissues is caused by a condition of hypodermic fatty tissue and muscles. It is determined by feeling of resistance to fingers investigating when squeezing a fold from skin and subjects of fabrics on the internal surface of a shoulder or hip.

At a palpation pay attention to presence of hypostases. Hypostases are observed both in skin, and in hypodermic fatty tissue. They can be the general (generalized) and local (localized). Formation of hypostasis can be connected with increase in amount of extracellular and extravasated liquid.

SEMIOTICS OF DEFEATS OF HYPODERMIC FATTY TISSUE

Newborns can have a diffuse consolidation of a hypodermic fat layer in calves, hips, buttocks, a stomach and a face – a sclerema. Along with consolidation also puffiness of a hypodermic fat layer – a scleredema can be observed.

Obesity – increase in body weight by 10% and more from the maximum norm on growth at the expense of fatty tissue.

Most often obesity develops under the influence of several contributing factors:

- improper feeding (the increased energy value);
- the increased comprehensibility of food;
- constitutional (family) tendency to the strengthened adiposity;
- the low-mobility sometimes connected with other diseases.

Diencephalic or diencephalic and hypophysial obesity develops after a severe craniocerebral injury, encephalitis, meningitis, in tumors in the field of the brain basis and also in an adiposagenital syndrome. Uneven distribution of subcutaneous fat on a stomach in the form of "apron", in area VII of a cervical vertebra and on a breast is characteristic of diencephalic obesity.

Decrease in turgor of fabrics, excess body weight, the increased hydrophilicity of hypodermic cellulose with its uneven distribution are possible also at the paratrofiya caused by irrational feeding or one of diathesis of early age exudative and catarrhal or limfatiko-hypoplastic.

Hypostases – accumulation of liquid in hypodermic cellulose.

Widespread hypostases are observed at an edematous form of a hemolytic disease of newborns.

The general hypostases quite often arise in acute and chronic renal diseases, in heart failure. In diseases of kidneys the hypostases develop in the beginning in the morning on a face (periorbitalno). Massive hypostases happen at a nephrotic syndrome.

The general hypostases of alimentary origin developing at insufficiency of belkovosoderzhashchy food (primary food flour, carbohydrate food) are allocated, in the general dystrophy.

The localized hypostases arise owing to angioneurotic disorders which typical manifestation there is Quincke's edema. The localized hypostases are characteristic of a serum disease, a hemorrhagic vasculitis (on extremities, a front wall of a stomach, a face) before appearance of hemorrhagic rash.

Some infectious diseases are also followed by the localized hypostases. So, in toxic diphtheria puffiness of skin and hypodermic fatty tissue on a neck to clavicles, in rare instances is noted – on a chest wall. In epidemic parotitis the massive pasty hypostasis in parotid sialadens is found.

Moderate puffiness of the person is possible owing to heavy tussive paroxysms in whooping cough.

A peculiar dense dropsy of cutaneous and hypodermic fatty tissue develops at a hypothyroidism. Skin in this disease becomes dry and reinforced, in supraclavicular poles in the form of "small pillows" mucinous hypostases are located, the pole when pressing on the front surface of a shin is not formed.

AFO OF LYMPHATIC SYSTEM

Newborns have a capsule of lymph nodes very thin and gentle, trabeculas are insufficiently developed therefore their palpation is complicated. Lymph nodes soft, roll in friable hypodermic fatty tissue. By 1 year the lymph nodes are palpated already at most of children. By 12-13 years the lymph node has the finished building with well developed connective tissue capsule, trabeculas, follicles, with narrower sine and less expressed reticular fabric. During puberty

growth of nodes stops, quite often they partially are exposed to involution. The maximum quantity of lymph nodes is formed by 10 years.

Reaction of lymph nodes on various agents, most often infectious, comes to light at children usually from 3rd month of life. Children of 1-2 years have a barrier function of lymph nodes low, than frequent generalization of an infection at this age (development of sepsis, meningitis, generalized forms of tuberculosis, etc.) speaks. Underdevelopment of the lymphoid device of a digestive tract by the birth causes light susceptibility of children, especially the first year of life, to intestinal infections, early allergization of an organism in the enteral way.

In the prepreschool period the lymph nodes can already be a mechanical barrier and respond to implementation of causative agents of infectious diseases with inflammatory reaction. At children of this age lymphadenites, including purulent and caseous (are frequent in a tuberculosis infection).

By 7-8 years the possibility of immunological suppression of an infection in a lymph node appears. At the senior children the pathogenic microorganisms come to lymph nodes, but do not cause suppuration or other specific changes.

Distinguish the following groups of the peripheral lymph nodes available to a palpation:

1. *Occipital*
2. *Mastoidal*
3. *Submaxillary*
4. *Mental*
5. *Perednesheyne*
6. *Zadnesheyne*
7. *Supraclavicular*
8. *Subclavial*
9. *Axillary*
10. *Thoracic*
11. *Elbow, or kubitalny*
12. *Inguinal*
13. *Subnodal*

RESEARCH TECHNIQUE

INQUIRY

In lymphadenitis the child can complain of pain in lymph nodes, emergence of a swelling or reddening.

SURVEY

At survey it is possible to find only sharply increased superficially located lymph nodes. In lymphadenitis reveal a dermahemia and hypostasis of hypodermic fatty tissue over inflamed and, as a rule, a painful lymph node.

PALPATION

At a palpation of lymph nodes define:

- size of nodes; normal their diameter reaches 0.3-0.5 cm. The hyperadenosis can be symmetric, widespread or isolated and to reach such degree that they become visible at survey;
- quantity: if in each group no more than 3 nodes are palpated, they are considered single, by more than 3 – multiple;
- consistence – soft, elastic, dense. Normal nodes myagkoelastichesky;
- mobility – normal nodes are mobile;
- the relation to skin, hypodermic fatty tissue and among themselves (are soldered or not). Normal nodes are not soldered;
- sensitivity and morbidity at a palpation: normal nodes are not sensitive and are not painless. The morbidity indicates acute inflammatory process.

Symmetric groups of lymph nodes, except for elbow, are palpated in one stage both hands. At healthy children no more than three groups of lymph nodes are usually palpated. Normal are not palpated mental, over - and subclavial, thoracic, kubitalny, subnodal.

Except clinical trial of lymph nodes, apply a puncture, a biopsy and a limfografiya to more exact diagnostics of their defeat.

SEMIOTICS OF DAMAGE OF LYMPH NODES

Changes of lymph nodes, both local, and generalized often are found in children. At the same time the reactive hyperplasia resulting from the immune response on an infection and direct participation of lymph nodes in inflammatory or tumoral process are possible.

The local (regional) hyperadenosis is noted at purulent skin processes: folliculitis, pyoderma, furunculosis, multiple miliary abscesses, contaminated wound, hydradenitis, etc.

The generalized lymphadenopathy arises at a row sharp and chronic infectious and also in many non-infectious diseases that quite often complicates differential diagnostics. So, in an infectious mononucleosis usually all groups of the lymph nodes available to a palpation are involved in process. Their most significant increase and inflammatory changes are noted in the field of zadneshey group which is visible at survey of a neck. As a result the lymphostasis resulting in puffiness of the person can be observed.

The generalized lymphadenopathy can be also one of manifestations of diffusion diseases of connective tissue, AIDS.

The generalized lymphadenopathy of the non-infectious nature can be also caused by various diseases.

The lymphogranulomatosis, as a rule, begins with involvement of peripheral lymph nodes, is more often cervical and submaxillary. Gradually lymph nodes increase and merge in large conglomerates. Consistence their plotnoelastichesky, the quantity is increased, to the touch they remind "a bag with potatoes", are painless. For the diagnosis the histologic research of the increased lymph nodes and detection of Berezovsky-Shternberg's cells in them is decisive.

In an acute lymphoblastoid leukosis all groups of lymph nodes quickly increase in sizes, remaining juicy, painless. When carrying out the differential diagnosis it is necessary to consider analysis findings of blood and dynamics of a condition of lymph nodes against the background of the carried-out treatment.

ANATOMO-FIZIOLOGICHESKIE OF FEATURE OF SKELETAL SYSTEM

By the time of the child's birth the diaphysis of tubular bones is provided by a bone tissue while epiphyses of tubular bones and spongy bones generally consist of a cartilage. On the first year of life 50-70% of a bone tissue peremodelirutsya. In epiphyses ossification centers are also formed.

Sequence of their emergence rather certain. The set of the ossification centers who are available for the child represents important characteristic of level of its biological development and is called bone age. It is possible to determine the approximate bone age of the healthy child by means of the kernels of ossification which are formed in a wrist in a certain sequence: by 6 months the first kernel, by 1 year – the second is formed usually, then every year (on average) increases on one kernel.

In process of ossification of a diaphysis and an epiphysis between them there is a cartilaginous layer – an epiphyseal plate which cells, strongly breeding, provide growth of a bone in length. Children of early age have low density and hardness of a bone tissue also promote emergence of various deformations. Hardness of bones depends on extent of substitution of cartilaginous tissue ossiform and degrees of its mineralization.

Durability and at the same time elasticity of bones is reached by a certain ratio of the organic and inorganic matters which are a part of a bone. On the chemical composition the bone tissue of the child differs in high content of water and organic substances, smaller – mineral substances. The fibrous structure and the chemical composition of a bone cause big elasticity and its pliability at compression, than at adults. A periosteum at children thicker, than at adults that

defines possibility of a change as "bent" – a subperiosteal change. The child has a blood supply of a bone more intensive, than at adults, and is carried out by the branched system of diaphyseal arteries and also metafizarny and epiphyseal arteries. By 2 years the uniform system of intra bone blood circulation develops. Intensive blood circulation of a bone tissue is a basis of frequent emergence at children of hematogenic purulent osteomyelitis in metaphyses and epiphyses. Depending on features of a form, function and development of a bone divide into 4 groups: tubular, spongy, flat, mixed.

Functions of bones: protective – bones make a rigid framework for internals (spinal canal, a skull, a thorax, a basin); fixing and basic – for internals; basic – for all body and motive – for its movement in space; exchange (bones contain 99% of calcium, 87% of phosphorus, 50% of magnesium, 46% of sodium); hemopoietic.

FEATURES OF THE STRUCTURE OF THE SKELETON OF THE CHILD

The skull by the time of the birth is provided by a large number of bones, seams (arrow-shaped, coronal, occipital) are open and begin to be closed only with 3-4 months of life. At the full-term children the side fontanels are closed, the small fontanel is open at 25% of newborns, generally premature, and is closed no later than 4-8 weeks after the birth. The big fontanel located in the place of crossing of coronal and longitudinal seams is open at all newborns, its sizes from 3x3 cm to 1.5x2 cm. Closing time of a big fontanel is individual, normal it occurs by 1 year, but it is possible earlier (9-10 months), and after (1.5 years).

The backbone of the newborn is deprived of physiological bends. The cervical lordosis is formed after the child begins to lift and hold the head; a chest kyphosis in 6-7 months when the child independently sits down; the lumbar lordosis – in 9-12 months when the child surely costs and goes. Final forming of physiological bends comes to the end at early school age. Due to the incompleteness of forming of a backbone, imperfection of muscular fixing, uneven draft of muscular groups under the influence of the wrong pose and inconvenient furniture easily there are scolioses and the pathological bearing develops.

Milk teeth are cut through after the birth in a certain sequence: lower, as a rule, earlier, than upper. The teeth of the same name on the right and left half of a jaw appear at the same time.

Formula for definition of number of milk teeth:

$$n — 4; \text{ where } n – \text{age of the child in months.}$$

By 2 years the child has all 20 milk teeth. During the first period (from eruption up to 3-3.5 years) teeth stand closely, orthognathic occlusion (upper teeth cover lower on one third) in connection with underdevelopment of a mandible. The second period (from 3 to 6 years) is

characterized by transition of a bite in a straight line, emergence of physiological intervals between teeth, a stertost of teeth.

Change of milk teeth with constants begins from 5-6 years. For approximate assessment of second teeth it is possible to use a formula:

$$X = 4n - 20; \text{ where } X - \text{number of second teeth, } n - \text{number of years.}$$

Forming of both a milk, and constant bite at children is an important indicator of biological maturing of the child.

The constant bite normal has to be slaboortognatichesky or direct.

Joints – the mobile faltering connections of bones of a skeleton which are characterized by existence of the articulate surfaces covered with an articulate cartilage, a joint cavity and an articulate bag. Basic elements of a joint are the articulate surfaces of bones covered with a cartilage, the articulate capsule and a joint cavity. Carry sheaves, articulate disks, meniscuses to number of auxiliary formations. Depending on number of articulate surfaces (interphalanx), and difficult, formed by several bones having the general articulate capsule allocate the simple joints formed by two articulate surfaces. By the time of the birth the joint and copular device is anatomically created. Further there is a cartilage mineralization (by 14-16 years), the relief of a synovial membrane becomes complicated, the joint innervation is improved.

TECHNIQUE OF THE RESEARCH OF SKELETAL SYSTEM. COMPLAINTS

In musculoskeletal system diseases children and their parents complain of ostealgias, joints, a swelling, puffiness of joints, restriction of mobility.

When collecting the anamnesis it is important to find out family burdeness rheumatic diseases, the state of health of the child on the eve of the real disease (communication with streptococcal, intestinal or urogenital infections), presence of injuries.

It is necessary to specify durations of a pain syndrome, localization of pains (bones, joints), symmetry of defeat, character and intensity of pain, time and conditions of its emergence and duration (morning constraint, pains of night character, at physical activity, etc.). At deformations of skeletal system it is necessary to find out time of their emergence.

Survey is carried out in a prone position and in the movement consistently from top to down: head, then trunk (thorax, backbone) and extremities.

Skull at the healthy child symmetric, rounded shape. At the newborn the asymmetry, the deformation connected with passing of a head of the child in patrimonial ways in the form of cherepitseobrazny finding of bones of a skull at each other, impressions or protrusions can be observed, for example in a cephalohematoma.

At survey of the head estimate a shape of a skull (a roundish, tower skull, with the flattened nape, with existence of frontal and parietal hillocks); symmetry; state upper and mandible, feature of a bite (orthognathic, direct, prognathic), development of teeth.

At survey of a thorax define its form (cylindrical, barrel-shaped, conic) and symmetry, pay attention to deformation of a thorax – keeled (with protrusion of a breast), funneled (with retraction of a breast), existence of a garrisonovy furrow (retraction through attachment of a diaphragm) Estimate the epigastric corner allowing to define constitutional type.

At survey of a backbone pay attention to symmetry of arrangement of shovels, crests of ileal bones, volume and symmetry of muscles of a back, existence of physiological bends and their expressiveness, existence of side bends of a backbone (scoliosis).

Tasks for independent preparation:

1. Solve situational problems and test tasks.
2. Examine and describe a condition of skin, hypodermic cellulose, lymph nodes and the bone muscular system of your patient in a workbook.

Scheme of inspection of the patient.

1. To collect the anamnesis of life of the child. To find out, since the neonatality period whether were at the child of change from skin (an intertrigo, rashes, hypostases, pustules and so forth), hypodermic cellulose (superfluous, lowered), lymph nodes (increase in the sizes), skeletal system (in the presence of deformations when appeared) when the fontanel, age of a teething was closed.
2. To perform inspection to pay attention on:
 - color, presence of rashes, intertrigo, humidity, temperature, elasticity;
 - condition of hypodermic fatty tissue: degree of manifestation (a fold on a stomach, on a hip, a shoulder, below a shovel corner), equitability, turgor of soft tissues;
 - lymph nodes: size consistence, mobility, morbidity;
 - muscular system: extent of development, tone of muscles;
 - skeletal system: form and size of the head, sizes of fontanels, density of edges, protrusion or retraction, craniomalacia; number of teeth, their state; size and shape of a thorax, existence of deformations (beads, garrisonovy furrow, etc.).
 - To examine and propalpirovat long tubular bones (existence of beads, a brasletok, curvatures).

Data of an objective research are entered in a workbook

Situational tasks

Task No. 1

Boy of 3 months. Had a SARS, within 10 days mother did not bathe the child. In the morning, swaddling, noticed emergence in the child of rash on skin of a stomach, extremities in the form of bubbles with serous and purulent contents. In 2 days on the place of some bubbles, grayish-yellow crusts were formed.

Questions:

1. With what weakening of function of skin the appearance of rash is connected?
2. What of the described elements belong to primary and secondary morphological elements of skin?

Task No. 2

The child of 5 months at a research of a musculoskeletal system is marked out the head with the expressed frontal and parietal hillocks, a big fontanel 2.5 x 2 cm, its edges are pliable, a skoshennost and baldness of a nape, asymmetry of the person, sites of softening of an occipital bone, the sunk-down nose bridge, the high arch of the sky, a thorax of a keeled form. Hypomyotonia.

Questions:

1. How do you estimate a condition of a musculoskeletal system of the child?
2. At what disturbance of exchange of substances there can be similar anomalies?

Task No. 3

Child of 2.5 years. At survey the increase in the sizes of the head with the acting frontal and parietal hillocks and the "Olympic" forehead attracts attention. The thorax is squeezed from sides, costal "beads" are palpated. The lower extremities About – are figuratively bent. Psychomotor development in age.

Questions:

1. What, in your opinion, it is possible to explain changes of skeletal system at the child with?
2. What changes in biochemical blood test do you expect?

Task No. 4

Baby. At survey has 6 teeth – 2 lower and 4 upper cutters.

Questions:

1. Specify age of the child, using data of "tooth" age.
2. What formula of calculation of number of milk teeth?

Test control.

1. Physiological features of skin of children of early age are:
 - a) protective function is well developed
 - b) the resorption through skin is well developed
 - c) imperfect regulation of body temperature through skin
 - d) secretory function is insufficiently developed
 - e) low respiration intensity through skin
2. Specify features of sebaceous glands at babies:
 - a) begin to function after the birth
 - b) are widespread on all skin, except palms and soles
 - c) are concentrated on palms and soles
 - d) begin to function in utero
3. Specify features of sweat glands at children of early age:
 - a) the strengthened sweating in axillary hollows, inguinal folds
 - b) begin to function in utero
 - c) rather significant functioning since 3-4 months.
 - d) at the birth are absent
 - e) at the birth quantity same, as well as at adults
 - g) underdevelopment of output channels
4. Features of hypodermic fatty tissue at babies are:
 - a) large lipoblasts, do not contain a kernel
 - b) the relative mass of hypodermic fatty tissue is more, than at adults
 - c) lack of brown fatty tissue
 - d) small lipoblasts, contain kernels
5. Babies have an ease damage and infection of skin is connected with:
 - a) acid reaction of skin
 - b) immaturity of local immunity
 - c) thick, loose corneal layer
 - e) tendency to maceration
6. Features of the morphological structure of skin of children of early age are:
 - a) good development of all layers
 - b) poor development of a basal layer
 - c) good development of a granular layer

d) poor development of a granular layer

7. Features of functioning of the ferruteros device of skin of children of early age:

a) underdevelopment of sweat and sebaceous glands

b) good development of sweat and sebaceous glands

c) stalemate are well developed, sebaceous glands are underdeveloped

d) are well developed grease, an underdevelopment of sweat glands

8. Physiological jaundice at the full-term newborns on average:

a) appears on 1-2, disappears for 5-7 day of life

b) appears on 2-3, disappears for 7-10 day of life

c) appears on 4-5, disappears for 10-14 day of life

9. The big fontanel at children is closed aged

a) 6 months.

b) 1-2 months.

c) 12-18 months.

d) by the birth

e) 8 months.

10. The small fontanel at the full-term children is closed aged:

a) 6 months.

b) 1 month.

c) 12-18 months.

d) by the birth

e) 8 months.

11. Closing of seams of a skull at the full-term children happens to:

a) 1 month.

b) 2-3 months.

c) 3-4 months.

d) 4-6 months.

12. First dentition comes to an end to age:

a) 1-1.5 years

b) 1.5-2 years

c) 2-2.5 years

d) 2.5-3 years

13. The number of milk teeth at the child is calculated by a formula ($n - \text{age}$ in months)

- a) $n - 2$
- b) $n - 4$
- c) $n - 6$

14. The first second teeth appear aged:

- a) 4 – 5 years
- b) 5 – 6 years
- c) 7 – 8 years

15. At the newborn child the condition of muscles is characterized:

- a) hypomyotonia
- b) prevalence of a tone of flexor muscles of extremities
- c) prevalence of a tone of extensor muscles of extremities
- d) during sleep muscles relax

Class in a subject:

"ANATOMO-FIZIOLOGICHESKIE OF FEATURE OF THE SYSTEM OF BREATH AND BLOOD CIRCULATION".

I. Scientific and methodical justification of a subject:

During the different periods of the childhood the respiratory organs and blood circulations have the essential differences in functioning and the anatomic building causing features and weight of a clinical course of bronchopulmonary and cardiovascular diseases at children and creating prerequisites of development of complications. Knowledge of these features, skills of an objective research of the child will allow future doctor to reveal even insignificant aberrations and to make the diagnosis at early stages of a course of a disease, will help with performing pathogenetic therapy and the organization of preventive actions.

II. Purpose of activity of students on occupation.

The student has to know:

- anatomo-physiological features respiratory system (a nose, adnexal bosoms, a throat, a throat, a trachea, bronchial tubes, lungs) at children;
- methods objective, clinical laboratory and tool research of children with bronchopulmonary pathology;
- anatomo-physiological features of a cardiovascular system;
- differential and diagnostic criteria of functional and organic noise;
- features of the ECG and arterial blood pressure at children of different age.

The student has to be able:

- to collect the anamnesis at the child with a disease of a respiratory system;
- to carry out percussion and auscultation of lungs at children of various age;
- on the basis of objective inspection to allocate the symptomatology characteristic of a syndrome of a croup, bronchial obstruction, pneumonia, pleurisy;
- to give an assessment to additional methods of research ECG, ZhEL, spirometry, roentgenoscopy and a X-ray analysis;
- to collect the anamnesis at the child with a disease of a cardiovascular system;
- on the basis of anatomo-physiological features of bodies of blood circulation to draw clinical conclusions on a condition of bodies of blood circulation;
- at the general survey to note signs of defeat of a cardiovascular system;
- to make a palpation, percussion, auscultation of heart and large vessels, to give an assessment to the obtained data;
- to define and estimate pulse, the ABP, the functional trials given to a X-ray analysis, the ECG, FKG, EhoKG.

III. Content of training:

1. Anatomo-fiziologicheskyye features of respiratory organs and blood circulation at a fruit.
2. Anatomo-fiziologicheskyye features of respiratory organs and blood circulation at children of different age.
3. Technique of inspection and semiotics of damage of respiratory organs and blood circulation at children.
4. The Anatomo-fiziologicheskyye features of a respiratory and cardiovascular system at children contributing to development of diseases of respiratory organs and blood circulations.
5. Physiological constants of respiratory and cardiovascular systems in age aspect.
6. Differential signs of organic and functional noise of heart.
7. Characteristic of additional methods of a research in children's pulmonology and cardiology.

IV. Educational material security.

1. Visual aids: tables, schemes, multimedia presentations, videos, audiogramma.
2. Educational medical documentation (case histories, laboratory researches, roentgenograms).
3. Technical means of training.

4. Literature.

V. List of references:

1. Propaedeutics of children's diseases / to N.A. Geppa. – M.: GEOTAR-media, 2009. – 464 pages.
2. Propaedeutics of children's diseases/T. V. Kapitan. – M.: MEDpress-inform, 2009. – 656 pages.
3. Propaedeutics of children's diseases/Ampere-second. Kalmykova. – M.: GEOTAR-media, 2010. – 920 pages.
4. Pediatrics: The textbook for medical schools. Under the editorship of N.P. Shabalov. – SPb: SpetsLit, 2006. – 895 pages.
5. Children's diseases: the textbook / under the editorship of A.A. Baranov. – M.: GEOTAR-media, 2009. – 1008 pages.
6. A.V. Mazurin, I.M. Propedevtik's Baneberries of children's diseases. – Volume, 2009. – 505 pages.
7. Z.D. Kaloyeva, K.M. Dzilikhova, S.K. Karyaeva, etc. Background diseases of children of early age. Manual for students. – Vladikavkaz, 2011. – 64 pages.
8. Z.D. Kaloyeva, K.M. Dzilikhova, S.K. Karyaeva, etc. Technique of a research of the child. The study guide for students. – Vladikavkaz, 2011. – 51 pages.
9. Lectures on pediatrics.
10. Methodical instructions for out-of-class work of students 4 courses of medical faculty on discipline "Pediatrics".

VI. List of questions for check of initial level of knowledge:

1. List the main departments of a respiratory system and their function.
2. What types of breath do you know?
3. What complaints are characteristic of diseases of a respiratory system?
4. What criteria for evaluation of degree of respiratory insufficiency do you know?
5. What types of an asthma do you know? In what diseases do they meet?
6. Describe auskultativny characteristic of respiratory noise normal and in pathology.
7. What additional methods of a research are used in pathology of respiratory organs?
8. What departments of a cardiovascular system do you know?
9. Call the main functions of a myocardium?
10. What is "automatism"? What structures of heart are responsible for this function?

11. Types of acute vascular insufficiency.
12. What clinical symptoms testify to a left ventricular failure?
13. What pathological symptoms arise at right ventricular insufficiency?
14. Give characteristic to functional and pathological noise in heart.
15. What methods of an additional research of a cardiovascular system do you know?

VII. List of questions for check of final level of knowledge:

1. Call anatomico-physiological features of respiratory organs at children.
2. What features of a respiratory system at children contribute to development of pathology?
3. Call borders of bottom edge of lungs at children.
4. What frequency of breathing in a minute at children of various age? What frequent breath at children of younger age is explained by?
5. Call features of manifestation of respiratory insufficiency at children of younger age.
6. What features of inspection of a respiratory system at children (palpation, percussion, auscultation) do you know?
7. Call features of blood circulation of a child.
8. How does functioning of the blood circulatory system change from the moment of the child's birth? What it matters?
9. Call features of the vascular system at children.
10. Call limits of relative warm dullness at children? At what morbid conditions can they change?
11. How average values of systolic and diastolic arterial blood pressure at children are calculated?
12. Call features of the ECG at children.

Information block

ANATOMO-FIZIOLOGICHESKIE OF FEATURE OF RESPIRATORY ORGANS

Nasal structures promote warming, mechanical clarification of air cilia, to destruction of microorganisms which contact with immunological components of protection of a mucous membrane. Children of early age have narrow nasal courses, the lower nasal course is formed by 4 years, sinks thick. A mucous membrane gentle, richly in a vaskulyarizovan therefore even small hypostasis it at development of rhinitis complicates breath through a nose and suction of a maternal breast.

Adnexal (additional) bosoms of a nose by the birth are insufficiently developed; Highmore's, etmoidal (trellised) and sphenoidal bosoms are partially created, but they have very small sizes. The frontal sinus is absent. These features define a rarity of sinusitis at children of early age. Completely all bosoms develop by 15 years.

Throat at the newborn rather narrow. The lymphoid ring is developed poorly. After 1 year the palatine tonsils go beyond handles, however crypts in them are developed poorly in this connection, a tonsillitis at children of early age is observed seldom.

The throat at children has the funneled form, rather narrow, her cartilages are gentle and pliable. Phonatory bands are shorter, than at adults that defines a high timbre of a children's voice. A mucous membrane richly in a vaskulyarizovan that defines tendency to hypostasis; in this regard children (first 2-3 years of life) often have a throat stenosis (stenosing laryngitis, a croup), which is followed by an osiplost of a voice or an aphonia.

Thorax of the newborn barrel-shaped or cylindrical. Its gradually perednezadny size decreases. The internal surface of a thorax is covered with a parietal pleura which densely adjoins edges and a front surface of a diaphragm, and then passes to mediastinum. Each lung is put into a separate visceral pleural bag. At children in comparison with adults of an edge are connected to a backbone in more horizontal position (almost at right angle). The thorax of the newborn constantly is kind of in a condition of a breath that in combination with weakness of respiratory muscles *explains small excursions of a thorax and the superficial nature of breath*. Breath at children generally phrenic. The extensibility of pulmonary fabric decreases in connection with development of elastic structures with age therefore ventilation becomes more effective. The extensibility is an ability of a chest wall and lungs to extend at increase in volume of air. The extensibility is defined by two main factors: alveolar surface intention which depends mainly on surfactant, and elasticity.

The trachea consists of 14-20 cartilaginous half rings connected behind at children by a fibrous membrane. The softness of cartilages of a trachea, poor development of elastic fabric and big mobility can lead to its slit-like fall and emergence of the noisy snoring breath (stridor).

The bronchial tree by the birth is already created. The basis of bronchial tubes is also formed by the cartilaginous half rings connected by a fibrous membrane. The trachea is divided into the right and left primary bronchi. The right primary bronchus is kind of continuation of a trachea therefore at aspiration the foreign body gets into this bronchial tube more often.

The mucous membrane of small bronchial tubes and bronchioles gentle, is rich with blood vessels, is covered with a thin layer of slime, covered by a cylindrical multirow epithelium. The

mucous membrane of large bronchial tubes is covered by the ciliate epithelium providing evacuation of slime, the parts of dust and bacteria which got into lungs with air.

At newborns the airways contain very little smooth muscles, but at children of 4-5 months muscle tissue is already rather developed. Because of underdevelopment of muscular and elastic fabrics at children of early age of the phenomenon of a spasm of bronchial tubes are less expressed, and bronchial obstruction is connected generally with hypostasis of a mucous membrane and products of a viscous secret.

Lungs at children, as well as at adults, have the segmentary building. Through numerous alveolar structures there is an exchange of gases between the inhaled air and a blood-groove. The number of alveoluses quickly increases due to their forming from sakkulyus ("sacks") with age. Lungs at children of the first 2 years of life are rich with connective tissue, krovosnabzhatsya plentifully, elastic fabric is developed poorly owing to what they are less vozduشنا and are more full-blooded, than at adults. These factors contribute to obstruction and development of atelectases. Ease of development of atelectases is caused by also insufficient amount of surfactant that can be one of the reasons of a neraspravleniye of lungs at premature children.

The segmentary structure of lungs is well-marked already at newborns. Each segment has independent ventilation, a trailer artery and is delimited from other segments by intersegmental partitions from elastic connective tissue.

RESEARCH TECHNIQUE

ANAMNESIS. It is necessary to find out the following:

Whether the child has a difficulty of nasal breath; what nature of discharges from a nose; whether there is cough, what its character; in what time of day mainly the child coughs; if cough with a phlegm, what its character; whether there are no breast, stomach pains, sides; what diseases of respiratory organs the child had earlier; whether was contact with sick acute infectious diseases, suffering from tuberculosis.

Also allergological and family anamnesis of surveyed is important.

SURVEY

Begin with the general survey, assessment of a condition of consciousness, position of the patient in a bed, behavior of the child. It is very important to estimate color of integuments, coloring of a nasolabial triangle. Careful survey of a nasal cavity is obligatory. If the entrance to a nose is closed by discharges or crusts, it is necessary to remove them with a cotton plug.

The pharynx is examined at the end of inspection. Children of the first year of life of a tonsil usually have for front no handles. At preschool age the hyperplasia of adenoid tissue is

observed usually, tonsils at survey go beyond front handles, dense and on color do not differ from a mucous membrane of a pharynx.

At survey of a thorax pay attention to its form, participation of muscles in breath, synchronism of participation in breath of both half of a thorax.

Normal rate of breath in 1 min.

Newborn	40-60
Child of 1 year	30-35
5-6 years	20-25
10 years	18-20
Adult	16-18

The respiratory rhythm at children differs in considerable variability. Instability of a rhythm and short (up to 5 sec.) apnoeas (apnoea) can be observed also at the full-term newborns. Aged up to 2 years, but mainly within the first months of life, the respiratory rhythm can be wrong, especially during sleep.

At survey pay attention to breath type. At children of early age the belly type of breath is observed. At boys it remains further, at girls from 5-6-year age the type of breath becomes chest. Voice trembling is also defined by the hands lying on symmetric sites of a thorax. At children of early age the voice trembling is investigated during shout or crying.

At percussion of healthy lungs the clear pulmonary sound is defined. On the right in underlying departments because of proximity of a liver it is shorter, at the left because of proximity of a stomach accepts a tympanic shade (so-called space of Traube).

The upper bound of lungs, i.e. height of standing of tops, at children of preschool age, is not defined as tops of lungs at them do not go beyond a clavicle. Determination of height of standing of tops of lungs at the senior children. The upper bound of lungs in front is at distance 2-4 see aboveclavicles (from the middle). Normal height of standing of tops behind is defined at the level of an acantha of the VII cervical vertebra.

Mobility (excursion) of bottom edge of lungs. Percussionly find the lower bound of lungs on the average axillary or back axillary line on a breath and an exhalation.

Lower bounds of lungs

Line of a body	On the right	Sleva
Sredneklyuchichny	The VI edge	Forms dredging for heart at the level of VI edge
Axillary lobby	The VII edge	The VII edge
Average axillary	VIII-IX edge	The VII-IX edge
Back axillary	The IX edge	The IX edge
Scapular	The X edge	The X edge
Juxtaspinal	At the level of an acantha of the XI thoracic vertebra	

AUSCULTATION.

Position of the listened child same, as well as at percussion. Listen to symmetric sites of both lungs.

At newborns and children at the age of 3-6 months a little weakened vesicular breath sound, from 6 months to 5-7 years – puerile is listened. In the latter case respiratory noise louder and long in both phases of breath. At children 7 years breath gradually are more senior gains the nature of vesicular. At the same time the exhalation is heard still rather well before almost disappearing at vesicular breath sound.

RESEARCHES IN DISEASES OF RESPIRATORY ORGANS

Rentgeno- and radiological methods: a X-ray analysis of lungs, a tomography (it is usually used for a detailed research of a root of lungs), a X-ray analysis of adnexal bosoms of a nose, bronchography (administration of contrast agent in bronchial tubes), pulmonary arteriography and an aortografiya (the condition of pulmonary blood circulation is estimated), radiological scanning of lungs.

Endoscopic methods. Laringoskopiya (glottis research): at children of early age carry out under anesthetic, at children of more advanced age apply indirect (by means of a mirror) a laringoskopiya. Bronkhoskopiya at children of the first 3-4 years carry out the rigid bronchoscope under the general anesthesia; at more senior children carrying out a fibrobronkhoskopiya at local anesthesia of a mucous membrane of a nasopharynx is possible.

Microbiological methods. Investigate smears from a pharynx and a nose, a bronchial secret. If necessary conduct pleurocentesis, a bacteriological and bakterioskopichesky research of pleural liquid.

Allergological diagnostics. Carry out skin (application, scarifying), intracutaneous and provocative tests with allergens. Define the general IgE and specific IgE and IgG₄ to various allergens.

Research of function of external respiration. Carry out spirometry by which determine the vital capacity of lungs (VCL), the general capacity of lungs, reserve volume of a breath, reserve volume of an exhalation, functional residual capacity, residual volume, air flow rate on an exhalation or a breath (FZhEL, OFV, MSV 25, 50, 75% of ZhEL).

Blood gases. Determine partial tension About₂ (ro_2 and carbon dioxide (rSO_2 , rn in the mixed capillary blood. Monitoring of blood gases is provided in the noninvasive way with transkutanntny long transdermal measurement of saturation of blood oxygen (SaO_2).

SEMIOTICS OF DAMAGE OF RESPIRATORY ORGANS

The forced situation is characteristic of an attack of bronchial asthma. The child sits, leaning hands against edge of a bed with the raised shoulders. Excitement, motive concern develops at the stenosing laryngotracheitis (croup syndrome), an attack of bronchial asthma.

Important symptom of difficulty of breath is tension of wings of a nose, a nostril indicating hard work of the respiratory device.

Discharges from a nose have diagnostic value: transparent, mucous are usually observed at sharp katara (flu, rhinitis); slizisto blood (sanious discharges), purulent with impurity, are characteristic of diphtheria, syphilis. Presence of a film on a nasal partition allows to make the diagnosis to diphtheria prior to a bacteriological research. Bloody discharges from one nostril happen at hit in a nose of a foreign body (stones, grains, buttons, etc.).

The senior children have a breath through a mouth, especially at night, meets at adenoid vegetations in a nasopharynx. On same specifies also snore at night. At adenoid vegetations the adenoid face type is formed: a pale face, bloated, with the slightly opened mouth, the raised upper lip and a snub nose.

Color of integuments reflects the degree of manifestation of respiratory insufficiency. Than oxygen tension is less, especially cyanosis is expressed and widespread. Cyanosis of fingers of hands, Crocq's disease, "drum sticks" (thickening of trailer phalanxes of fingers of hands) indicate developments of stagnation in a small circle of blood circulation, a chronic hypoxia. This symptom is characteristic of the children having chronic diseases of lungs.

Cough. The rough barking cough arises at catarrhal conditions of a throat and trachea, at grain. In bronchitis the nature of cough changes depending on a disease stage: the painful dry cough amplifying at a conversation and shout of the child, quite often preventing it to sleep is observed in initial stages of bronchitis and also at trakheofaringita. At permission of bronchitis the cough becomes damp, the phlegm begins to be allocated. Children of the first years of life, and sometimes and advanced age swallow a phlegm. At significant increase in bronchial lymph

nodes the cough gains a peculiar bitonalny character – the spastic cough having rough main tone and musical, high-pitch second tone. Painful dry cough meets in pharyngitises and nasopharyngites.

In some pulmonary diseases the shape of a thorax changes. For example, in a serious obstructive illness (asthma, a mucoviscidosis) arises, a so-called, barrel-shaped shape of a thorax. In exudative pleurisy on the party of defeat notes protrusion of a thorax, and in chronic pneumonia – retraction.

In pleurisy, atelectases of a lung, chronic pneumonia of unilateral localization it is possible to notice that one of half of a thorax (on the party of defeat) lags behind at breath.

Change of respiration rate: its increase – a tachypnea (more than 10% of middle-aged norm) at healthy children arises at nervousness, physical exercises, etc.; at patients, more expressed the tachypnea is observed at extensive defeats of respiratory and cardiovascular systems, diseases of blood (anemia), feverish diseases (at the expense of irritation of a respiratory center), at pain, a distress a syndrome.

Urezheniye of breath (bradipnoe) meets at children very seldom and points to exhaustion of a respiratory center. Peculiar disturbances of a respiratory rhythm are known as cheyn-Stokes and biotovsky breath. Both types are characterized by intermittence of respiratory movements. Such types of breath are noted at children at the heavy and far come forms of meningitis and encephalitis, at intracranial hemorrhages, etc.

At damage of respiratory organs at children the ratio between the respiration rate and pulse changes. At healthy children on the first year of life 3-3.5 beating of the pulse are the share of one breath, at children years – 3.5-4 blows are more senior.

At damage of lungs (pneumonia) it is a ratio there is 1:2, 1:3 as breath becomes more frequent in bigger, and pulse – to a lesser extent.

Asthma is characterized by difficulty of either a breath, or an exhalation, i.e. is inspiratory or expiratory and subjectively represents feeling of shortage of air. **An inspiratory asthma** is observed at obstruction of upper airways (a croup, a foreign body, cysts and tumors, congenital narrowing of a throat, trachea, bronchial tubes, retropharyngeal abscess, etc.). **An expiratory asthma** is characterized by the complicated exhalation and active participation of muscles of an abdominal press in it (it is observed in bronchial asthma, an asthmatic bronchitis and a bronchiolitis, at the obstacles for passing of air located below a trachea, for example in large bronchial tubes). **The mixed asthma** – expiratory and inspiratory is shown by swelling of a thorax and retraction of compliant places of this area. It is inherent to a bronchiolitis and pneumonia.

Strengthening of voice trembling is connected with consolidation of pulmonary fabric (dense bodies carry out a sound better), in the presence of cavities in lungs (the distance from a glottis is shortened). Voice trembling is weakened in bronchial obstruction (lung atelectasis), at pushing off of bronchial tubes from a thorax wall (exudate, pneumothorax, a pleura tumor).

Shortening of a percussion sound can be caused by reduction of lightness of tissue of lung. The tympanic shade of a sound appears at emergence in lungs of the cavities containing air. The box sound appears in case the elasticity of pulmonary fabric is weakened, and its lightness is increased (emphysema of lungs).

Bronchial breath most often indicates existence of inflammatory infiltration of pulmonary fabric (lobar pneumonia, bronchial pneumonia, tubercular infiltrative processes, etc.); it is listened often over pleural exudate in the field of the lung squeezed by it.

The reasons of the weakened breath: strong narrowing of a throat, paresis of respiratory muscles, a foreign body, formation of an atelectasis or compression of a bronchial tube, a considerable bronchospasm, the obstruction syndrome caused by hypostasis and an accumulation of slime in a gleam of bronchial tubes, exudative pleurisy, pneumothorax.

Overbreathing is possible when narrowing small or smallest bronchial tubes, at their inflammation or a spasm – asthma attack, a bronchiolitis, in feverish diseases.

Pathological processes in lungs are followed by rattles of various character.

Dry rattles. Distinguish whistling (diskantovy, high) and bass (low, more musical). The first more often are when narrowing bronchial tubes, especially small; the second are formed from fluctuation of a dense phlegm, especially in the large bronchial tubes giving a resonance.

Damp rattles arise when passing air through liquid. Depending on bronchial tube caliber where rattles are formed, they are small-bubbling, srednepuzyrchaty and large-bubbling. It is important to subdivide them into ringing and not ringing. Ringing are listened at consolidation of the pulmonary fabric lying near bronchitis that is observed in pneumonia. They can arise also in cavities (cavities, bronchiectasias). Not ringing rattles meet in a bronchiolitis, bronchitis, a fluid lungs, atelectases.

It is necessary to distinguish *crepitation* which is formed at a razlipaniye of terminal departments of bronchioles from rattles. Locally defined crepitation testifies to the pneumonic center.

Pleural rub arises at friction of visceral and parietal leaves of a pleura and is listened only at inflammation of a pleura.

BLOOD CIRCULATION OF THE NEWBORN

At the birth there is a blood circulation reorganization:

- placental blood circulation stops;
- the main fetal vascular communications (venous and arterial channels, oval window) are closed;
- in full the vascular bed of a small circle of blood circulation with a high resistance and tendency to vasoconstriction joins;
- because of increase in oxygen requirement the warm emission and system vascular pressure accrue.

From the beginning of lung respiration the blood stream through lungs increases approximately by 5 times. By 2nd month of life at 5-10 times vascular resistance in a small circle of blood circulation decreases. Pressure in an aorta at newborns averages 75/50 mm Hg. Through lungs there passes all volume of warm emission while in the pre-natal period – only 10%.

Approximately in 3 months there is a functional closing of an oval opening with the available valve, and then increment of the valve to its edges. The complete interatrial partition is so formed. Anatomic closing of an oval window happens by the end of the first year of life. But approximately the opening in an interatrial partition which is passing the stylet and not having any value for a hemodynamics is found in 50% of children and 10-25% of adults.

From the moment of the first breath the arterial channel, thanks to reduction of unstriated muscles of its wall, is functionally closed (the healthy newborn by the 10-15th o'clock has lives), later (at 90% of children approximately by 2 months) there is its anatomic closing. The blood stream and on a venous channel which is gradually obliterated stops. Separately small and big circles of blood circulation begin to function.

Disturbance in the course of normal closing of an arterial channel leads to forming of defect, a known as open arterial (botallo) channel.

ANATOMIC FEATURES OF HEART AND VESSELS

Heart at the newborn is rather big and makes 0.8% of body weight that there is slightly more similar ratio at adults (0.4%). The right and left ventricles are approximately equal. Thickness of their walls is about 5 mm. Auricles and the main vessels have a little big sizes in comparison with ventricles.

Departments of heart increase unevenly with age: more intensively up to 2 years auricles, from 2 to 10 years – all heart in general grow, after 10 years ventricles increase mainly.

Up to 6 years the shape of heart usually spherical, after 6 years approaches oval, inherent to adults. Heart volume concerning thorax volume much more. Up to 2-3 years the heart is located horizontally on the raised diaphragm: to a front chest wall prilezhit the right ventricle forming generally apical cardiac impulse.

At the same time there is a fabric differentiation. The myocardium at the newborn represents an undifferentiated syncytium. Muscle fibers very thin, are poorly delimited from each other. Connective and elastic tissue are poorly developed. In the first 2 years of life there are an intensive growth and a differentiation of a myocardium: thickness and amount of muscle fibers increase, the number of kernels of muscle cells at significant increase in their sizes decreases. The innervation of heart is carried out through the superficial and deep textures formed by fibers of vagus nerve and the cervical sympathetic nodes contacting to gangliya of sinus and atrioventricular nodes. Branches of vagus nerve finish the development and are myelinated by 3-4 years. To this age the warm activity is regulated by generally sympathetic nervous system what physiological tachycardia at children of the first 2 years of life is partially connected with.

Heart rate during the different age periods

Age	ChSS in 1 min.
Newborn	140-160
1 year	120
5 years	100
10 years	80-85
15 years	70-80

Under the influence of vagus nerve the warm rhythm urezhatsya and can appear a sinus arrhythmia (like respiratory) and separate "vagal impulses" – sharply extended intervals between warm reductions. Such functions of a myocardium as automatism, excitability, conductivity, contractility, are carried out the same as at adults.

Coronary vessels up to 2 years are distributed on loose type, from 2 to 6 years – on mixed, after 6 years – on adult, main type.

The plentiful vascularization and friable cellulose surrounding vessels create predisposition to inflammatory and dystrophic changes of a myocardium.

The sclerosis and myocardial infarction at early age meet very seldom.

The main trunk of a pulmonary artery by the time of the birth rather short is also divided into two approximately equal branches that creates at some children pressure differences between

vessels (to 8-15 mm Hg) and can be the cause of emergence of characteristic systolic noise of a peripheral stenosis of a pulmonary artery.

Blood vessels of newborns thin-walled, muscle and elastic fibers in them are developed insufficiently. Walls of arteries are more elastic therefore peripheral resistance, arterial blood pressure and speed of a blood-groove at healthy children of the first years of life are less, than at adults.

With age at children the systolic arterial blood pressure grows, diastolic tends only to increase.

Calculation of arterial blood pressure for children is more senior than 1 year is carried out on a formula:

Systolic arterial blood pressure = 90 + 2n Diastolic arterial blood pressure = 60 + n; where n – age of the child advanced in years.

The gleam of arteries is rather wide and approximately identical with a gleam of veins. Because veins grow quicker than arteries, by 16 years their gleam becomes twice wider, than a gleam of arteries.

By 12 years structure of vessels same, as at adults. The differentiation of arterial and venous network is shown by development of collateral vessels, emergence of the valve device in veins, increase in number and length of capillaries. Capillaries at children are well developed, wide, their number reaches 6-8 in a linear field of vision. They have irregular shape (short, gyrose), the permeability at children is higher than them, than at adults.

RESEARCH TECHNIQUE

ANAMNESIS

When collecting the anamnesis it is necessary to reveal complaints of the patient, to find out when they arose that provoked their emergence. Most often meet: an asthma at rest or at movements, cyanosis of lips, nails, the general bluish shade of skin at rest or at physical activity, hypostases of legs, waists, faces, heartbeat (subjective feeling of cardiac impulses or "dying down" of heart).

In the presence of complaints to pains in heart it is necessary to specify their localization, time and frequency of emergence, duration, intensity, irradiation, provocative factors, individual manifestations, than they act.

GENERAL SURVEY

At the general survey define existence or lack of consciousness, weight of a state and position of the patient.

Position of the patient in heart failure forced, at expressed – on the right side with a high headboard, at pronounced – semi-sitting or sitting with the lowered legs. At acute vascular insufficiency the patients usually lie with a low headboard and avoid movements. Weight of a state is defined by presence of short wind, cyanosis and visible hypostases, level of arterial blood pressure. An asthma can be shown both by increase of breath (tachypnea), and participation in breath of auxiliary muscles. In character cardiac short wind is expiratory or mixed, amplifies in a prone position and is weakened in a sitting position (orthopnea). Sometimes an asthma has an appearance of the attacks which are followed by appearance of cyanosis. It testifies to a decompensation.

At survey of integuments it is possible to reveal pallor of skin or cyanosis, cyanosis can arise at physical activity or remain constantly. At survey of a neck at the healthy child, the pulsation of carotids of a knutra from grudino - a clavicular and mastoidal muscle in vertical position, usually is not visible or visible poorly. In the presence of knaruzha pathology from grudino - a clavicular and mastoidal muscle it is possible to see swelling and a pulsation of cervical veins. It is possible to reveal also pathological pulsation in the field of epigastrium, epigastriß area and in right hypochondrium.

On the lower extremities the pastosity or hypostases which arise in a circulatory unefficiency can be noticeable. In the beginning hypostases develop by the evening, and by the morning disappear. Then, if hypostases accrue, they can develop on a trunk, a waist, a face and in cavities. Cardiac hypostases move under the influence of gravity, they are more profound on that side of a body where the patient lies.

Survey of area of heart. At survey it is possible to see an apical or cardiac impulse and also "a warm hump". At morbid conditions the apical beat can be displaced in vertical and horizontal provisions.

The cardiac impulse is a diffuse pulsation of all warm area which arises only at pathological situations.

PALPATION

At a palpation of area of heart it is possible to define an apical beat. It is localized: children up to 2 years have the fourth mezhreberye of a knaruzha from the sredneklyuchichny line; from 2 to 7 years – the fifth mezhreberye of a knaruzha from the sredneklyuchichny line; after 7 years – the fifth mezhreberye on the sredneklyuchichny line or knutr from it. Width of an apical beat depends on the size of the space occupied by it (normal at adult 1.5-2 cm). If it is less, it is called limited if it is more – diffuse. At children the push is described as diffuse if it is palpated in two and more mezhreberye. Size (height) of an apical beat. Distinguish the moderated (norm), a high and low apical beat.

At a palpation of area of heart at some patients with heavy pathology of heart it is possible to reveal trembling of a front difficult wall which is called cat's purring.

Palpatorno investigate pulse on beam, sleepy, temporal, femoral, subnodal, back tibial, arteries, on an artery of the back of foot – on border of a distal and average third of foot. Pulse is probed on both hands and legs and compared. On femoral arteries the pulse is stronger, than on hands. At children of chest age standing normal pulse is weaker.

Rhythm. The rhythm can be correct or wrong. Normal at children the pulse is very labile. Arrhythmia is most profound at the age of 4-12 years, is most often connected with breath (on an exhalation the pulse urezhatsya). The respiratory arrhythmia is eliminated at breath holding. At early age 3-3.5 warm reductions, in the senior – 4 are the share of one respiratory movement.

It is necessary to compare pulse rate to number of warm reductions according to auscultation. Deficit of pulse – such state at which not all pulse waves reach a beam artery.

PERCUSSION

At percussion of heart determine its sizes, a configuration and situation and also width of a vascular bundle.

AUSCULTATION of heart gives an idea of tones and noise (the sound phenomena arising in operating time of heart). It should be carried out in position of the patient lying, sitting, standing, if necessary on the left side, before physical activity, at usual breath and its delay. Over all area of heart it is possible to listen to two tones: The I tone – systolic, is caused by tension and trembling of valves and muscles of heart in the period of a systole and also trembling of walls of vessels at the beginning of a blood sphygmic interval; The II tone – diastolic, is caused by a zakhlopyvaniye, tension and vibration of valves and trembling of internal structures of heart in the period of a diastole.

Auscultation is carried out in places of the best listening of the sound phenomena arising in the field of valves in the following order:

The 1st point – a heart top, area of an apical beat – the place of listening of the mitral valve;

The 2nd point – the second mezhreberye to the right of a breast – the place of listening of the valve of an aorta;

The 3rd point – the second mezhreberye to the left of a breast – the place of listening of the valve of a pulmonary artery;

The 4th point – at the basis of a xiphoidal shoot on the right – the place of listening of the three-leaved valve;

The 5th point (Botkin's point) – the place of attachment of the III-IV edges to the left of a breast – the place of listening of aortal and mitral valves.

Tones of I and II differ on sonority: at adults on a top the I tone, and on the basis of heart, over valves of an aorta and pulmonary artery – the II tone is better heard. In case the II tone is more sonorous over an aorta, than over a pulmonary artery, consider that it is accent of the II tone over an aorta and if, on the contrary, the II tone is more sonorous over a pulmonary artery, than over an aorta, it is regarded as accent of the II tone over a pulmonary artery.

Healthy children have clear cardiac sounds. Moderately weakened tones are called muffled, sharply weakened – deafs. The ratio of sonority of tones changes with age. At newborns during the first 2-3 days on a top and in the 5th point the II tone is louder than the I tone, then they are leveled on sonority, and from 3 months the I tone prevails. On the basis of heart in the period of a neonatality the I tone is better heard, then the sonority of tones is compared, and since one and a half years the II tone prevails again. Additional III and IV tones result from stretching of the weakened wall of ventricles, under the influence of fast receipt in their cavity of the first portion of blood from auricles at the beginning of a diastole (II tone) and at the time of an auricular systole (IV tone). The silent III tone can be listened at children in the field of a heart top, on a timbre it soft, hard of hearing. Very weak sound listened in a diastole at auscultation represents the IV tone.

At auscultation it is possible to find warm noise which differ from tones in the bigger duration of sounding, less accurate beginning and the period of abatement. Noise are in a certain ratio with phases of a cardial cycle. Noise are often listened at children, even at absolutely healthy, at the same time they are more sonorous and distinct.

Noise distinguish on intensity (loudness), a timbre (rough, rigid, blowing, gentle, soft, musical, scraping), durations (short or long), localizations (points or zones of the maximum audibility), on communication with a systole, a diastole or with tones, on the field of primary carrying out, in relation to a postural change of a body and physical activity.

Systolic noise arise in heart and large vessels in a phase of reduction (systole) and are listened between the first and second tone.

Diastolic noise arise in a phase of a diastole and are listened during a big pause between the second and first tone.

The intensity of noise can be very different. Loudness depends on the speed of a blood-groove and conditions of carrying out a sound on a chest wall. The loudest noise are listened at small defects with the kept sokratitelny ability of a myocardium at thin children. The intensity of noise depends on the size of stroke output: the it is more, the noise is stronger.

Allocate two groups of noise: intracardial and extracardiac. Intracardial divide into organic, caused by defects of valves or partitions of heart, and inorganic (functional) at which there are no heart diseases.

Organic noise arise with anatomic features of walls, openings or valves of heart. They arise at the congenital or acquired defects, inflammation of endocardium and a pericardium, damage of a myocardium. Functional noise are listened more than at 50% of children after 2 years.

The following properties are inherent in functional noise:

- they practically always are systolic;
- are short, seldom occupy all systole, are usually heard in the middle of a systole;
- on character can be soft or "musical";
- are listened on the limited site;
- are not carried out on other points;
- are non-constant, breath phases (disappear or are sharply weakened at a breath depth), physical activity depend on position of a body (are better listened in a prone position) (change intensity and a timbre).

From extracardiac noise the noise in anemia caused by change of rheological properties of blood most often meet.

Arterial blood pressure is measured on hands and the child's legs, the difference has to make 15-20 mm Hg.

The ECG which at children of different age has a number of features is important for diagnosis of heart diseases. For objective assessment of noise use a phonocardiography (FKG), a polycardiography, an echocardiography (EKHOKG), doppler sonography. The last, as well as a reovazografiya, allows to judge a condition of vessels.

SEMIOTICS OF DAMAGE OF THE CORDIAL VASCULAR SYSTEM

Cyanosis. Total cyanosis of skin and visible mucous membranes at children is usually observed in congenital heart disease of blue type. Cyanosis with a cerise shade is characteristic of a stenosis of a pulmonary artery or not rheumatic carditis with a small cavity of a left ventricle. The Crocq's disease is often observed at mitral defect. "The mitral butterfly" is marked out in a mitral stenosis.

The pallor of skin and mucous membranes is usually observed in aortal heart diseases or an infectious endocarditis.

Heartbeat is more often noted in "not cardiac" pathology: vegeto-vascular dystonia, anemia, a thyrotoxicosis, a hypercorticoidism, gastrointestinal diseases, feverish states, infectious diseases and also in emotional stresses, high standing of a diaphragm.

The feeling of "interruptions" is observed in premature ventricular contraction which can have the neurogenetic nature or to be caused by an organic lesion of heart.

Heartaches can arise at disturbance of coronary circulation, in particular at an abnormal otkhozhdeniye of the left coronary artery from a pulmonary artery, in carditises, pericarditises and also in the absence of changes in heart at emotionally labile children. Pains in heart can arise reflex in a peptic ulcer of a stomach and duodenum, cholecystitis, phrenic hernia, an additional edge, a humeroscapular periarteritis, etc.

Asthma arises at developments of stagnation in a small circle of blood circulation, because of disturbance of outflow of blood from pulmonary veins in the left auricle in a mitral stenosis, a carditis with reduction of a cavity of a left ventricle, an adhesive pericarditis, insufficiency of the mitral valve. An asthma can be also caused by right ventricular insufficiency at a sharp or chronic pulmonary heart, an embolism of a pulmonary artery, etc.

The general cardiac hypostases indicate right ventricular insufficiency. Local hypostases of one shin or hip testify to thrombophlebitis.

The pulsation of carotids "carotid shudder" can be seen at insufficiency of valves of an aorta. It usually is followed by an involuntary kivaniye the head (Masset's symptom).

Swelling and pulsations of cervical veins are noted at compression, an obliteration or thrombosing of an upper vena cava that is followed by edema of face and neck (Stokes's collar). The pulsation of cervical veins is observed at an obstacle to outflow of blood from the right auricle, insufficiency of the tricuspid valve.

Phlebectasia of the lower extremities and the side surfaces of a thorax is observed at difficulty of outflow through the lower vena cava.

Shift of an apical beat is noted at increase in the left and right ventricles, increase in all mass of heart and also at high or low standing of a diaphragm, increase in pressure in one of pleural cavities, adhesive processes.

The cardiac impulse can be visible and is palpated at children at a heavy physical tension, a thyrotoxicosis, shift of heart of a kperedá, hypertrophy of a right ventricle.

Pulse. Frequent pulse is noted during physical and mental activities, in tachycardia, heart failure, anemias, a thyrotoxicosis, a pain syndrome. At fervescence by one degree the pulse becomes more frequent on 8-10 blows in 1 min.

The trained people can have an infrequent pulse during sleep, at negative emotions, at blockade of the carrying-out system of heart, weakness of sinus node, intracranial hypertension, at a hypothyroidism, diphtheria, meningitis, etc. Weakening of pulse testifies to an arteriostenosis on which there passes the pulse wave.

Increase in the sizes of heart happens generally due to increase in his cavities. The right border of heart extends at increase in the right auricle or right ventricle. Cardiomegaly is done at dilatation and a hypertrophy of a left ventricle to the left. Cardiomegaly is done up at considerable expansion of the left auricle. Increase in borders of heart extensively can be in a zksudativny pericarditis, at the combined and combined defects.

Cardiac sounds. Easing of both cardiac sounds can be caused by deterioration in carrying out a sound in obesity, a myopachynsis, emphysema of lungs, presence of exudate in the left pleural or pericardiac cavity and also at damage of a myocardium.

Easing of the I tone arises at insufficiency of mitral and aortal valves, delay of atrioventricular conductivity, damage of a myocardium (decrease in sokratitelny ability).

Easing of the II tone on an aorta is observed in aortal heart diseases, on a pulmonary artery – at insufficiency of valves of a pulmonary artery or a stenosis of its mouth.

Thin children can have strengthening of both cardiac sounds, in the presence of a thin chest wall, high standing of a diaphragm.

Strengthening of the I tone is noted at a thin thorax, physical and emotional pressure, under some pathological conditions: an open arterial channel, defect of an interventricular partition, the shortened PQ interval. The clapping I tone on a top is listened in a mitral stenosis, and at the basis of a xiphoidal shoot – in a stenosis of the right atrioventricular opening, gun I tone – at total atrioventricular block when one auricles and ventricles are temporarily reduced.

The accent of the II tone over an aorta is most often noted in arterial hypertension. The accent of the II tone over a pulmonary artery testifies to a hypertrophy of a right ventricle owing

to pulmonary hypertension which arises in heart diseases, diseases of the lungs leading to reduction of the pool of a small circle of blood circulation at deformations of a thorax.

The distinct III tone is listened at a vagotonia, the raised blood-groove via atrioventricular valves (left-right shunt, mitral or tricuspid insufficiency). The first, second and third backgrounds form well audible tripartite rhythm – a cantering rhythm.

The embryocardia (pendulum rhythm) arises in an acute heart failure, a Bouveret's disease, high fever, etc.

Independent work of students.

Scheme of inspection of the patient

Respiratory organs.

At the general survey to pay attention on:

- cyanosis at rest and at physical activity (shout, suction);
- inflating of wings of a nose;
- retraction of compliant places of a thorax;
- asthma, its nature, frequency and respiratory rhythm, ratio of pulse and frequency of respiratory movements;
- characteristic of crying, shout, voice and cough;
- nasopharynx research;
- nature of a percussion sound, border of lungs and mobility of pulmonary edges;
- percussion signs of the increased bronchial lymph nodes (Korany's cm, juxtaspinal shortenings, cm of "bowl");
- at auscultation to pay the attention to the nature of breath (weakened, vesicular, bronchial, puerile), existence of rattles, pleural rub.

Bodies of blood circulation.

At the general survey of bodies to pay attention on:

- the additional anamnesis (fatigue at physical activity whether long ago puffiness and cyanosis is noted);
- cyanosis of integuments, hypostases, fingers in the form of "drum sticks", an asthma;
- warm hump, pulsation in jugular veins, peripheral arteries and capillaries;
- palpation of an apical and cardiac impulse (characteristic of localization, area);
- percussion limits of relative and absolute warm dullness;

- at auscultation – characteristic of cardiac sounds, existence of noise, their change at a postural change, physical activity, functional trials. Change of a rhythm. To give characteristic of pulse;
- to measure the ABP.

At assessment of paraclinic methods of a research to pay attention on:

- roentgenograms of lungs, hearts;
- these spiographies, ZhEL, pikfloumetriya;
- ECG, FKG, EhoKG.

Situational tasks

Task No. 1

The child of 2 years got sick with a respiratory infection. Besides the catarrhal phenomena in a pharynx, it had an asthma of expiratory character with the extended whistling exhalation, the non-constant reznokaliberny and whistling rattles in lungs.

Questions:

1. Make the preliminary diagnosis.
2. What features of a respiratory system of the child of early age promote to emergence of a similar complication of a respiratory infection?

Task No. 2

The child of 3 months, is sick the second day: difficulty of nasal breath, not plentiful mucous discharges from a nose, rare dry cough, body temperature is 37.5 °C. From the day before yesterday disease the state worsened: cough gained spastic character, appeared and quickly an asthma up to 80 in the min. Child accrued became uneasy, there was single vomiting. Body temperature is 37.3 °C.

At survey condition of the child heavy. Integuments, mucous membranes of lips and an oral cavity cyanotic, breath noisy, "puffing", superficial with the complicated exhalation and participation in the act of breath of auxiliary muscles (nose wings, a shoulder girdle), retraction of intercostal spaces. The thorax is blown up, over lungs – the box shade of a sound, limit of warm dullness are reduced, the upper bounds of a liver and spleen are displaced down on one mezhreberye. At auscultation breath rigid, the exhalation is sharply extended, on a breath and an exhalation in front and behind a lot of small-bubbling and crepitant rattles on both sides is listened. Cardiac sounds sonorous, ChSS - 172 in 1 min., accent of the I tone over a pulmonary artery. Borders of heart correspond to age. Other bodies and systems at physical inspection without features.

Questions:

1. Your diagnosis?
2. Specify the most typical symptoms.
3. Specify the plan of emergency aid.

Task No. 3

The child of 4 months when feeding by a breast quickly is tired, and at shout the passing cyanosis develops. From the anamnesis it is found out that the child from the I pregnancy, births in time. Mother in the first half of pregnancy had a SARS with high temperature, was treated by independently folk remedies. By profession the child's mother – the painter. The genealogical anamnesis is not burdened. Incomplete family, material living conditions satisfactory. At survey: the left limit of relative warm dullness – on the left front and axillary line, is auskultativno defined rough systolodiastolic noise in the 2nd mezhreberye at the left.

Questions:

1. Your expected diagnosis?
2. On what data your assumption is based?
3. What researches the child needs to conduct for your confirmation diagnosis?

Test control.

- 1) In diseases of children of early age all listed below reasons contribute to the development of obstruction of bronchial tubes **except**:
 - a) underdevelopment of a cartilaginous framework and elastic fibers;
 - b) insufficient blood supply of mucous membranes;
 - c) narrowness of a gleam of bronchial tubes;
 - d) slime hypersecretion
- 2) At children the puerile breath is caused:
 - a) narrowness of the nasal courses;
 - b) thin wall of a thorax;
 - c) wide gleam of bronchial tubes;
 - d) the pulmonary fabric raised by lightness
- 3) At children the puerile breath is listened aged:
 - a) since the birth to 4 years;
 - b) from 6 months to 5-7 years;
 - c) from 1 to 8 years;

- d) 6 months up to 12 years
- 4) At the full-term newborn child the respiration rate at quiet wakefulness is in 1 min.:
- a) 18 – 20
 - b) 25 – 30
 - c) 30 – 40
 - d) 40 – 50
 - e) 60 – 70
- 5) From what age the ratio of ChD and ChSS makes 1:4:
- a) since 6 months.
 - b) since 1
 - c) since 5 years
 - d) since 10 years
- 6) Anatomic features of a nose at children of early age are all listed below **except**:
- a) underdevelopment of cavities
 - b) tenderness of a mucous membrane
 - c) density of cartilages
 - d) narrowness of the nasal courses
 - e) not created lower course
- 7) By apnoea at newborn children it is connected:
- a) with a lack of surfactant
 - b) immaturity of a respiratory center
 - c) with weakness of reduction of a diaphragm
 - d) with a hypoxia of a respiratory center
- 8) Features of a throat at children of early age are:
- a) good development of elastic fabric
 - b) narrowness of a glottis
 - c) long phonatory bands
 - d) tenderness of a mucous membrane
 - e) pliability of cartilages
- 9) Small depth of breath at children of early age is caused by all factors **except**:
- a) big frequency of dykhaniye
 - b) small number of alveoluses
 - c) small excursion of a thorax
 - d) weakness of respiratory muscles

- 10) On the back surface of a thorax lung lobes are projected on the right:
- a) upper
 - b) average
 - c) lower
- 11) Oxygen requirement on 1 kg. body weights at children in comparison with adults
- a) it is more
 - b) it is less
 - c) same
- 12) The minute volume of breath is at 1 kg. body weights at children in comparison with adults
- a) same
 - b) it is less
 - c) it is more
- 13) Gas exchange in lungs at children per 1 kg. body weights in comparison with adults
- a) same
 - b) it is more
 - c) it is less
- 14) On the front surface of a thorax lung lobes are projected on the right:
- a) lower
 - b) average
 - c) upper
 - d) lingular
- 15) Height of standing of tops at children of preschool age in front:
- a) 1 – 2 cm.
 - b) 4 – 5 cm.
 - c) 6 – 7 cm.
 - d) do not go beyond a clavicle
- 16) The lower bound of lungs at children on the scapular line is at the level:
- a) The VIII edges
 - b) The IX edges
 - c) The X edges
 - d) The XI edges
- 17) Inspiratory asthma is characteristic for:
- a) pneumonia
 - b) grain

- c) asthmatic bronchitis
 - d) bronchiolitis
- 18) Weakening of voice trembling on the party of defeat is peculiar at:
- a) pneumonia
 - b) pneumothorax
 - c) existence of cavities in lungs
19. For calculation of average systolic arterial blood pressure at children years are more senior the formula is used:
- a) $60 + 2n$
 - b) $90 + n$
 - c) $90 + 2n$
 - d) $100 + n$, where n — age advanced in years
20. Ratio of a gleam of veins and arteries at children of early age:
- a) 2:1
 - b) 1:1
 - c) 1:2
 - d) 1:3
21. The rarity of myocardial infarctions at children of the first years of life is explained by type of blood supply of a cardiac muscle:
- a) main
 - b) loose
 - c) mixed
22. The ratio of a gleam of a pulmonary artery and aorta over the valve makes at newborns:
- a) the aorta is less than pulmonary artery
 - b) the aorta is more than pulmonary artery
 - c) are identical
23. Heart diameter concerning a thorax at children with age:
- a) increases
 - b) decreases
 - c) does not change
24. Children have a stroke output of blood with age:
- a) increases
 - b) decreases
 - c) does not change

25. Children have a blood-groove speed with age:
- a) increases
 - b) does not change
 - c) decreases
26. At the full-term newborn the average heart rate is:
- a) 90 in 1 min.
 - b) 110 in 1 min.
 - c) 140 in 1 min.
 - d) 170 in 1 min.
27. Average diastolic arterial blood pressure (mm Hg) at children is more senior than 1 year is calculated by a formula:
- a) $40 + 2n$, where n – age advanced in years
 - b) $50 + n$
 - c) $60 + n$
 - d) $70 + 2n$
28. Arterial blood pressure standing in comparison with hands:
- a) same
 - b) above
 - c) below
29. At the newborn the left limit of relative warm dullness of heart is:
- a) on the median and clavicular line
 - b) on the front axillary line
 - c) knaruzh from the median and clavicular line on 1-2 cm.
 - d) knutr from the median and clavicular line on 1-2 cm.
30. Provision of an electrical axis of heart according to the ECG at children of early age
- a) deviation to the left
 - b) deviation to the right
 - c) normal position
31. Distinguishing characters of functional noise in heart at children are:
- a) soft timbre
 - b) constant
 - c) connected with tones
 - d) it is carried out ekstrakardialno
 - e) changes after physical activity

32. The cardiothoracic index (%) at children till 1 year makes:
- a) 25
 - b) 30
 - c) 45
 - d) 55
33. Features of vessels at children in comparison with adults:
- a) the gleam of veins is wider than a gleam of arteries;
 - b) the growth rate of large arteries advances the speed of increase in volume of heart with age;
 - c) high speed of a blood-groove;
 - d) at the birth – muscular type of the structure of vessels of a big circle of blood circulation
34. Ventricular systole duration at newborns in relation to a diastole:
- a) it is more
 - b) it is less
 - c) same

Class in a subject:

"FEATURES OF THE HEMOPOIESIS AT CHILDREN.

ANATOMO-FIZIOLOGICHESKIE OF FEATURE OF SYSTEMS OF DIGESTION AND UROPOIESIS".

I. Scientific and methodical justification of a subject.

Diseases of a system of blood are a current problem of health care, especially in pediatrics. Even easy forms of pathology have negative impact on development and forming of the child in any age period, affecting in the subsequent the state of health, efficiency of the adult.

Severe forms pose a direct threat of life or long, sometimes lifelong disability. In this regard the program for students doctor books included questions of morpho-physiological features of a system of blood at children.

Diseases of digestive and mocheobrazovatelny systems are a current problem of health care, especially in pediatrics. Even easy forms of pathology have negative impact on development and forming of the child in any age period, affecting in the subsequent the state of health, efficiency of the adult.

Severe forms pose a direct threat of life or long, sometimes lifelong disability. In this regard the program for students doctor books included questions of morpho-physiological features of systems of digestion and an uropoiesis at children.

II. Purpose of activity of students.

The student has to know:

- anatomo-physiological features of the haematogenic, digestive and urinary systems at children;
 - main stages of formation of a hemopoiesis anti- and postnatalno;
 - physiological role of morphological elements of blood;
 - methods of an objective, clinical laboratory and tool research of patients with diseases of blood, digestive organs and urinations;
 - standards of indicators of peripheral blood and miyelogramma at children of various age;
 - the main mechanisms of a hemostasis from modern positions;
 - semiotics of diseases of blood.
 - the reasons of vomiting at children of chest age;
 - influence of anatomo-physiological features on pathology of a digestive tract;
 - features of a microlandscape a calla at the child of early age;
 - features of urination and urine at children;
- semiotics of diseases of digestive and urinary systems

The student has to be able:

- to collect and estimate the social, biological and genealogical anamnesis;
- to perform anthropometrical examination of the child, to give an assessment of his physical development;
- to perform clinical examination of the hematologic, gastroenterological and nephrological patient;
- to make the plan of necessary additional inspection;
- to estimate results of clinical and biochemical analysis of blood, urine, uric tests, duodenal and gastric sounding, tool methods of a research;
- to render emergency aid at a hemorrhagic syndrome;
- to render emergency aid in an acute renal failure;
- to give an assessment of a diuresis, a chair;
- to write prescriptions on antianemic drugs to children of different age groups.
- to write prescriptions on antibiotics, diuretic, bile-expelling, fermental drugs to children of different age groups.

III. Content of training:

1. Stages of an antenatal hemopoiesis – characteristic, practical value.

2. Modern scheme of a hemopoiesis.
3. Anatomico-physiological features of digestive system at children.
4. Features of intestinal digestion at children depending on feeding type
5. The functional features of digestive system contributing to development of toxicoses in children.
6. Features of intestinal microflora at children. Role of saprophytic intestinal microflora.
7. Anatomico-physiological features of a urinary system at children.
8. Features of concentration and filtrational function of kidneys in age aspect.
9. Features of peripheral composition of blood at children, age dynamics.
10. Blood types at children. Main erythrocyte antigens of blood, practical value. Leukocytic antigens of blood: general concept, role, value of pathology of children's age.
11. Hemostasis (definition, main mechanisms). Laboratory methods of a research in hematology.
12. Anatomico-physiological features of digestive system at children.
13. Features of intestinal digestion at children depending on feeding type
14. The functional features of digestive system contributing to development of toxicoses in children.
15. Features of intestinal microflora at children. Role of saprophytic intestinal microflora.
16. Anatomico-physiological features of a urinary system at children.
17. Features of concentration and filtrational function of kidneys in age aspect.

IV. Educational material security.

1. Visual aids: tables, schemes, multimedia presentations, videos, audiogramma.
2. Educational medical documentation (case histories, laboratory researches, roentgenograms).
3. Technical means of training.
4. Literature.

V. List of references:

1. Propaedeutics of children's diseases / to N.A. Geppa. – M.: GEOTAR-media, 2009. – 464 pages.
2. Propaedeutics of children's diseases/T. V. Kapitan. – M.: MEDpress-inform, 2009. – 656 pages.

3. Propaedeutics of children's diseases/Ampere-second. Kalmykova. – M.: GEOTAR-media, 2010. – 920 pages.
4. Pediatrics: The textbook for medical schools. Under the editorship of N.P. Shabalov. – SPb: SpetsLit, 2006. – 895 pages.
5. Children's diseases: the textbook / under the editorship of A.A. Baranov. – M.: GEOTAR-media, 2009. – 1008 pages.
6. A.V. Mazurin, I.M. Propedevtik's Baneberries of children's diseases. – Volume, 2009. – 505 pages.
7. Z.D. Kaloyeva, K.M. Dzilikhova, S.K. Karyaeva, etc. Background diseases of children of early age. Manual for students. – Vladikavkaz, 2011. – 64 pages.
8. Z.D. Kaloyeva, K.M. Dzilikhova, S.K. Karyaeva, etc. Technique of a research of the child. The study guide for students. – Vladikavkaz, 2011. – 51 pages.
9. Lectures on pediatrics.
10. Methodical instructions for out-of-class work of students 4 courses of medical faculty on discipline "Pediatrics".

VI. List of questions for check of initial level of knowledge:

1. Characterize the modern scheme of a hemopoiesis.
2. What blood types do you know? A concept about the main erythrocyte antigens of blood, their practical value.
3. Call the main mechanisms of a hemostasis.
4. Call the main laboratory methods of a research in hematology, their practical value.
5. Call the main symptoms of defeat of a system of a hemopoiesis.
6. Call departments of digestive system, their function.
7. What main complaints are shown by gastroenterological patients?
8. Call the main functions of a liver.
9. What additional methods of a research are used in gastroenterological practice?
10. What is the main structural unit of a kidney? Of what departments does consist?
11. Call the main stages of an uropoiesis.
12. What symptoms can be revealed at survey of patients with pathology of an urinary system?
13. What methods of a research of an urinary system do you know?

VII. List of questions for check of final level of knowledge:

1. Characterize stages of an antenatal hemopoiesis.

2. What features of peripheral composition of blood at children and their age dynamics are known to you?
3. What is leukocytic antigens of blood? Characterize their role, value in pathology of children's age.
4. What main clinical laboratory symptoms, are characteristic of blood diseases at children?
5. Call features of the building and functioning of a digestive tract of the child.
6. What types of feeding of children of the first year of life do you know?
7. What functional features of digestive system contribute to development of toxicoses in children?
8. How does the microbic landscape of intestines of children, since the birth moment change?
9. What is saprophytic microflora? What functions in an organism does perform?
10. Call anatomo-physiological features of an urinary system at children.
11. What features does concentration and filtrational function of kidneys at children have?
12. How anatomo-physiological features of digestive and urinary systems contribute to the fast development of toxicoses in children?

Information block **HEMOPOIESIS AFO AT CHILDREN**

Blood formation (hematopoiesis) call processes of emergence and maturing of uniform elements of blood. Over the pre-natal period there is a consecutive change of the haematogenic bodies. Distinguish the periods of a vitelline, hepatic and marrowy (medullary) hemopoiesis.

Adenoid tissue begins to be differentiated only by the end of the pre-natal period, approximately from 7th month. An important role in formation of a lymphopoiesis is played a thymus gland.

After the child's birth the formation of erythrocytes, granular leucocytes and thrombocytes happens in marrow. Lymphocytes are formed in lymph nodes, a thymus gland, a spleen, solitary follicles of intestines, peyerovy plaques. At children of early age the hematopoiesis proceeds everywhere. The mass of marrow in relation to body weight is 1.5-3 times more, than at adults. On the 4th year after the birth at children the regeneration begins

red marrow in fat, this process proceeds up to 14-15 years. By the puberty period the hemopoiesis remains in red marrow of spongy substance of bodies of vertebrae, edges, breasts, femurs and bones of a shin (after 30 years the hematopoiesis occurs only in marrow of a breast, edges and vertebrae).

Quantity and properties of blood.

Amount of blood newborn children – about 0.5 l, at adults have 4-6 l, but the amount of blood having per unit mass bodies at newborns is more (11-20%), than at adults (6-8%). At boys rather bigger amount of blood, than at girls. At rest the adult in circulation has 2/3 volumes of blood, other blood is in depot. Deposition of blood is one of functions of a spleen. At newborns this its function is significant poorly since forming basic sokratitel'nogo the device of vessels and the capsule of a spleen comes to an end by 12-14 years.

The Gematokritny number (relation of volume of uniform elements of blood to plasma volume) at adults makes 40-45%. In the 1st day after the birth this indicator is higher – 54%, by the end of the 1st month of life reaches values of adults. Proteins of blood plasma at children contain in smaller concentration, than at the adult. The newborn has on average 56 g/l, by the end of 1 month – 48 g/l. Only by 3-4 years the concentration of blood protein reaches values of the adult (70-80 g/l).

Other is characteristic of blood plasma of children of the first years, than adults have a ratio of protein fractions. At newborns higher content of gamma-globulins is noted (the fruit receives them from mother). Maintenance an alpha 1- and beta globulins in blood plasma of newborns is lower, than at adults, gradually increasing by the end of the first year of life.

Erythrocytes. In the first day after the birth concentration of erythrocytes on average $6.1 \times 10^{12}/l$. In the period of a neonatality the decrease in maintenance of erythrocytes is observed and by 1 month is $4.7 \times 10^{12}/l$.

Decrease in concentration of erythrocytes in blood of newborns is explained by their increased destruction. The maximum speed of destruction of erythrocytes is observed for 2-3 day after the birth. At this time it exceeds that by 7 times. Along with destruction there is a formation of the new cells containing instead of fetal hemoglobin of adults.

Destruction of erythrocytes at newborns is followed by development of physiological jaundice. It develops for 2-3 day of life and disappears for 7-10 day. Reduction of concentration of erythrocytes in blood continues for the first months of life. The lowest concentration of erythrocytes is observed at the age of 5-6 months, on average $4.1 \times 10^{12}/l$. As a result of influence of adverse factors (the wrong feeding, a lack of walks, infectious diseases, etc.) decrease in quantity of erythrocytes can be more expressed. Further increase in quantity of erythrocytes is noted.

The significant difference of diameter of separate cells (from 3 to 10 microns) – an anisocytosis is characteristic of newborns. At the same time the average diameter of erythrocytes of children of the first days of life a little bigger (8.1 microns), than at adults (7.5 microns). At the birth about 8% of erythrocytes have irregular shape (dome-shaped, stomatocytic, spherocytic,

etc.), the quantity of such erythrocytes by the end of 1 week decreases to 5%. In the first days after the birth the maintenance of reticulocytes is rather big. Their contents decreases from 4.5% in the first day to 0.6% by 8th day of life. Blood of the adult contains 0.75-0.85% of reticulocytes.

Hemolysis in hypotonic salt solutions at newborns is characterized by decrease minimum (0.48-0.52, at adults – 0.44-0.48) and increase maximum (0.24-0.3, at adults – 0.28-0.36) osmotic resistance.

SOE at newborns is equal to 1-2 mm/hour. Small SOE is explained by generally low concentration of globulins. SOE increases from 2nd month after the birth and makes 3-4 mm/hour until the end of chest age.

Hemoglobin.

During the separate periods of ontogeny of the person in the ripening erythrocytes different forms of hemoglobin are synthesized. Erythrocytes of an embryo contain embryonic hemoglobin (NvE or NvR). By 3rd month of pre-natal development, embryonic hemoglobin is substituted with fetal hemoglobin (NvF). At the full-term newborn children fetal hemoglobin makes 70%, other quantity is provided to NvA.

After the birth, fetal hemoglobin is replaced with NvA, at the end of the 2nd week the keeping of whom makes about 50%. At children at the age of 35-40 days the overwhelming quantity is already provided to NvA.

Blood of newborns contains very large amount of hemoglobin of 220-240 g/l. From the 2nd day the concentration of hemoglobin begins to decrease and by 9-15 day makes 190 g/l, and at the age of 1 month – 145 g/l.

The color indicator during 1 week after the birth has sizes 0.9-1.3 that speaks about a hyperchromia. At children of the 1st year tsv. the indicator 0.75-0.8, and is more senior than year – 0.85-1.05. The average amount of hemoglobin in an erythrocyte in absolute units is after the birth 33.3 pg., in 5-6 months – 1 pg., at adults – 30 pg.

Leukocytes.

At newborns the maintenance of leukocytes is big, to them svoystven physiological a leukocytosis ($10-30 \times 10^9/l$). At children of chest age the concentration of leukocytes makes ($6-12 \times 10^9/l$). After a year the decrease in this indicator is noted and by 15 years the concentration of leukocytes meets standard of the adult ($4-9 \times 10^9/l$).

The relative maintenance of neutrophils and lymphocytes at children considerably changes. In the 1st day after the birth the neutrophils make 68% of total number of leukocytes, and lymphocytes – 25%, i.e. a ratio same, as well as at adults. Since 2nd day, the maintenance of neutrophils decreases, and lymphocytes increases. At the age of 5-6 days the maintenance of

neutrophils and lymphocytes is leveled and makes 43-45% (first decussation). Further relative decrease in quantity of neutrophils and increase in maintenance of lymphocytes continues. For 2-3 months after the birth the quantity of lymphocytes reaches a maximum (60-63%), and neutrophils – a minimum (25-27%). Then the quantity of neutrophils increases, and lymphocytes decreases. At the age of 5-6 years the quantity of these leukocytes is equalized again (the second decussation). After 15 years the relative quantity of neutrophils and lymphocytes becomes the same, as well as at adults.

At the end of the pre-natal period and soon after the birth T - and V-lymphocytes are differentiated. Stem cells of marrow migrate in a thymus gland. Here under the influence of hormone of Timosinum T lymphocytes are formed. The place of formation of V-lymphocytes presumably are tonsils, a worm-shaped shoot, plaque peyerova. T - and V-lymphocytes move to lymph nodes and a spleen. The relative maintenance of T lymphocytes at the newborn is less, than at the adult (35-56%). However owing to a physiological leukocytosis the absolute quantity is higher than them. At children 2 years a share of T lymphocytes same, as at adults (60-70%) are more senior.

Thrombocytes.

Decrease in concentration of thrombocytes is observed by 7-9 day of life of the child ($165-180 \times 10^9/l$), and to the end of the 2nd week reaches sizes of the adult ($150-400 \times 10^9/l$) and does not change significantly further. The child is younger, the more he has a maintenance of young forms of thrombocytes with what their decline in the ability to aggregation, discharge of a factor 3 and serotonin is connected.

Fibrillation.

By the time of the birth of value of these factors are also considerably reduced. Despite this, the blood clotting time of fruits from 6 months and newborns is close to norm of adults. Bleeding duration also meets standard of adults (2-4 min. after Duke). This results from the fact that the speed of coagulation is defined not only by concentration of separate factors, but also a ratio of their concentration.

Tasks for independent preparation:

1. Solve test tasks and situational problems.
2. Examine and describe in workbooks of the patient with blood pathology.

The scheme of inspection of the child with a blood disease

When collecting the anamnesis to pay attention on:

- diseases of the haematogenic system among family and the immediate family;
- living conditions: family food, production harm;
- number of pregnancies, abortions, abortions; diseases in the pregnancy period, a course of childbirth; time of bandaging of an umbilical cord, blood loss;
- donoshennost and the child's maturity at the birth;
- defects of food, disease (frequency, weight, reaction of the haematogenic system;
- beginning and development of symptoms of a disease.

At objective inspection to pay attention on:

- weight of a state;
- color of integuments;
- presence of hemorrhagic rashes and hemorrhages (their characteristic, quantity, arrangement, depth, dynamics);
- morbidity in bones, a condition of joints;
- condition of the lymphatic device;
- condition of a cardiovascular system;
- sizes of a liver and spleen;
- condition of other bodies and systems.

At assessment of laboratory analyses to pay attention on:

- quantity, size, form, coloring of erythrocytes;
- amount of hemoglobin, SOE, color indicator;
- quantity of reticulocytes, thrombocytes, resistance of erythrocytes; hemorrhagic complex (coagulability, bleeding time);
- hematocrit;
- quantity of leukocytes, leukocytic formula;
- to miyelogramm (total number of blasts, ratio of cells of different sprouts).

AFO OF THE URINARY SYSTEM

Kidneys are located in upper parts of retroperitoneal space. They are covered with the connective tissue capsule, and in front also a serous cover. Substance of a kidney is formed by two layers: cortical (external) and brain (internal) which is divided into segments, the called pyramids. Tops of pyramids (nipples) act in renal cups. A structural and functional unit of renal fabric is the nephron consisting of a vascular ball (glomerula), Shumlyansky-Boumen's capsule, the system of renal tubules (proximal, Henle's loops, distal), collective tubules (though the last morphologically do not treat nephron), blood, absorbent vessels, neurohumoral elements.

Collective tubules, repeatedly merging, form the papillary channel which joins a kidney cup. The general

number of nephrons in both kidneys about 2 million. In them there are difficult processes of formation of urine: glomerular filtration, a canalicular reabsorption (active and passive transport of substances from a gleam of tubules in blood), canalicular secretion (transport of substances from an intercellular lymph in a gleam of tubules).

By the time of the birth the morphological and functional maturing of a kidney is not finished yet. Rather big sizes of kidneys and shorter lumbar department of a backbone cause low topographical arrangement of kidneys at children of the first years of life. At them the lower pole is located below a comb of an ileal bone. This feature disappears by 2 years.

At children of younger age of a kidney are more mobile, than at adults. It is connected with poor development at them pararenal cellulose, before - and pozadipochechny fastion. Forming of fixating mechanisms comes to an end by 5-8 years. In the first years of life of a kidney have the lobular building (disappearing by 2-5 years), the medulla prevails over cortical (1:4).

The full-term newborn has already enough nephrons, and only at premature children their new growth goes still some time after the birth. The number of balls in unit of volume of renal fabric are even more, than at children of advanced age. However at the newborn the balls of kidneys have small diameter, many of them are poorly differentiated and do not function, a capillary network of balls fallen down. The visceral layer of the capsule of Shumlyansky-Boumen covering capillaries glomerul consists of a cubic and cylindrical epithelium which turns into flat more deeply with age plunges between loops of capillaries.

Tubules and Henle's loops – their gleam twice already, than at adults.

The juxtaglomerular device playing an important role in formation of renin and in control of sodium removal is formed by 2 years. Final maturing of cortical substance comes to an end by 3-5 years, and kidneys in general – to school age.

Morphologically immaturity of nephron defines features of function of kidneys of newborns and children of early age.

They have rather low glomerular filtration (especially on the first year of life), at children of the first 3-6 months reabsorbtsionny and secretory functions of kidneys owing to an insufficient maturity of fermental (euzymatic) systems of tubules are limited. Reduced concentration function is explained by immaturity of osmoreceptors, low sensitivity of distal tubules and collective tubules to antidiuretic hormone, the small length of a Henle's loop, low glomerular filtration (and respectively low canalicular filling) and imperfection of regulatory influences of adrenal glands. The concentration ability similar to the adult, kidneys of children reach by 9-12 months. Despite

imperfection of many functions, kidneys of children of the first year of life in physiological conditions at natural feeding support a homeostasis at the appropriate level. However at transfer of the child to artificial feeding, especially in the first days of life, balance of acids and the bases easily moves in the acid party, i.e. so-called physiological acidosis develops.

Owing to imperfection osmo- and volyumoregulation children's kidneys are incapable quickly and to effectively normalize water and electrolytic disturbances. They cannot vigorously remove water at its surplus or save liquid at its shortcoming, is much more active, than at adults, reabsorbirut sodium which is deposited in body tissues. Therefore children easily have both hypostases, and dehydration. It is necessary to remember it when performing infusional therapy.

Rather low and slow excretion by children's kidneys of many substances, including antibiotics, it is necessary to consider at prescription of medicines, saline solutions, etc.

At healthy newborn first 3 days of life of urine it is allocated very little (a tranzitorny oliguria) or it is absent at all (in the first 12 h) that is caused by small intake of liquid in an organism, its extrarenal losses and features of a hemodynamics. Further in connection with metabolic rate and an originality of a diet children allocate urine rather more, than adults. The daily amount of urine at children up to 10 years can be calculated by a formula:

$$600 + 100 (n-1);$$

where 600 – a daily urine of the one-year-old child, and n – age advanced in years.

On the first week of life (3-5th day) at most of newborns the physiological state – an urate heart attack of kidneys – adjournment of crystals of uric acid in a gleam of collective tubules and papillary channels is noted. At this time the catabolic orientation of a metabolism and disintegration of a large number of cells, generally leukocytes which of nucleic acids of kernels are formed many the purine and pirimidinovy bases (the final product of their metabolism – uric acid) are the reasons of the raised discharge of uric acid. The child's urine during this period rather turbid, reddish and brick color, leaving on diapers of a spot of the corresponding coloring.

Urinary tract at children of younger age groups differ in underdevelopment in their walls of muscle and elastic tissue.

Ureters depart from a pelvis at right angle, they are more izvita, gipotonichna, have rather large diameter. These anatomic features of a pelvis and ureters contribute to disturbance of a passage, stagnation of urine and to the subsequent accession of microbic and inflammatory process in overlying departments.

The bladder at children of chest age is located above, than at adults (over a symphysis), with age he gradually goes down in a small pelvis. Its front wall is not covered with a peritoneum

and predlezhit to a front wall of an abdominal cavity. The urethra at girls during all age periods is shorter and wider, than at boys. Its curvature at children of chest age is significant stronger, than at adults. The act of urination in the first months of life is carried out on the basis of congenital unconditioned spinal reflexes. In process of growth and development of the child it turns into any process regulated under a crust and a cerebral cortex. Number of urinations in day at newborns (except the first days of life) – 20-25 times, from 6 months to 1 year – 15-16, in 3 years – 7-8.

RESEARCH TECHNIQUE

INQUIRY

At inquiry of the child and his parents it is necessary to reveal actively the following possible complaints and disturbances of health:

- abdominal pain and lumbar area;
- dysuric disorders (frequent or rare, urodynias, incontinence and not deduction of urine, enuresis);
- hypostases which are quite often considered by parents as fast increase at the child in body weight;
- increase in arterial blood pressure which sometimes is followed by a headache, dizziness, pains in heart;
- change of outward of urine (turbidity, emergence of a deposit, discoloration) and results of the made analyses;
- "unmotivated" temperature rises to febrile figures or long subfebrile condition;
- disorder of vision, hearing;
- dispepsichesky disorders (nausea, vomiting, loss of appetite, diarrhea), thirst, itching of skin;
- weakness, slackness, increased fatigue, indisposition, adynamia, weight loss.

Also specification of the anamnesis of a disease, family, allergological is necessary.

Survey allows to reveal the following pathological signs:

Pallor of integuments (because of a spasm of arterioles or accession of anemia); the wax pallor is characteristic of an amyloidosis of kidneys; pallor with an ikterichny shade – for uraemia (at the same time it is possible to note raschesa, ecchymomas on skin, the laid-over dry language, to feel the ammonia smell proceeding from a mouth or from the patient's skin).

Hypostases (or pastosity) on a face and extremities. Hypostases can be the general, widespread on all body (anasarca), with accumulation of liquid in cavities: belly (ascites), pleural (hydrothorax) in a pericardium cavity (hydrocardia).

Swelling of lumbar area on the party of defeat is observed in a paranephritis.

Changes of behavior of the child during urination: children of chest age express morbidity at urination by the shout arising in time or right after urination. At a hyper reflex form of neurogenetic dysfunction of a bladder the act of urination proceeds a long time, often, in stages. Children resort to pressing by hands on an anterior abdominal wall.

PALPATION

This method is used for detection of hypostases, pastosity of fabrics. Kidneys (is more often right) can be probed at children of the first 2 years of life (especially with subnutrition) owing to rather big sizes and low arrangement. At children of advanced age of a kidney normal are not palpated.

Detection of kidneys at a palpation at children of advanced age demonstrates their increase or shift. The increased kidneys can be probed at inflammation, hydro-, a pyonephrosis, a polycystosis, a tumor, a vicarious hypertrophy of the only kidney. Sometimes it is possible to reveal a nephroptosis (nephroptosis), the di hundred-pyrobathroom or the wandering kidney.

The palpation of a stomach is used for identification of morbidity or sensitivity on the course of ureters which projections to an anterior abdominal wall are upper and lower ureteric points.

PERCUSSION

Effleurage of lumbar area (the modified Pasternatsky's symptom) is used for the identification of morbidity or unpleasant feelings which sometimes are sent to a leg or the lower half of a stomach which can arise when carrying out this research (in this case the symptom is estimated as positive). The positive symptom of effleurage is defined at inflammatory processes in kidneys and pararenal cellulose (pyelonephritis, a paranephritis, etc.), an urolithiasis.

It is possible to determine by percussion height of standing of an upper pole of the filled bladder over a pubis. Percussion only reveal also presence of free liquid in an abdominal cavity

LABORATORY AND TOOL METHODS OF THE RESEARCH

The analysis of urine is the informative test for diagnosis of diseases of an uric system. It includes determination of physical properties, the chemical composition of urine and microscopy of its deposit. Urine of the healthy child transparent, straw-colored color that is caused by existence in it of urochromes, urobilinoid, an uroeritrin and other substances, is more often than subacidic reaction (however normal fluctuations are 5.0-7.0). Its relative density 1005-1028 that depends on age of the child and the water loading changing in physiological conditions. Normal the urocheras contains no more than 3-4 leukocytes under review at boys and 5-6 – at girls; single erythrocytes (0-1 under review), hyaline cylinders can meet (is normal 1-2 under

review). In urine of the healthy child there is no protein (or insignificant quantity – traces), some sugar, salts, bilious pigments, bacteria. Protein in urine is found in most of newborns in the first days of life (physiological albuminuria) owing to hyperpermeability of an epithelium of balls, tubules, against the background of features of a hemodynamics during this period. Disappears by the end of the 1st week, and from 2nd week the presence of protein in urine is considered as pathological sign.

The general analysis of urine gives an approximate assessment of changes of an uric deposit therefore at identification of the last use quantitative tests (Nechiporenko's methods, Addis-Kakovsky, quantitative assessment of a bacteriuria).

Nechiporenko's method: calculation of cellular elements in 1 ml. fresh urine (average portion). **Normal** leukocytes make 0-2000, erythrocytes – 0-1000.

Addis-Kakovsky's method: calculation of cellular elements in daily amount of urine. **It is normal** of leukocytes of 0-2 million, erythrocytes – 0-1 million.

Bacteriological research of urine. Make crops of the morning urine collected in sterile ware. In 24 h carry out quality and quantitative standard of results. Reveal a type of the activator and its sensitivity to antibacterial drugs. The bacteriuria more than 100,000 microbic bodies in 1 ml of urine is pathological.

Functional renal tests. The research of a functional condition of kidneys allows to judge localization and expressiveness of structural damages of their parenchyma.

Function of balls is estimated on the level of creatinine, urea in blood serum, i.e. on ability to an azotovydeleniye, and on the volume of glomerular filtration which is determined by clearance of endogenous creatinine (the modified Reberg's test), i.e. by amount of the blood plasma in milliliters which is completely exempted from this substance in 1 min. **Normal** for children 1 years the glomerular filtration calculated by this method are more senior makes: 80-120 ml/min. x 1.73 sq.m, newborns have 30-50 ml/min. x 1.73 sq.m.

The concentration ability of kidneys reflecting function of a Henle's loop, distal tubules and collective tubules is estimated on the relative density of urine in the single analysis and in test across Zimnitsky which represents determination of amount of urine and its density for day in each 3 h (only 8 portions). The first four portions make a day diuresis, remained – night. Fluctuations of relative density of urine within a day normal are: aged till 1 year – 1005-1016, at children of younger age – 1010-1025, the senior – 1011-1028. A ratio of a day and night diuresis at the healthy child – 3:1 - 4:1.

If necessary perform the profound examination of the child including ultrasonic endoscopic (tsistoskopiya), radiological (a renografiya, excretory urography, an angiography,

etc.), radiological (a renografiya, a nefrostsintigrafiya, etc.) researches and a nefrobiopsiya which allow to specify an anatomic and functional condition of uric bodies, vascular very tectonics and microscopic structure of kidneys.

SEMIOTICS OF DEFEAT OF THE URIC SYSTEM

Emergence of uric, painful, edematous syndromes, dysuric disorders and arterial hypertension most often testify to pathology of bodies of an uric system at children.

Uric syndrome.

Color of urine becomes:

- brown-red (like "meat slops") at a hamaturia;
- very light (as water) in a polyuria of different genesis;
- saturated, yellowy-brown (as "strong tea") at an oliguria, with foam ("beer with yellow foam") in diseases of a liver or at newborns due to hemolysis of erythrocytes;
- dark brown at the states causing the increased disintegration of proteins (fever, heavy infections, a hyperthyroidism).

The uric syndrome provided most often by a leukocyturia, a hamaturia and a proteinuria is, as a rule, the first sign nefro or uropathies.

Leukocyturia – detection in urine of a large number of leukocytes. It is the main symptom of microbic and inflammatory process in uric ways and defeats of tubulointerstitialny tissue of kidneys. In the first case the leukocyturia has neutrophilic character. Its renal origin is demonstrated by leukocytes with the changed form (Shterigeymera-Malbin's cells), active leukocytes (cells with signs of Brownian motion in cytoplasm) and leukocytic cylinders. In the second case (in a glomerulonephritis, hereditary and interstitial nephrites) the leukocyturia has mononuclear character, i.e. in an uric deposit lymphocytes and monocytes prevail. Eosinophils appear in urine in allergic diseases.

The bacteriuria (existence in urine of bacteria) along with a leukocyturia testifies to urinary tract infection. Most often in crops of urine find colibacillus, various strains a protea, a pyocyanic stick and other gram-negative microorganisms, sometimes gram-positive flora. Epithelial cells can get to urine from various sites of uric and also sexual systems. Emergence of cells of a transitional epithelium is characteristic of inflammatory process in a pelvis and a bladder, cells of a prismatic epithelium of renal tubules – of acute and chronic pathological processes in kidneys (a glomerulonephritis, lupoid nephrite, etc.), feverish states, intoxications, infectious diseases.

Hamaturia – existence in urine more than 3 erythrocytes under review in a morning portion or more than 1000 in test across Nechiporenko. It is sign of defeat of balls of kidneys, vessels, is

more rare than tubulointerstitialny fabric and meets in a glomerulonephritis, a nephropathy, hereditary, interstitial, secondary nephrites, a dizmetabolichesky nephropathy, anomalies of renal vessels, hemorrhagic cystitis, pyelonephritises, an urolithiasis, a gemolitiko-uraemic syndrome, tuberculosis, tumors of kidneys.

The expressiveness of a hamaturia is various. If it is found only at microscopy of an uric deposit, then it is a microhematuria if macroscopically it is a gross hematuria. The last is most often observed in an acute glomerulonephritis, a hemorrhagic vasculitis, hemorrhagic cystitis.

Proteinuria – detection of protein in urine (more than 100 mg. in day). It appears at the damage of a basal membrane of capillaries of balls leading to increase in its permeability at disturbance of functional capacity of proximal tubules to reabsorbirivat plasma proteins.

Cylindruria – existence in urine of cylinders (proteinaceous and cellular formation of canalicular origin). Distinguish hyaline, granular and wax-like cylinders. Detection of two last types demonstrates serious damage of kidneys.

Crystalluria – emergence of crystals of salts (urates, oxalates, phosphates) in urine. The isolated crystalluria can come to light at healthy children owing to features of a diet, the insufficient use of liquid or the increased its extrarenal loss at physical activity, during a hot season. The crystalluria which is combined with changes of an uric deposit is more often with a hamaturia, is characteristic of a dizmetabolichesky nephropathy and an urolithiasis.

The oliguria (reduction of a diuresis up to 20-30% of norm) or an anury (about 6-7% of norm) results from decrease or complete cessation of formation of urine kidneys because of falling of glomerular filtration, a neuroreflex spasm or an obstacle to outflow in the lower uric ways. Most often these symptoms reflect development of the acute renal failure (ARF).

Polyuria – increase in a daily urine by 1.5 times and more in comparison with norm. In physiological conditions the polyuria is a consequence of the excessive use of liquid (polydipsia), coolings of an organism. Comes to light at patients with diabetes, the chronic kidney disease (CKD), OPN (in a diuretic phase, at convalescents), after feverish states, at a convergence of hypostases

The nocturia – prevalence of a night diuresis over day, demonstrates lengthening of operating time of kidneys owing to falling of their function.

Changes of relative density of urine reflect disturbance of ability of kidneys to concentrate and dissolve urine.

The hyposthenuria the maximum relative density of urine makes 1008 and below. In most cases it accompanies a polyuria and is noted at the same physiological and morbid conditions.

Hyposthenuria combination to a polyuria and nocturia – characteristic sign of functional insufficiency of kidneys.

The isosthenuria – fluctuation of relative density of urine within 1010-1012, i.e. it is equal to the relative density of a protein-free filtrate of plasma.

The isosthenuria develops in the profound nephrosclerosis which is a final stage of many chronic diseases of kidneys.

The high density of urine (1030 and more) is observed at restriction of drink, high temperature of air, diabetes.

Dysuric disorders – disturbance of the act of urination (frequent, urodynias, incontinence or not deduction of urine, an urination delay). The speeded-up urinations (pollakuriya) are inherent in the small portions - "drops" to infections of lower parts of uric ways, neurogenetic bladder dysfunctions. In the first case of urination can be painful, sometimes at the end of their gripes amplify (for example, in acute cystitis).

Pains during urination in lumbar area and in one of half of a stomach, sharp or stupid, recurrent – sign of a vesicoureteral reflux.

Urine incontinence (urine is emitted without desire to urination) and urine not deduction (the child has a desire to urination, but he is not able to hold urine) arise in the chronic started cystitis, a hyper reflex form of neurogenetic dysfunction of a bladder, injury of a spinal cord.

Enuresis (bed wetting) is noted in an organic lesion of nervous system and also in malformations and inflammatory diseases of an uric system.

Delay of urination (ischuria). The sharp ischuria arises in a paraphimosis, urethra stones, a complete traumatic separation of an urethra. The chronic ischuria at which are observed urination delay, its performance in several stages, intermittence of a stream is characteristic of a hyporeflex form of neurogenetic dysfunction of a bladder, an ureterohydronephrosis, a vesicoureteral reflux.

Extrarenal manifestations of diseases of an uric system most often are hypostases and arterial hypertension.

Digestion in the periods of a neonatality and chest age

The Laktotrofny and mixed food.

Milk or laktotrofny food – extremely important period in the child's life. Only this type of food can provide the growing organism with necessary plastic and energy resources in the conditions of even insufficiently developed digestive device. Milk food is the intermediate stage between pre-natal food and definitivny food. Through milk the communication of an organism of the child with mother is carried out that is important not only in supply of nutrients to the child's

organism, but also his host defense (in forming of resistance to infections). With mother's milk the child receives vitamins, enzymes, mineral salts, physiologically active agents therefore premature deprivation of the child of maternal milk – the tragedy for the child. Milk cannot be completely compensated by artificial feeding.

But for the increasing plastic and energy demands of children of 5-6 months there is not enough maternal milk any more therefore gradually increasing feeding up – transition to the mixed feeding begins with this age. The beginning of a feeding up coincides with forming of mechanisms of digestion and nutritive absorption of not milk food. On the other hand, introduction of feedings up accelerates development of digestive system and adaptation of its activity to definitivny food.

The first 2 days after the delivery mammary glands of mother emit dense viscous liquid – colostrum. It differs from mature milk in high content of proteins (including globulins), irreplaceable amino acids and salts, the smaller content of carbohydrates and fats. Generally oleic acid which in comparison with other fatty acids is easier acquired by children is a part of fats of colostrum. Existence in colostrum of antigens is important for forming of immunity of the child. From the 2-3rd day, colostrum passes into colostric milk, from 4-5 in the afternoon – into transitional milk, and about 2-3 weeks – into mature milk. These terms are non-constant. Caloric content is 1 l of female milk about 700 kcal.

Suction – the reflex act caused by mechanical irritation of receptors of lips. The sucking reflex is formed in ontogenesis very much early. Its signs are available for fruits of 13 weeks. The irritation of flavoring receptors is of great importance for emergence of suction and salivation. They function right after the birth though the flavoring sensitivity at this age is lower, than at adults.

Autolytic digestion.

Autolytic and own digestion participates in hydrolysis of nutrients of breast milk in a GIT of the child. Autolytic digestion at laktotrofny food is made by the enzymes which are contained in milk. Milk, especially colostrum, contains a number of enzymes, including hydrolytic. Enzymes of milk are synthesized by mammary glands, transported from mother's blood where are delivered by her digestive glands and also released from uniform elements of milk, especially from leukocytes.

Milk has high lipolytic and esterazny activity. The activity of lipases of milk increases in the child's stomach. They hydrolyze milk triglitserina in the wide range. Milk, in particular colostrum, has amylolytic activity, contains in them several isoforms of amylase, several proteases most of which part belongs to peptidases and also phosphatases and other hydrolases.

With increase in term of a lactation up to 8-9 months the content of enzymes in milk gradually decreases.

Autolytic digestion has essential value in the first day and weeks after the birth. At reduced enzymatic activity of milk growth and development of the child are delayed. Further more and more the role of own digestion raises.

Own digestion. Saliva role.

Sialadens of the newborn excrete not enough saliva. From 4-month age the volume of a sialosis increases and by 1 year reaches 150 ml a day (about 1/10 secretions at adults). Early transition to the mixed food increases sialosis volume. It considerably amplifies also in the period of a teething (physiological hypersalivation).

The baby's food – milk, and one of prescribing of saliva is moistening of food. Naturally, saliva does not perform such function at babies, but she participates in other processes. The tightness of contact of lips of the child with a breast is necessary for effective suction. Such tightness is provided with wetting of the place of contact by saliva. Salivation disturbance (and also passability of a nose) does the act of suction defective or impossible. Saliva and in digestion of milk is important. Though the enzymatic activity of saliva of newborns is low, its action on milk promotes its curdling in a stomach with formation of small flakes that facilitates casein hydrolysis. Activity of amylase of saliva at newborns low (about 1/3 levels of adults). It raises in the second half of the year and reaches the level of adults within 1-2 years after the birth. Below, than at adults, and activity of lysozyme (muramidaza).

Digestion in a stomach.

At newborns the stomach has rounded shape. By 1st year it becomes oblong, and gets the form characteristic of the adult only by 7-11 years. Capacity of a stomach of newborn 5-10 ml. Capacity of a stomach increases in the first weeks to 30-35 ml, by the end of the year - to 250-300 ml. The mucous membrane less folded, is more gentle and thinner, than at adults. Tubular glands shorter and have wider gleam. As a part of glands there are less glandulotsit. Stomach contents only of the been born child can be alkalescent, neutral or subacidic (rn about 6). The stomach contains any given amount of amniotic liquid. In the first 6-12 h rn quickly decreases (to 1-2), and then accrues (up to 4-6) by the end of the week. Further rn again gradually decreases and by the end of the 1st year becomes equal 3-4. The acidity of gastric juice in the early post-natal period is generally caused not by hydrochloric, but lactic acid. Development of secretion of hydrochloric acid depends on food type. The acidity of juice is minimum when feeding by maternal milk. It increases approximately twice at the mixed feeding, and at early transfer to artificial feeding increases by 2-4 times. Enzymes of gastric juice at this age are adapted to casein

hydrolysis: it is split with greater speed, than other proteins. Proteins of plant origin in the first 2 months after the birth are practically not split, this ability appears at the age of 2-3 months since 4 months it has high rates. Proteins of meat begin to be digested gastric juice still later - at the age of 5-6 months, this activity becomes well-marked at 7 months of children.

Since the neonatality period until the end of the 1st year of life the proteolytic activity of gastric juice increases by 3 times, but remains twice lower, than at adults. Glands of a stomach cosecrete several isoforms of a pepsinogen. Discharge glands of a stomach of fetal pepsin is characteristic of newborns (an optimum m 3.5). It has by 1.5 times bigger ability to curdle milk, than pepsin. To 2-month age discharge of fetal pepsin decreases, the leading role in proteolysis passes to pepsin and gastricsin.

Gastric juice of newborns has rather high lipolytic activity, it hydrolyzes the emulsified milk fats.

The cardial sphincter of newborns has a low tone owing to what they note a gastroezofagalny reflux and vomiting. The motor periodical press of a stomach on an empty stomach at newborns is absent that is connected with immaturity of nervous regulatory mechanisms. There are only weak continuous reductions of a stomach. Evacuation of contents of a stomach after feeding of the child breast milk happens for 2-3 h. It determines the frequency of feedings. Nutritious mix with cow's milk of the same volume at artificial feeding is late in a stomach longer – 3-4 h.

Digestion in a small intestine.

Intestines length at children in relation to length of a body is more, than at the adult, and depending on age this ratio makes: at newborns – 8.5:1; in 1 year – 7.5:1; at adults – 5.5:1. The mucous membrane thinner and gentle, is less than fibers, than at adults. At newborns is them 7-12, and at adults – 30-40 on 1 mm². The muscular coat of intestines at newborns is developed poorly, forming of intramural nervous system is not finished, it continues up to 3-5 years.

Formation of secretion of enzymes of a pancreas happens not at the same time. At the age of 2 years the secretion of both proteases, and amylase and a lipase is well stimulated. The volume of pancreatic secretion by the end of the 1st year increases by 10 times, and amylase discharge - by 25 times. With age secretion of trypsinogen, chymotrypsinogen, a lipase, phospholipase and peptidases increases. Transition on mixed, and especially on artificial feeding strongly increases both the secretion volume, and a fermentovydeleniye.

The liver of the newborn child is rather big and makes about 4% of body weight (adults have 2-3%). Within 1 year the mass of a liver doubles. The gall bladder at newborns is small and narrow, stuffed up deeply in a liver parenchyma. At the newborn the bile production happens

rather intensively – on 1 kg. the body weight of bile is allocated 4 times more, than at adults, but the absolute amount of bile is small and with age increases. In bile of children the concentration of bile acids, cholesterol and salts is lower, but in it there are more mucin and pigments, than at adults. In bile of children it is rather more taurocholic, and in bile of adults - glycocholic acid. Poverty of bile of children sometimes is bile acids the reason of insufficient digestion of fats and emergence them in Calais (steatorrhea), especially at an early feeding up milk.

The mucous membrane of a small intestine of newborns has high enzymatic activity. At the expense of it the child of the 1st year intensively has a membrane digestion, compensating low intensity of band digestion. At children of early age has bigger, than at adults, the value is intracellular digestion. Within 1 year there is a fast development of digestive glands and the band digestion provided with their secrets combined with membrane. In the early period of the childhood still high-permeability of a mucous membrane of a small intestine, a number of high-molecular substances of food, including proteins, can be transported from an intestines cavity in a blood stream.

Lactase of a small intestine splits lactose by means of membrane digestion on monomers – glucose and a galactose which are soaked up in blood. Cow's milk contains more hydrolyzable lactose, than women's. Absorption of products of its hydrolysis happens in proximal department of a small intestine. And in a large intestine lactose does not come to its distal department, but it is necessary for development of normal intestinal microflora which lack leads to development of dysbacteriosis. Intestinal peptidases by membrane digestion hydrolyze oligo- and the dipeptides which are formed of proteins of milk under the influence of proteases of gastric and pancreatic juice. Proteins of female milk are digested and soaked up in intestines more stoutly (90-95%), than cow (60-70%).

The role of intestinal digestion is big also in hydrolysis of the fats which are especially containing fatty acids with a long carbon chain. Hydrolysis of these fats is carried out by a pancreatic lipase in the presence of bile acids. Fats of female milk are acquired for 95%, and cow – in smaller quantity because of the low content in bile of bile acids.

Processes in an oral cavity.

In the first months after the birth the teeth are under a mucous membrane of gums. In the beginning cutters, medial, then side – from 6 to 12 months, then – the first painters – from 12 to 16 months, canines from 16 to 20 months, the second painters - from 20 to 30 months are cut through. These are milk teeth, later they drop out and are replaced with constants.

Secondary dentition begins at children from 5 years (first painters). Cutters are cut through in 6-8 years, canines – 10-11, painters - 9-12, the second painters - 12-13, the third painters – ("wisdom teeth") – 18-25 years. Due to the acceleration the teething can occur in earlier terms.

Secretion of sialadens increases up to 10 years, the amylolytic activity of saliva sharply increases in age of 1-4 years. At the age of 10-14 years the salivation varies over a wide range. The amylolytic activity of saliva at boys is higher, than at girls of the same age.

Digestion in a stomach.

With age the weight and the area of a mucous membrane of a stomach increases. With age the volume of secretion of gastric glands on an empty stomach and especially effect of stimulation of secretion increases. With age also the intensity of secretion of pepsinogens stomach glands increases.

Digestion in intestines.

With age digestion in a small intestine is improved. In band digestion especially important is a pancreas juice role, its secretory activity increases, by 6-9 years of the maximum sizes amylolytic and its lipolytic activity reaches. With age also bile production volume increases. Stage of latency of reduction of a gall bladder is shortened. In bile the amount of bile acids increases that does more effective digestion of fats. Vesical bile at children of the first years alkaliescent, later – subacidic or neutral (pH 6.0-7.0).

Secretion of intestinal juice and activity in it hydrolytic enzymes amplifies. Digestion becomes more and more active in an initial third of a small intestine, and its distal department gains value of a reserve zone. At the same time the permeability of a mucous membrane of a small intestine and absorption of high-molecular substances in blood and a lymph decreases. Processes in a large intestine after transition to definitivny food generally proceed, as at adults.

Tasks for independent preparation:

1. Solve test tasks and situational problems.
2. Examine and describe in workbooks of the patient with pathology of a GIT, blood or an urinary path.

The scheme of inspection of the child with a disease of the digestive system and urinations.

When collecting the anamnesis to pay attention on:

- type of feeding;
- appetite of the child;

- existence of vomiting, vomiting;
- increase in body weight;
- nature of a chair;
- nature of urination (painful, rare, frequent)

At objective inspection to pay attention on:

- condition of a mucous membrane of an oral cavity;
- quantity and dental health;
- child's language (size, nature of a plaque);
- condition of food of the child, turgor of soft tissues, pastosity, hypostases;
- form and size of a stomach;
- sizes of a liver, spleen (density, morbidity);
- nature of a chair;
- existence of a symptom of Pasternatsky;
- examine external genitals, to children of the pubertal period make a sexual formula.

At assessment of laboratory analyses to pay attention on:

- indicators of complete blood count test (quantity of erythrocytes, Nv, leukocytosis, leukocytic formula, SOE);
- data of the general analysis of urine (existence of bacteria, protein content, morphology of an uric deposit);
- data of uric tests (the analysis on Nichiporenko, Zimnitsky);
- biochemical blood test (bilirubin, its fractions, transaminases, amylase, protein, its fractions, creatinine, urea, residual nitrogen, etc.)
- data of fractional gastric and duodenal development;
- these koprogramma;
- research a calla on microflora (content of saprophytic, pathogenic intestinal microflora);
- data of ultrasonography of kidneys, liver and biliary tract, pancreas;
- X-ray inspections (excretory urography, miktsionny tsistografiya, cholecystography).

Situational tasks

Task No. 1

Blood test of the child of 10 months:

Ayr-4.5 x 10¹²/l, Nv-120 of g/l, Ley-10.5 x 10⁹/l, e e-2, p/ya-7%, s/ya-32%, l/ts-55%, m/ts-4%, mm/hour SOE-15.

Task: interpret the analysis.

Task No. 2

Blood test of the child of 8 years:

Ayr – $3.2 \times 10^{12}/l$, Nv – 90 g/l, Ley – $5.5 \times 10^9/l$, e e-3, p/ya-3%, s/ya-24%, l/ts-58%, m/ts-8%, plasmocytes – 4%, SOE – 10 mm/hour.

Task: interpret the analysis.

Task No. 3

Blood test of the child of 12 years:

Ayr – $4.2 \times 10^{12}/l$, Nv – 100 g/l, Ley – $8.5 \times 10^9/l$, Trb-98 $\times 10^9/l$, e e-10, p/ya-3%, s/ya-54%, l/c of 27%, m/ts-6%, SOE – 21 mm/hour.

Task: interpret the analysis.

Task No. 4

General analysis of urine of the child of 10 years:

Quantity – 100.0, transparency – muddy, color – straw-colored, ud. weight – 1018, protein – 0.3%, an epithelium – single in p/zr., leyk. – 2-1-2-2 in p/zr., Ayr. – 10-15-8-10 in p/zr., lixivious.

Task: interpret the analysis.

Task No. 5

General analysis of urine of the child of 8 years:

Quantity – 100.0, transparency – muddy, color – yellow, ud. weight – 1010, protein of-0.03 ‰, an epithelium – a large number in p/zr., leyk. – 12-20-18-15 in p/zr., Ayr. – 1-0-1-1 in p/zr.

Task: interpret the analysis.

Task No. 6

The analysis of urine across Nechiporenko the child of 3 years:

Leukocytes – 4500

Erythrocytes – 850

Cylinders – 10

Task: interpret the analysis.

Task No. 7

The analysis of urine across Nechiporenko the child of 5 years:

Leukocytes – 1500

Erythrocytes – 2550

Cylinders – 40

Task: interpret the analysis.

Task No. 8

The analysis of urine across Zimnitsky the child of 4 years:

6 h – 50.0 - 1008 18 h – 150.0 - 1010

9 h – 100.0 - 1005 21 h – 100.0 - 1014

12 h – 80.0 - 1011 24 h – 30.0 - 1015

15 h – 120.0 - 1012 3 h – 20.0 - 1009

Task: interpret the analysis.

Test control.

1. Hemoglobin level of g/l right after the birth of the child is:

1) 90-110

2) 120-140

110-130

3)

4) 180-240

5) 160-180

2. Hemoglobin level of g/l at children is more senior than 1 year is:

1) 90-110

2) 100-130

3) 120-140

4) 160-180

5) 180-240

3. The quantity of lymphocytes (in %) at children of 4-5 years is:

1) 10-15

2) 20-30

3) 30-40

4) 40-45

5) 50-60

4. The quantity of neutrophils (in %) at children of 4-5 years is:

1) 10-15

2) 25-30

- 3) 30-40
 - 4) 40-45
 - 5) 60-70
5. The quantity of reticulocytes (in ‰) at children are more senior than 10 days is:
- 1) 0-3
 - 2) 3-5
 - 3) 5-10
 - 4) 10-15
 - 5) 40-60
6. Feature of function of tubules of kidneys at children is:
- 1) the reabsorption is raised, secretion is reduced
 - 2) the reabsorption is reduced, secretion is increased
 - 3) both functions are reduced
 - 4) both functions are increased
7. The amount of urine from amount of the drunk liquid at children normal is:
- 1) 20-30%
 - 2) 30-40%
 - 3) 40-55%
 - 4) 55-65%
 - 5) 70-75%
 - 6) 85-90%
3. The number of urinations at the newborn child is:
- 1) 3-4
 - 2) 5-10
 - 3) 10-15
 - 4) 20-25
8. The size of glomerular filtration normal at children is more senior than 1 year is:
- 1) 150-170 ml/min.
 - 2) 120-150 ml/min.
 - 3) 80-120 ml/min.
 - 4) 50-70 ml/min.
 - 5) 30-60 ml/min.

9. Features of renal balls at children in comparison with adults:

- 1) by the size are big, quantity they are unit surfaces more
- 2) by the size are big, the quantity is unit surfaces less
- 3) by the size are small, the quantity is unit surfaces less
- 4) by the size are small, the quantity is unit surfaces more

10. Vsasyvatelny ability of a small intestine at children in comparison with adults:

- 1) more
- 2) it is less
- 3) same

11. Length of a small intestine concerning body weight at children of early age in comparison with adults:

- 1) more
- 2) it is less
- 3) same

12. The tendency of children of the first year to vomiting is explained by the fact that:

- 1) the stomach is located vertically
- 2) the cardial department of a stomach is well developed
- 3) the greater cul-de-sac lies above an antral piloricheskogo of department
- 4) the peloric department of a stomach is well developed

13. In the course of digestion of food at children of the first weeks of life plays an important role:

- 1) intestinal microflora
- 2) band digestion
- 3) membrane digestion

14. Feature of a small intestine at children of early age in comparison with adults is:

- 1) smaller intestinal glands
- 2) adenoid tissue is not grouped
- 3) few absorbent vessels
- 4) permeability mucous above

**Class in a subject:
"FEEDING".**

I. Scientific and methodical justification of a subject:

The state of health of the child, his physical and psychological development in many respects is defined by the nature of its food. Quantitative and qualitative full value of food, since the birth moment, correctness and timeliness of introduction of feedings up – a necessary condition for forming of the healthy person.

II. Purpose of activity of students.

The student has to know:

- anatomo-physiological features of digestive organs at children;
- value of natural feeding for normal development of the child;
- composition of colostrum and mature female milk;
- technology of carrying out natural feeding;
- reasons of a hypogalactia and methods of treatment;
- types of artificial mixes;
- technology of the artificial and mixed feeding;
- ways of calculation of daily volume of food of children of the first year of life;
- the daily needs for the main ingredients of food and calories at different types of feeding of the child on the first year of life;
- rules of introduction of a feeding up;
- features of feeding of children with anomalies of the constitution, rickets, anemia.

The student has to be able:

- to estimate physical and psychological development of the child;
- to estimate food of the child of the first year of life;
- to calculate the daily volume of food and amount of milk (mix) on one feeding, to make the approximate menu for one day;
- to calculate the daily need for the main ingredients of food and calories to the child of the first year of life;
- to carry out control feeding;
- to carry out correction of food of the child of the first year of life;
- to appoint treatment at a hypogalactia;
- to calculate the needs for the main food ingredients and calories a day, to make the approximate menu for one day to the child years are more senior;
- to make a food allowance to children with rickets, anomalies of the constitution and anemia.

III. Content of training:

1. Concept the natural, mixed and artificial feeding.
2. Lactation. The factors affecting lactic ability of a mammary gland.
3. Colostrum, transitional and mature milk (structure, caloric content, value in the course of feeding).
4. Advantages of natural feeding of the child.
5. Technology of carrying out natural feeding.
6. Difficulties at natural feeding from the child and mother. Contraindications to breastfeeding.
7. The daily need for the main ingredients of food and calories of the child of the first year of life depending on feeding type, correction of food.
8. Hypogalactia (definition, reasons, classification, treatment methods).
9. Rules, terms of introduction of a feeding up.
10. Features of feeding of premature.
11. Indications for the translation on mixed and artificial feeding, technology of carrying out.
12. Characteristic of substitutes of maternal milk.
13. Food of children after a year.
14. Feeding habits of children with rickets, anomalies of the constitution, anemia.

IV. Educational material security.

1. Visual aids: tables, schemes, multimedia presentations, videos, audiogramma.
2. Educational medical documentation (case histories, laboratory researches, roentgenograms).
3. Technical means of training.
4. Literature.

V. List of references:

1. Propaedeutics of children's diseases / to N.A. Geppa. – M.: GEOTAR-media, 2009. – 464 pages.
2. Propaedeutics of children's diseases/T. V. Kapitan. – M.: MEDpress-inform, 2009. – 656 pages.
3. Propaedeutics of children's diseases/Ampere-second. Kalmykova. – M.: GEOTAR-media, 2010. – 920 pages.

4. Pediatrics: The textbook for medical schools. Under the editorship of N.P. Shabalov. – SPb: SpetsLit, 2006. – 895 pages.
5. Children's diseases: the textbook / under the editorship of A.A. Baranov. – M.: GEOTAR-media, 2009. – 1008 pages.
6. A.V. Mazurin, I.M. Propedevtik's Baneberries of children's diseases. – Volume, 2009. – 505 pages.
7. Z.D. Kaloyeva, K.M. Dzilikhova, S.K. Karyaeva, etc. Background diseases of children of early age. Manual for students. – Vladikavkaz, 2011. – 64 pages.
8. Z.D. Kaloyeva, K.M. Dzilikhova, S.K. Karyaeva, etc. Technique of a research of the child. The study guide for students. – Vladikavkaz, 2011. – 51 pages.
9. Lectures on pediatrics.
10. Methodical instructions for out-of-class work of students 4 courses of medical faculty on discipline "Pediatrics".

VI. List of questions for check of initial level of knowledge:

1. Anatomico-physiological features of digestive system at children.
2. Features of digestion at premature.
3. What is "lactation"? What factors affect lactation ability of a mammary gland.
4. Call the main stages of formation of a lactation (colostrum, transitional and mature milk). What value do they have in the course of feeding?

VII. List of questions for check of final level of knowledge:

1. Give definition to concepts the "natural", "mixed" and "artificial" feeding.
2. What advantages does feeding of the child breast milk have?
3. Describe technology of applying of the child to a breast.
4. What difficulties from the child and mother can arise at natural feeding?
5. List contraindications to breastfeeding.
6. Call the daily need for the main ingredients of food and calories of the child of the first year of life depending on feeding type.
7. What is "hypogalactia"? Give basic reasons of its emergence. What methods of treatment are applied at a hypogalactia?
8. Call terms and rules, introductions of a feeding up.
9. Call features of feeding premature.
10. Call indications for transfer to the mixed and artificial feeding.

11. Give characteristic to milk mixes for baby food.
12. Tell about food of children after a year.
13. What features food of children with rickets, anomalies of the constitution, anemia has.

Information block

Balanced diet of children – the important condition providing the correct physical and mental development, immune responsiveness and substantially the defining wellbeing of an organism during all subsequent life. The child of the first year of life feels special need in a full-fledged diet in connection with the intensive growth, rapid psychomotor development and forming of all bodies and systems.

FEEDING OF THE HEALTHY CHILD OF THE FIRST YEAR OF LIFE

Depending on whether the child receives maternal milk and in what quantity, allocate three types of feeding: natural, artificial and mixed.

NATURAL FEEDING

Natural feeding is food of children of chest age maternal milk with introduction of a feeding up from 5th month. At the same time the content of maternal milk in a daily diet has to be not less than 4/5. This type of feeding is most physiologic, its advantages are undoubted as on the structure maternal milk approaches composition of fabrics.

The most important advantages of female milk is the following:

- Female milk is completely deprived of antigenic properties while proteins of cow's milk have pronounced antigenic activity that promotes emergence and strengthening of allergic reactions in babies. Refusal of breast milk in the presence at the child of allergic reactions – the gross blunder though quite often the translation of the child with allergic reactions to artificial, usually acidified milk formulas as though gives positive effect: manifestations of exudative diathesis abate for some time. And all are happy – "cured an allergy". Actually at the same time exclude that allergen which arrived to it through maternal milk from food of the child. In this situation it was necessary to find and exclude the allergen causing reaction in the child from mother's diet and it is obligatory to maintain natural feeding.
- The total amount of protein in breast milk is much less, than in cow, on structure it is close to proteins of cells of the child. In it fine fractions, particles of coarse-dispersion protein of casein several times more small, than in cow's milk prevail that provides curdling of breast milk in a stomach with more gentle flakes and by that its easier digestion.

- Female milk contains unique substance taurine. It is the sulfur-containing amino acid having neuroactive properties.
- At artificial feeding, when feeding inevitably there are proteinaceous overloads as cow's milk contains 3 times more amino acids. These overloads are followed by intoxication leading to delay of development of central nervous system of the child and also damage of kidneys because of disturbance of exchange processes. It is known that at the school students who were within 4-9 first months of life on natural feeding, intellectual opportunities are higher in comparison with other children.
- Female milk, especially the colostrum which is emitted in the first 3-4 days after the delivery is very rich with immunoglobulins, mainly class A, and 90% are the share of secretory to IGA which plays a fundamental role in local immunity of digestive tract of newborns. Leukocytes of breast milk synthesize interferon; milk contains a large number of macrophages, lymphocytes, and the level of lysozyme is 300 times higher, than in cow's milk. Also the antibiotic lactoferrin is a part of female milk. Thanks to it natural feeding provides formation of immunobiological protection of the baby in this connection, the incidence and mortality among the children receiving maternal milk are much lower, than among the children who are on artificial feeding.

Quite often obesity of adults originates in the period of early children's age. Artificial feeding promotes obesity of babies. At many of them during puberty the secondary obesity remaining during all life is observed, generally it is connected with a proteinaceous reforge too.

- The amount of fat in female and cow's milk is almost identical, but there is a considerable difference in its Ingredients: breast milk contains several times more unsaturated fatty acids. The dyslipidemia which big role in emergence, is played by lack of breast milk in the child's diet, especially in the first 5 months of life is the cornerstone of development of atherosclerosis of adults. The lipolysis at babies begins in a stomach under the influence of a lipase of breast milk; it stimulates emergence of actual acidity in a stomach, promotes regulation of its evacuatory function and earlier discharge of pancreatic juice. All this facilitates digestion and digestion of fat which separate components are a part of cells of all fabrics and biologically active agents, are spent for myelination of nerve fibrils, providing the increased need for fats of the child of the first year of life.
- Carbohydrates in breast milk contain in rather large number. They substantially define microbic flora of intestines. β -lactose (up to 90%) which together with oligoaminosaccharida stimulates growth of normal flora with prevalence of bifidobacteria is their part, suppressing thereby proliferation of pathogenic microorganisms and colibacillus. Besides, β -lactose participates in synthesis of vitamins of group B.

- Exclusively richly female milk various enzymes: amylase, trypsin, a lipase (it is more a lipase in breast milk, than in cow, almost by 15 times, and amylases - by 100 times). It compensates temporary low enzymatic activity of a GIT of the child and provides assimilation of quite large volume of food.
- Mineral composition of food, the maintenance of microelements in it is important for the growing organism. Concentration of calcium and phosphorus in breast milk is lower, but they are acquired twice better, than the same microelements from cow's milk. Therefore at natural feeding children much easier and less often have rickets. The maintenance of microelements (sodium, magnesium, chlorine, iron, copper, zinc, cobalt, sulfur, etc.) in breast milk corresponds to needs of the child. For example, female milk of iron contains 0.5 mg/l, and in milk mixes – 1.5 mg/l, however degree of bioavailability makes respectively to 50 and 5. For this reason the children who are on natural feeding have anemia much less often therefore there is no need to add to their diet iron up to 6 monthly age. At artificial feeding appoint in addition iron from 4-month age usually in the form of the foodstuff enriched with this microelement. In breast milk of sodium contains 4 times less, than in cow. Excess loadings sodium can be the causes of vegeto-vascular dystonia with fluctuations of arterial blood pressure during puberty and also heavier and more frequent crises in a hypertension of the adult.
- Breast milk differs from cow in higher content and higher activity of vitamins, in particular vitamin B metabolites that also promotes prevention of rickets.

At artificial feeding the gastric secretion increases by 5 times, i.e. the programmed course of biological clock of maturing is broken. Further it contributes to the development a diskinezy GIT, gastroduodenit, cholecystitises, especially with genetic predisposition.

It is established that at the adults who were in chest age on natural feeding the sexual potency is better, the fertility is higher. The players of female milk are changed in the presence of in utero the arisen diseases that is considered as compensatory reaction to development of pathology of a fruit.

At natural feeding the fixed attitudes towards mother and her subsequent influence on the child are put for life and also future parental behavior of the child is formed. As showed observations, at the animals raised from a small bottle, the parental behavior is sharply perverted: when they become adults, refuse to feed the posterity. Therefore the great value to natural feeding is attached by the psychologists dealing with issues of the family relations. Thus, the refusal of natural feeding is the worst disturbance of the biological chain which developed in evolution "pregnancy-childbirth-lactation".

In conclusion it is necessary to add that mammary glands at the nursing mother, as well as a placenta at the pregnant woman, are the most powerful barrier which is extremely seldom passing microorganisms, salts of heavy metals and other substances, harmful to the child. Therefore recommendations need to belong rather carefully to it, for example, as refusal of natural feeding and conversion of the child to milk mixes because of an adverse ecological situation in this area.

Rare applying of the child to a breast further, a breastfeeding regulation, purely technical approach to control of process of a lactation. The insufficient lactation is not a contraindication to frequent applying to a breast. On the contrary, more frequent feeding, in 2-2.5 h without night interval is recommended. Frequent and unlimited feeding by a breast in the first 2 weeks of life (on average 9 times a day) considerably increases a lactation. In the 80th years in many developed countries began to refuse a strict regulation of breastfeeding. It is impossible to attach too great value to amount of the exhausted milk, especially at single control feeding as the appetite of children during the day can be various. Besides, structure of female milk, and, therefore, and the need for it differ in extreme variability: for example, the protein content in milk of different women fluctuates from 0.9 to 2 gr. in 100 ml. The composition of tissues of the child is individual, and milk of his mother always suits it, but can not suit other child. Therefore feeding of children donor milk is not absolutely identical natural.

As a rule, at mother in mammary glands so much milk how many it is required to the child is formed. It is better to feed from both glands, especially if there is not enough milk as it stimulates a lactation and also reduces risk of a laktostaz. If after feeding in mammary glands there is a milk, it is necessary to decant it until it flows a stream (but it is not allocated with drops).

Treatment of a hypogalactia: niacin, vitamin E, Ural federal district, UVCh, influence by ultrasound, vibration massage, acupuncture, compresses from the terry fabric moistened with hot water on mammary glands. Use phytotherapy: broth of leaves of a nettle on 1 tablespoon 3 times a day (4-5 tablespoons of a nettle are made in 1 l. waters); hawthorn extract till 20-30 drops 3-4 times a day to food within 10-14 days. Use infusions of roots of a dandelion, marjoram ordinary, fruits of fennel, an anise.

Calculation of necessary volume of food happens at insufficient increase of body weight of the child or his concern during the period between feedings.

It is required to determine a food dose also when feeding by the decanted milk and its substitutes.

The easiest way of calculation of amount of the milk necessary for the newborn in the first 9 days of life, is following: on single feeding 10 ml are required. milk, increased on the date of life (at 6-7 single feeding). From the 10th to the 14th day the daily volume of milk remains invariable. From 2-week age the necessary amount of milk is defined taking into account the daily need for calories on each kilogram of body weight.

The daily need for kilocalories on 1 kg. makes body weights:

The I quarter – 120 kcal/kg;

The II quarter – 115 kcal/kg;

The III quarter – 110 kcal/kg;

The IV quarter – 100 kcal/kg.

Knowing age and body weight, it is possible to calculate amount of milk which is required to the child in day (X). For example, the child at the age of 1 month has the body weight of 4 kg., and, therefore, needs in 500 kcal a day; 1 l. breast milk contains 700 kcal. Therefore,

$$X = \frac{500 \times 1000}{700} = 710 \text{ ml.}$$

It is possible to use also less exact, but by simpler method of calculation for volume from body weight. According to it the child has to receive milk aged:

from 2 to 6 weeks – 1/5 from body weight,

of 6 weeks up to 4 months – 1/6 from body weight,

from 4 to 6 months – 1/7 from body weight,

from 6 to 9 months – 1/8 from body weight,

from 9 to 12 months – 1/9 from body weight.

Daily volume of food of children of the first year of life should not exceed <i>1000 ml.</i>
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The mode of feeding is set depending on age of the child and amount of milk at mother, considering at the same time individual needs of the child and other moments. In the first 3 months of life of healthy full-term children 7 times, i.e. each 3 h with a 6-one-hour night break feed. If the child maintains longer period between feedings, it is transferred to 6 and 5 single feeding.

From 5 months most of children feed 5 times a day.

FEEDING UP

From 4th month of life include fruit and vegetable juice in food – in the beginning on several drops, gradually increasing volume.

Further the amount of juice is calculated according to the scheme: the age of the child in months increased by 10. As a rule, begin with apple juice.

After 5 months it is possible to enter other juice – carrot, garnet, cabbage, blackcurrant, etc. Lemon juice can also be given from 4th month of life, but in smaller volume: in the first half of the year about 5 ml, in the second – on 10 ml a day. From a citrus children can appoint juice of grapefruits even with allergic mood.

From 4.5 months, except juice, it is possible to enter the homogenized fruit puree as homogenization of food considerably increases the surface of contact of food particles with enzymes into a diet, accelerating thereby digestion and assimilation of feedstuffs.

Feeding up – introduction of the new food which was more concentrated and caloric which gradually and consistently replaces feeding with a breast. In 5-6 months the first feeding up is entered in the form of vegetable puree for the purpose of a covering first of all of micronutrient deficiency. For preparation of puree use various vegetables – potatoes, pumpkin, vegetable marrows, carrots, beet, turnip, green peas, cabbage.

From 5.5-6.5 months enter the second feeding up in the form of 7%, and after 10% of porridge on vegetable broth or on water with addition of 50% of milk in the beginning. In 2 weeks it is possible to cook porridges on whole milk. Considering that the child managed to get used to dense food, receiving vegetable puree, it is possible to begin with 10% of porridge at once.

From 6-7 months add a boiled (abrupt) egg yolk at first on 1/4 2 times a week, then every other day on 1/2 yolks.

Cottage cheese as a dish of a feeding up is recommended to appoint only from 6-7 months and no more than 40 gr. in day. Its earlier appointment is used for correction of food at deficiency of protein. In such cases it can be applied from 4-5 months.

From 7 months the child receives mincemeat from boiled beef, no more than 60-70 gr. in day (in 9 months). It is added to vegetable puree.

In 8 months one more feeding is replaced with a feeding up kefir.

Mincemeat from 10 months is replaced with quenelles, from 12 months – steam cutlets. In the same time give bread and apples pieces. Usually wean the child at the age of 1 year. In 12-16 months the morning and evening feeding is replaced with whole cow's milk or kefir with cookies or crackers.

Thus, by the end of the first year of life of the child transfer to a table d'hôte, but food has to be mechanically and chemically sparing, balanced on the main ingredients, to provide an intensive metabolism of the child.

ARTIFICIAL FEEDING

Artificial feeding is a feeding of the child of the first year of life milk mixes – so-called substitutes of female milk – at total absence of the last or existence in quantity less than 1/5 daily volumes of food.

It is desirable to provide children of the first 2-3 months of life with donor milk though its use and is not identical to natural feeding, however in the absence of maternal milk it is an optimal variant. If it is not possible to receive donor milk, appoint adapted (i.e. as close as possible on structure to difficult milk) milk mixes.

Negative sides of artificial feeding is the following:

1. Disturbance of the principle of species-specific food;
2. Lack of biological factors of protection against diseases and allergy;
3. Lack of biologically active components of food defining regulation of rates of maturing, managing directors of growth and a fabric differentiation;
4. Non-optimal structure and ways of a metabolization of food nutrients – "metabolic stress", creating the increased risk of developing "civilization diseases" and other pathology;
5. Lack of protection against the damaging action of excess intake of food nutrients;
6. Possibility of forming of chronic diseases of the digestive system, in connection with tension of the device of digestion and ease of disturbances of a biocenosis of intestines;
7. Weakening of psycho-emotional bonds between mother and the child;
8. Possibility of contamination of milk mixes ecological and infectious pathogens.

For artificial feeding of babies use now mainly adapted milk mixes which everywhere force out simple as the increased protein content and mineral substances in the child's diet when feeding by plain mixes leads to excess load of kidneys. The size of this loading depends on extent of adaptation of a product to female milk. Pretreatment of cow's milk is directed to decrease in it in protein, salts of calcium, sodium, increase in amount of irreplaceable fatty acids, enrichment with its vitamins, microelements, lysozyme, etc.

The principles of change of structure of cow's milk for creation of the adapted milk mixes:

1. Decrease in the general protein content;
2. Enrichment with seralbumins for the best digestion of protein and correction of amino-acid structure;

3. Change of composition of fats: partial or full replacement of animal fat by vegetable fats for optimization of level of polyunsaturated fatty acids, especially classes $\omega 6$, $\omega 3$;
4. Increase in level of carbohydrates due to additional administration of lactose and other sugars;
5. Correction of mineral composition – decrease in level of sodium, potassium, calcium, the general ash-content and osmolarity;
6. Enrichment with a complex of mineral salts, vitamins and microelements;
7. Enrichment with taurine, nucleotides, carnitine, inositol and other biologically active compounds;
8. Enrichment with bifidogenic and protective factors.

All artificial mixes are subdivided on:

- ***basic mixes for feeding of healthy children;***
- ***medical mixes for children with special dietary needs;***
- ***treatment-and-prophylactic artificial mixes.***

Children's milk mixes, depending on age of the child, are subdivided into initial (starting) – since the birth to 4-6 months of life (are designated by figure 1) and the subsequent – from 6 to 12 months (are marked by figure 2).

Both initial, and subsequent mixes can be dry and liquid, ready to the use, fresh and sour-milk.

THE MIXED FEEDING

At this type of feeding in connection with insufficiency of milk at mother enter a supplementary feeding the same milk mixes, as at artificial feeding. At first the child is put to a breast and only after its full depletion finished feeding mix. For the purpose of preservation of a lactation of the child put to a breast not less than 3-4 times a day.

Alternation of feedings by a breast and mixes is undesirable as it leads to decrease in a lactation and difficulty of digestion of products of cow's milk. It is recommended to enter a supplementary feeding through a pacifier with the small opening imitating a papilla of the breast not to cause refusal of the child of a breast. As well as at artificial feeding, need of the child for proteins, fats, carbohydrates, terms of introduction of a feeding up depend on a type of the milk mixes used at a supplementary feeding.

Tasks for independent preparation:

1. Solve situational problems
2. Make tasks for test control on a subject.

Situational tasks

Task No. 1

The woman gave rise in time. Condition of the child satisfactory. Body weight at the birth 3300 gr., length of a body is 51 cm. To a breast it is attached in 6 h a breast took well; feeding 6 single. Mother has flat nipples. Tranzitorny decrease of weight of 9%. By 10th day of life does not maintain intervals between feedings.

Question. Specify a basic reason of a hypogalactia.

- A. Age of the woman (35 years).
- B. Flat nipples.
- C. Late first applying to a breast.
- D. 6-times feeding.
- E. Any of above-mentioned.

Task No. 2

The woman gave birth to the healthy child in time. To him it was executed 1 month. Is on natural feeding, sucks well, milk at mother enough. Added in weight 600 gr. Psychomotor development corresponds to age. Since the birth at the child an unstable chair, 5-6 times a day, sometimes liquid with impurity of greens and lumps.

Question. Specify the most probable cause of instability of a chair at the child.

- A. Staphylococcal coloenteritis.
- V. Kolya infection.
- S. Tranzitornaya lactose intolerance.
- D. Reforage.
- E. All above-mentioned is possible.

Task No. 3

At repeated visit at the age of 2.5 months the psychomotor development of the child corresponds to age, added in weight for the second month 800 gr., sucks well, mother has enough milk. The chair of 4-6 times a day, remains unstable.

Question. What most rational recommendation about the child's food now?

- A. To add juice.
- B. To enter the acidified milk formulas (adapted).
- C. To add cottage cheese.

- D. To give to drink vegetable broth.
- E. Nothing from listed above.

Task No. 4

At the next visit at the age of 4.5 months, physical and psychomotor development of the child corresponds to age. Mother has enough milk. The chair was normalized.

Question. What dishes does the child need to enter in the nearest future?

- A. Vegetable puree, cottage cheese, egg yolk.
- B. Vegetable puree.
- Page of 5% semolina porridge on milk.
- D. Cottage cheese, egg yolk.
- E. Egg yolk.

Task No. 5

To the child 6.5 months were executed. Natural feeding remains.

Question. What dish from following does not correspond to an age diet?

- A. Mincemeat.
- B. Vegetable puree.
- Page of 10% semolina porridge.
- D. Kefir.
- E. Vegetable oil.

Task No. 6

The woman gave birth to the healthy child in time. To him it was executed 1 month. Is on natural feeding, sucks well, milk at mother enough. Added in weight 600 gr. Psychomotor development corresponds to age. Since the birth at the child an unstable chair, 5-6 times a day, sometimes liquid with impurity of greens and lumps.

Question. Your recommendations in this situation?

- A. Antibacterial therapy.
- B. A bacteriological research of milk and at detection of flora refusal of breastfeeding.
- C. Bacteriological research calla.
- D. Administration of juice.
- E. Continuation of observation of the child.