

**ANATOMO-PHYSIOLOGICAL PECULIARITIES,
METHODS OF EVALUATION, PARACLINICAL METHODS
OF INVESTIGATION AND SEMEIOLOGY OF THE BLOOD
AND IMMUNE SYSTEM DISEASES IN CHILDREN**

**Academic discipline «Pediatric Propedeutics»
*Self-study guide for the 3rd year
English medium students***

**АНАТОМО-ФІЗІОЛОГІЧНІ ОСОБЛИВОСТІ, МЕТОДИ
ОБСТЕЖЕННЯ ТА СЕМІОТИКА ЗАХВОРЮВАНЬ КРОВІ
ТА ІМУННОЇ СИСТЕМИ У ДІТЕЙ**

**З дисципліни «Пропедевтика педіатрії»
*Методичні вказівки
до самостійної роботи студентів 3-го курсу
медичного факультету***

**МІНІСТЕРСТВО ОХОРОНИ ЗДОРОВ'Я УКРАЇНИ
Харківський національний медичний університет**

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Затверджено
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Anatomo-physiological peculiarities, methods of evaluation, paraclinical methods of investigation and semeiology of the blood and immune system diseases in children: self-study guide for the 3rd year English medium students / compiled by.: V.A Klymenko., T.V. Sirenko, O.S. Lupaltsova – Kharkiv: KhNMU, 2016. – 20 p.

Compiled by: Klymenko V.A.
Sirenko T.V.
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Анатомо-фізіологічні особливості, методи обстеження та семіотика захворювань крові та імунної системи у дітей: метод. вказ. до самот. роботи студентів 3 курсу медичних факультетів / упор. В.А.Клименко, Т.В. Сіренко, Ю.В.Карпушенко. – Харків, ХНМУ, 2016. – 20 с.

Упорядники: Клименко В.А.
Сіренко Т.В.
Лупальцова О.С.

Contents

The knowledge of peculiarities of the blood and immune system in children in different age periods, methods of clinical-laboratory examination and semiotics of the main haematological syndromes (anaemic, haemolytic, haemorrhage and others) is necessary for diagnosing diseases in children. The immune system determines whether the organism stays healthy or get sick. The immune system is a complex array of organs, cells and chemicals that determine self from non-self, identify potential dangers to the body and eliminate them by mounting an immune response. If it is intact and in working order, this defence system activates the various immune cells that can rapidly and effectively overcome any threat from a viral or bacterial attack. Children are more susceptible to various infections, than adults. The reason for this is their developing immune system in different age period. The knowledge of main principles of functioning of blood and immune system in children according to the age is important for the practical work of a doctor.

Specific goals

- To define modern aspects of anatomical and physiological characteristics, methods of investigation diseases of the blood and immune system in children.
- To conduct clinical examination of the immune system and blood according to age.
- To differentiate the clinical signs of immunodeficiency, anemia, leading syndromes detect lesions of blood and immune system.
- To detect leading lesions in syndromes of blood and immune system.

- To interpret the results of laboratory and instrumental methods of investigation of the blood and immune system.

To know:

1. To define the anatomical and physiological characteristics of the blood and the immune system in children.
2. To define the peculiarities of the blood system in children of different age periods.
3. To define methods of clinical and laboratory investigation of children with diseases of the blood system.
4. To identify the clinical and hematological semiotics of major syndromes (anemic, hemolytic, haemorrhagic and other diseases of the blood system in children.
5. To define the peculiarities of the immune response in vaccinated children.
6. To define the term “immunodeficiencies», classification and semiotics immunodeficiencies.
7. To identify the clinical and immunological semiotics of HIV infection in children.

Be able to:

1. To collect anamnesis of children with diseases of the blood and immune system.
2. To demonstrate the conduction of the objective examination of the immune system and blood in children according to age.
3. To identify the major syndromes diseases of the blood and immune system.
4. To differentiate the clinical signs of immunodeficiency, anemia.
5. To interpret the results of laboratory and instrumental methods of investigation of the blood and immune system. Peculiarities of myelogram in children.

Basic knowledge, abilities, and skills, which are necessary for studying the topic (interdisciplinary integration).

The names of previous disciplines	Skills
1. Bases of psychology.	To analyze the emotions of the patient, interpersonal relationships, and children's behavior.
2. General anatomy	To know the structure of the organs and systems of child's body. Clarifying the meaning of certain anatomical features of child's organism in the organizing of childcare.
3. Normal physiology	To know the features of functioning of the organs and systems of child's body in dependence of the age of the child.

Graphical structures of individual issues of the topic.

1. Graphical structure of the topic «Organs of the hematopoietic system»- Appendix 1.
2. Graphical structure of the topic «Organs of immune system»- Appendix 2.
3. Graphical structure of the topic «Syndromes of blood diseases»- Appendix 3.
4. Graphical structure of the topic «Types of immunodeficiencies»- Appendix 4.

The list of study materials:

Main:

1. Propaedeutics of Paediatrics: Manual for foreign students / V. A. Fjoklin, V. A. Klymenko, O. M. Plakhotna, T. V. Sirenko, A. I. Kojemiaka, O. V. Sharikadze. – Kharkiv: 2010. – 356 p.
2. Kapitan T. Propaedeutics of children's diseases and nursing of the child / T. Kapitan. – The state cartographical factory, 2006. – 734p.

Additional:

1. Nelson textbook of pediatrics.—19th ed./ [edited by] Robert M. Kliegman... [at. ol], p. SM
2. Ghai O.P. Essential pediatrics (fourth edition). – New Delhi, India: Interpint, 1996.—476 p.
3. Gupte S. The short textbook of pediatrics, 8th edition. – New Delhi, India.: Iaypee Brthe others. Medical publishers (P) hTD, 1998. – 617 p.
4. Bickley L.S., Hockelman R.A. Physical examination and History Taking. – Philadelphia, New York, Baltimor.: Lippincott, 1999. – 789 p.

Test questions to the class:

1. Describe the composition of blood. What are the main functions of blood?
2. What do you know about the amount of blood in children?
3. What do you know about groups of blood, Rh factor and HLA system?
4. What do you know about the system of haemocoagulation?
5. State the characteristics of blood of children in the newborn period.
6. State the characteristics of blood of children in infancy.
7. State the characteristics of blood of children in other age periods.
8. What do you know about clinical methods of examination of the haemopoietic system and blood in children?
9. What do you know about paraclinical methods of examination of the haemopoietic system and blood in children?
10. List pathological syndromes of haematological diseases in children.
11. What do you know about haematological diseases in children?

12. How should the care for children with haematological diseases be organized?
13. What is the main function of the immune system?
14. What are the organs of the immune system? How may they be divided?
15. What is the function of the thymus?
16. Where are B-cells produced and differentiated?
17. Describe the structure and function of lymph nodes.
18. What do you know about ontogenesis of main organs of the immune system?
19. What types of immunity do you know?
20. What does the innate immune system consists of?
21. What is the function of a lysozyme? What is difference in quantity of lysozyme in newborn?
22. Name the stages of phagocytosis. What are its physiological peculiarities in early children?
23. What are the physiological peculiarities of the complement system and properdin in early children?
24. What is the function of interferon? What kinds of interferon do you know? What are the physiological peculiarities of interferon in children?
25. What is the adaptive immune response characterized?
26. What does the adaptive immune system consists of?
27. What kind of immunoglobulins do you know? Describe the function of every type of immunoglobulines.
28. What are the physiological peculiarities of humoral immunity in different periods of childhood? What do you know about synthesis of immunoglobulin in ontogenesis?
29. How do you understand definitions “primary” and “secondary” immunodeficiency?
30. What are the clinical manifestations of defects in the cellular immunity?
31. Describe examples of the diseases characterized by T-cell immunity deficiency. What are the clinical manifestations of defects in

- the humoral immunity? Describe examples of B-cell immunity deficiency.
32. What are the clinical characteristics of combined immunodeficiency diseases (T- and B-cell associated deficiency)? Describe examples of combined immunodeficiency diseases.
 33. What are typical for disorders of phagocytosis?
 34. What laboratory investigations reveal pathology of different parts of the immune system (humoral immunity, cell-mediated immunity, phagocytosis, complement system)?
 35. What do you know about the nursing children with immune system pathology?

Tests for self-control:

1. What is the specific immunological disorder of AIDS in children, except?
 - A) Lymphopenia;
 - B) Decreasing CD4/CD8;
 - C) Lack of T-helpers;
 - D) Increasing level of IgE;
 - E) Increasing levels of IgA, IgG, IgM to autoantigens.
2. What are main functions of IgA?
 - A) Protect mucous membranes against viruses and bakeries;
 - B) It is the main source of synthesis of serum IgA;
 - C) Takes part in allergy immediate type reactions;
 - D) Takes part in differentiation of lymphocytes;
 - E) All mentioned above;
3. What is the mane feature of IgM?
 - A) Acts on the endotoxins;
 - B) It is long-lived immunoglobulin;
 - C) Number of blood - less than 5%;
 - D) Maternal IgM crosses the placenta during gynecological diseases;
 - E) All mentioned above;

4. A child has increase levels of IgM and IgG in blood to Chlamydia pneumoniae. Evaluate the results of analysis.
- A) A child had infection and he is sick;
 - B) A child has acute infection;
 - C) A child had infection and now he is healthy;
 - D) A child is healthy;
 - E) All answers are wrong;
5. A child has anaphylactic reaction to a bee sting. Which of the immunoglobulin is upgraded?
- A) IgD;
 - B) IgG;
 - C) IgM;
 - D) IgE;
 - E) IgA;
6. What are main functions of IgD?
- A) Differentiations of lymphocytes and takes part in local immunity;
 - B) Acts on the endotoxins;
 - C) Acts on the bacteria;
 - D) Enhances phagocytosis;
 - E) Mane immunoglobulin in chronic reactions;
7. What is the total concentration of immunoglobulins in serum?
- A) 0,5-1 g/l;
 - B) 1-10 g/l;
 - C) 10-20 g/l;
 - D) 20-30 g/l;
 - E)30-40 g/l;
8. B-cells of total lymphocytes are:
- A) 5%;
 - B) 10%;
 - C) 15%;
 - D) 20%;
 - E) 25%;
9. What are the main clinical features of immunodifiency in children?

- A) Recurrent viral and bacterial infections;
 - B) Chronic diarrhea;
 - C) Hypotrophy;
 - D) Allergic reactions;
 - E) All mentioned above;
10. At what age is Bruton disease most often appeared?
- A) After birth;
 - B) 1th month;
 - C) 5th month
 - D) 1 year;
 - E) 17 years;
11. What is the specific immunological disorder of AIDS?
- A) Increasing levels of IgA, IgG, IgM to autoantigens;
 - B) Increasing T-killers/T-suppressors;
 - C) Decreasing level of IgE;
 - D) Lymphopenia;
 - E) Lack of T-helpers;
12. What is the main feature of IgM?
- A) Low avidity in newborns;
 - B) Acts on the exotoxins;
 - C) Number of blood - less than 1%;
 - D) Active in acute infections;
 - E) All mentioned above;
13. What is the source of IgA synthesis?
- A) IgD;
 - B) IgG;
 - C) IgM;
 - D) IgE;
 - E) IgA;
14. A child has increase level of IgM and normal level of IgG in blood to *Micoplasma pneumoniae*. Evaluate the results of analysis.
- A) A child is healthy;
 - B) A child had infection and still be ill;

- C) A child had infection and now he is healthy;
 - D) A child has acute infection;
 - E) All answers are wrong;
15. A child has opisthorchiasis. Which of the immunoglobulin to be upgraded?
- A) IgD;
 - B) IgG;
 - C) IgM;
 - D) IgE;
 - E) IgA;
16. What is the main function of IgD?
- A) Acts on the endotoxins;
 - B) Acts on the bacteria;
 - C) Acts on the viruses;
 - D) It is the mane immunoglobulin in chronic reactions;
 - E) It is the mane immunoglobulin in acute reactions;
17. What is the function of T-killers? (Choose the most right answer)
- A) Destroying of viruses;
 - B) Destroying of viruses and bacteria;
 - C) Destroying of tumor cells;
 - D) Destroying of bacteria, tumor cells and viruses;
 - E) Destroying of bacteria and tumor cells;
18. What avidity is?
- A) Ability to penetrate through the placenta;
 - B) Ability to self-synthesis in the body of a child;
 - C) It is bonding force an antibody to an antigen;
 - D) All mentioned above;
 - E) All answers are wrong;
19. What are the clinical features of immunodeficiency in children?
- A) Enlarged lymph nodes;
 - B) Reduced lymph nodes;
 - C) Absence of lymph nodes;
 - D) All mentioned above;
 - E) All answers are wrong;

20. What is the type of inheritance of the disease Bruton?
- A) Autosomal recessive;
 - B) Autosomal dominant;
 - C) Coupled with X-chromosom;
 - D) Coupled with Y-chromosom;
 - E) Bruton's disease is not inherited;
21. What is the normal quantity of erythrocytes in a newborn?
- a) $4.5 - 5.0 \times 10^{12}/l$
 - b) $5.0 - 6.5 \times 10^{12}/l$
 - c) $6.5 - 7.0 \times 10^{12}/l$
 - d) $7.0 - 7.5 \times 10^{12}/l$
 - e) $7.5 - 8.0 \times 10^{12}/l$
22. What is the normal level of Hb in a newborn?
- a) 150 – 160 g/l
 - b) 160 – 180 g/l
 - c) 170 – 220 g/l
 - d) 220 – 240 g/l
 - e) 240 – 260 g/l
23. What are the normal quantity reticulocytes in a newborn per 1000 mature erythrocytes?
- a) 1 – 10
 - b) 10 – 20
 - c) 50 – 100
 - d) 150 – 200
 - e) 200 – 300
24. What is the normal ESR in a newborn?
- a) 2 – 3 mm / hour
 - b) 5 – 10 mm / hour
 - c) 7 – 10 mm / hour
 - d) 10 – 12 mm / hour
 - e) 12 – 14 mm / hour
25. When does the first intersection of neutrophiles and lymphocytes take place in children?
- a) 2 – 3 days after birth

- b) 4 – 6 days after birth
 - c) 7 – 10 days after birth
 - d) 1-month-old
 - e) 1-year-old
26. When does the second intersection of neutrophiles and lymphocytes take place?
- a) 1 – 2 year
 - b) 2 – 3 year
 - c) 4 – 6 year
 - d) 6 – 7 year
 - e) 7 – 8 year
27. Anemia must be diagnosed in a 1-year-old child if the level of Hb is below:
- a) 100 g/l
 - b) 110 g/l
 - c) 120 g/l
 - d) 130 g/l
 - e) 140 g/l
28. Leucocytosis with the shift of formula to the left is possible to notice in case:
- a) diseases of infection origin
 - b) in case of anemia
 - c) in period of recovery from the diseases
 - d) in case of whooping cough
 - e) all mention above
29. The intravascular disseminated coagulation may take places in all diseases excluding:
- a) pneumonia
 - b) sepsis
 - c) meningoenkephalitis
 - d) asphyxia
 - e) hemolytic anemia
30. The administration of parental vitamin K is indicated for:
- A) all newborn infants

- B) infants below 2,500g
- C) infants of less than 36 week's gestation
- D) jaundiced infants
- E) infants born outside of hospital

31. Vitamin B12 deficiency is most likely to occur in a child with:

- A) resection of the jejunum
- B) resection of the ileum
- C) resection of the colon
- D) a colostomy
- E) a gastrojejunostomy

32. A 2-year-old child presents with anemia and painful swelling of the hands and feet. The most likely diagnosis is :

- A) child abuse
- B) congenital syphilis
- C) leukemia
- D) sickle cell disease
- E) vitamin D deficiency

33. Which one of the following is most often an important factor in the etiology of iron deficiency anemia in a 2-year-old child ?

- A) use of artificial sweeteners
- B) lack of fresh fruit in the diet
- C) intake of large amounts of fruit juice
- D) intake of excessive amounts of vitamin C
- E) intake of large amounts of unmodified cow's milk

34. Which one of the following infants is at greatest risk of developing an early iron deficiency anemia ?

- A) a premature infant
- B) an infant with ABO incompatibility
- C) an infant with physiologic hyperbilirubinemia

- D) a postmature infant
- E) an infant with polycythemia

35. What function of the blood do you know?

- A. Respiratory
- B. Protective and excretion
- C. Homeostatic
- D. Nutrition and hormonal
- E. All mentioned above.

36. What exoerythrocytal hemolytic factors do you know, except:

- A. Hemolytic poisons and toxins
- B. Congenital diseases
- C. Transfusion of group-incompatible and Rh-factor-incompatible blood
- D. Medical mistakes
- E. Significant burns

37. Causes of the anemia are:

- A. Posthemorrhagic and hemopoietic disorders
- B. Hemolytic poisons and toxins
- C. Medical mistakes
- D. The presence of antibodies to erythrocytes
- E. All mentioned above.

38. Classification of the anemia are:

- A. I – 110-90 g/L; II -90-70 g/L; III – less than 70 g/L
- B. I – 130-110 g/L; II -100-90 g/L; III – less than 70 g/L
- C. I – 120-100 g/L; II -100-90 g/L; III – less than 80 g/L
- D. I – 150-120 g/L; II -120-100g/L; III – less than 95 g/L
- E. I – 150-120 g/L; II -120-110g/L; III – less than 100 g/L

39. What is the hemorrhagic syndrome?

- A. inherent disease, with prolonged bleeding, caused by the disorder of blood clotting system
- B. clinical manifestation of the tendency of an organism to repeated bleedings and hemorrhages under the influence of insignificant trauma and so spontaneously
- C. disseminated intravascular coagulation of blood
- D. the process of destruction of erythrocytes after which hemoglobin releases from them into plasma
- E. condition for with the reduction of erythrocytes quantity and hemoglobin content in the unit of blood volume is characteristic

Assignment for individual student work:

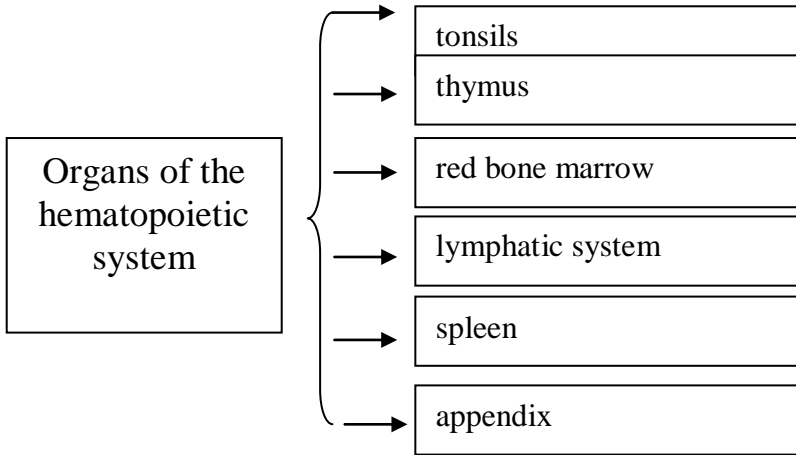
To make a conversation with parents of childrens with breastfeeding and after introduction of solid foods.

The standards of answers to the tests:

1-D; 2- A; 3-D; 4-A; 5-D; 6- A; 7-C; 8-E; 9- E; 10-C; 11-C; 12-D; 13-E; 14-D; 15-D; 16-C; 17-E; 18-C; 19-D; 20-C; 21- B; 22 -C; 23 - C; 24 -A; 25 -B; 26 -C; 27 -A; 28 -A; 29 -D; 30- A; 31-A; 32- D; 33- E; 34- A; 35 -E; 36 -B; 37 -A; 38 -A;39 -B.

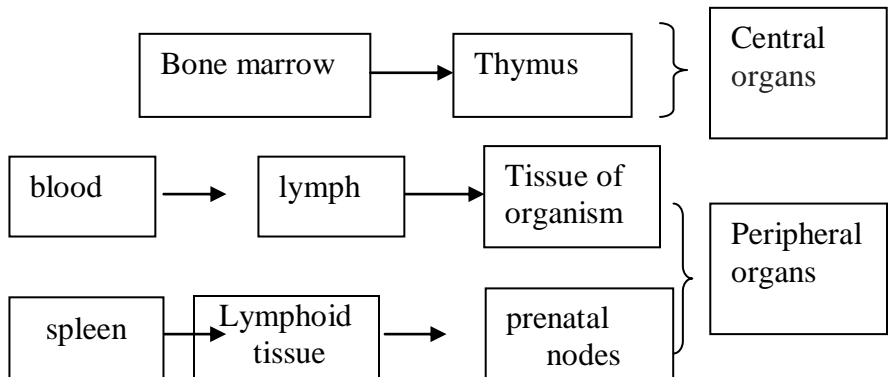
Appendix 1

Graphical structure of the topic «Organs of the hematopoietic system»



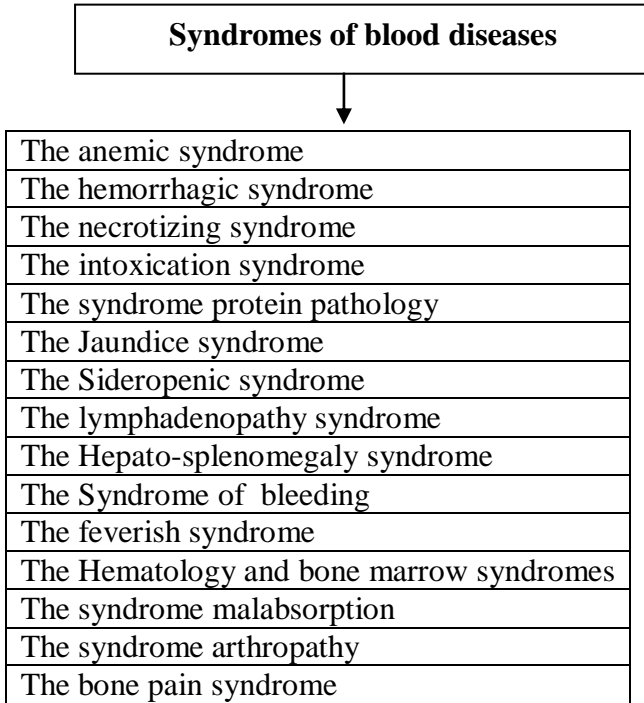
Appendix 2

Graphical structure of the topic «Organs of immune system»



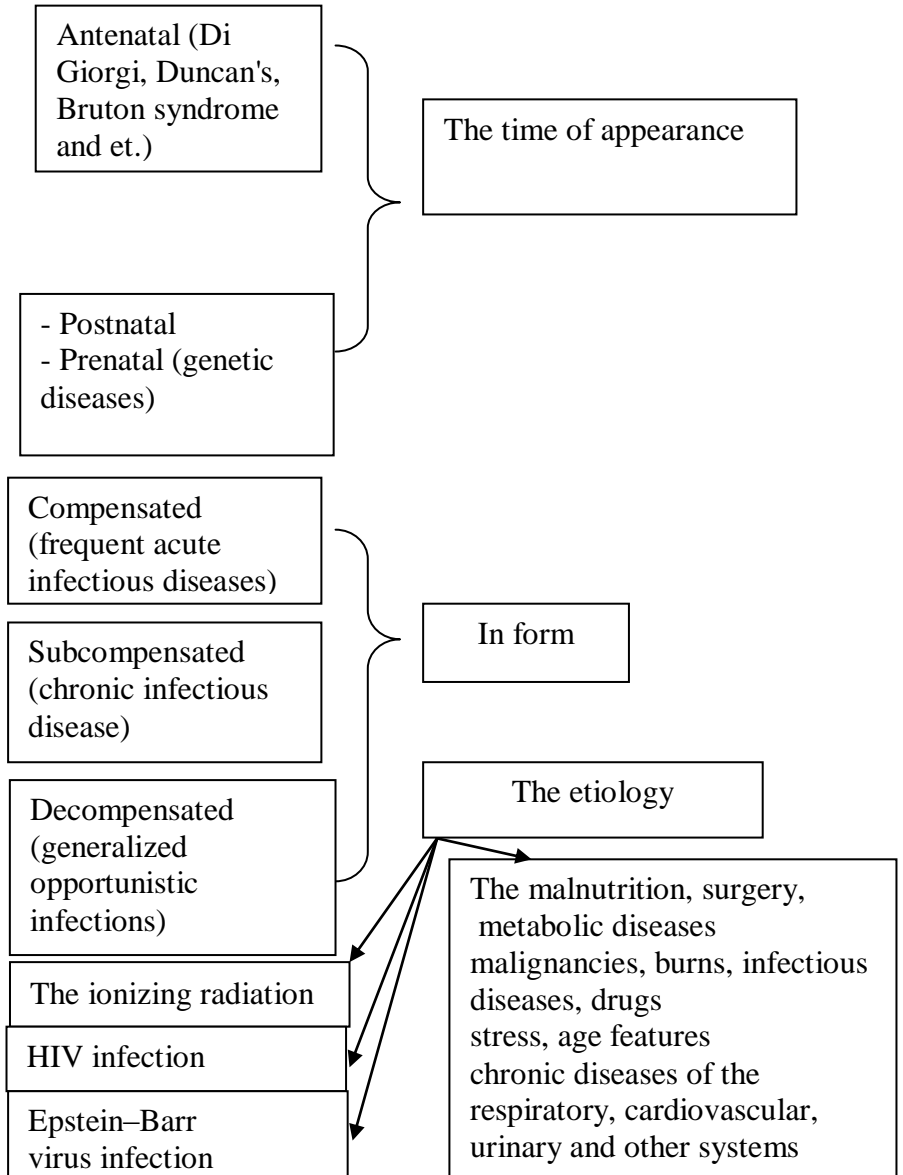
Appendix 3

Graphical structure of the topic
« Syndromes of blood diseases»



Appendix 4

Graphical structure of the topic «Types of immunodeficiencies»



Навчальне видання

Анатомо-фізіологічні особливості, методи обстеження та семіотика захворювань крові та імунної системи у дітей

Упорядники: Клименко Вікторія Анатоліївна
Сіренко Тетяна Вадимівна
Лупальцова Ольга Сергіївна

Відповідальний за випуск: Клименко В.А.

Комп'ютерна верстка

Ум. друк. арк.____. Тираж____ прим. Зам. №____.
