

GUIDELINES
Students' independent work during preparation to practical lesson

<i>Academic discipline</i>	HUMAN ANATOMY
<i>Topic</i>	IMMUNE SYSTEM

Preamble

The main goal of this guidelines is description of the all lessons and exact information that should be prepared. During preparation students should use Textbook 'Human anatomy' (Cherkasov, Kovalchuk et al.), Work Book (Coloring book), 'Atlas of human anatomy' (Sobotta), 'Anatomy international nomenclature' (Cherkasov), 'Tests for preparation of anatomy practical classes' (Kancer) and all other sources that teacher proposes to use.

1. The relevance of the topic:

The immune system is a host defense system comprising many biological structures and processes within an organism that protects against disease. To function properly, an immune system must detect a wide variety of agents, known as pathogens, from viruses to parasitic worms, and distinguish them from the organism's own healthy tissue. In many species, the immune system can be classified into subsystems, such as the innate immune system versus the adaptive immune system, or humoral immunity versus cell-mediated immunity. In humans, the blood–brain barrier, blood–cerebrospinal fluid barrier, and similar fluid–brain barriers separate the peripheral immune system from the neuroimmune system which protects the brain.

The endocrine system is made up of glands that produce and secrete hormones, chemical substances produced in the body that regulate the activity of cells or organs. These hormones regulate the body's growth, metabolism (the physical and chemical processes of the body), and sexual development and function. The hormones are released into the bloodstream and may affect one or several organs throughout the body.

2. Specific objectives:

- *the basic concept about cellular and humoral immunity;*
- *central organs of the immune system;*
- *peripheral organs of the immune system;*
- *morphological characteristics of the spleen;*

3. Basic training level *of the student includes learning from anatomical models and posters how to find, name and show endocrine glands. Make knowledge of anatomical and functional features of organs of endocrine glands in their meaning for the organism.*

4. Tasks for independent work during preparation to practical classes.

4.1. A list of the main terms, parameters, characteristics that need to learn by the student during the preparation for the lesson.

<i>Defined notion</i>	<i>Definition</i>
<i>The thymus</i>	<i>The thymus resides in the posterior mediastinum posterior to the manubrium of sternum reaching the IV rib.</i>
<i>The spleen</i>	<i>The spleen lies in the epigastrium and belongs to secondary lymphatic organs.</i>
<i>The pineal gland</i>	<i>The pineal gland is an endocrine organ of ectodermic neurogenic origin, which develops from evagination of the tegmentum of third ventricle.</i>
<i>The pituitary gland</i>	<i>The pituitary gland occupies the hypophysial fossa in the sella turcica of sphenoid bone.</i>
<i>The thyroid gland</i>	<i>The thyroid gland occupies anterolateral surfaces of the larynx and trachea at the level of C6-C7.</i>
<i>The parathyroid gland</i>	<i>The parathyroid glands reside on the posterior surface of lateral lobes of thyroid outside its capsule near inferior thyroid arteries.</i>

4.2. Theoretical questions to the lesson:

- 1. Name the anatomical and physiological distinctions between endocrine and exocrine glands.*
- 2. Discuss classification of endocrine glands according to their origin.*
- 3. Describe relations, structure and functions of pineal gland.*
- 4. Where does the pituitary gland reside and what parts are distinguishable in it?*
- 5. Describe connections between hypothalamus and pituitary gland.*
- 6. Name the hormones produced by anterior lobe of pituitary and discuss their effects on an organism.*
- 7. What part of the brain produces hormones of posterior lobe of pituitary? Discuss their effects on an organism.*
- 8. Describe gross structure of the thyroid gland and its relations.*

9. *What the thyroid gland is covered with?*
10. *Name the hormones produced by thyroid gland and discuss their effects on the organism.*
11. *Where do the parathyroid glands reside? What hormones do they produce?*
12. *Describe gross structure and relations of the thymus.*
13. *Name functions of the thymus.*
14. *What structures belong to endocrine part of the pancreas? What hormones does it produce?*
15. *Describe gross structure and relations of the suprarenal glands.*
16. *What part are distinguishable in the suprarenal glands?*
17. *Name hormones produced by the cortex of suprarenal glands and discuss their effects on an organism.*
18. *Name hormones produced by the medulla of suprarenal glands and discuss their effects on an organism.*
19. *Give definition of paraganglia and describe their origin and functions.*
20. *Name structures belonging to endocrine part of ovaries and testes and list the hormones produced.*

5. Sources:

Anatomy international nomenclature	http://anatom.ua/anatomical-terminology/
LECTURE	https://anatom.ua/basis/english/lectures/
Textbook 'Human anatomy' (2019)	PP. 278-289, 458 http://anatom.ua/basis/english/online-book-in-english/
Work Book (Coloring book 2019)	PP. 89-91
Atlas of human anatomy (Sobotta)	
QUIZES	https://anatom.ua/basis/english/tests/
VIDEO	https://anatom.ua/basis/video/

6. WRITE A SHORT DESCRIPTION!

Check yourself.

You should be able to describe, compare and classify:

1. *Primary lymphoid organs: structure and function.*
2. *Primary lymphoid organs. Bone marrow: topography, structure, function.*
3. *Primary lymphoid organs: thymus, topography, structure, function, age features.*
4. *Secondary (peripheral) lymphoid organs: spleen, topography, external structure, internal structure, function. Blood supply and innervation of the spleen.*
5. *Secondary (peripheral) lymphoid organs. Tonsils (topography, structure, function).*
6. *Peripheral organs of the immune system: lymphatic nodes, classification, topography, structure, function.*
7. *Peripheral organs of the immune system: solitary and aggregated lymphoid nodules (topography, function).*
8. *Peripheral organs of the immune system: vermiform appendix (topography, structure, function).*

7. QUIZES

Anatomy of the immune system

1. Doctor examines the patients peripheral organs of immune system. Which organ doesn't belong to peripheral organs?

- A. medulla osseum, thymus.
- B. noduli lymphoidei solitarii.
- C. noduli lymphoidei aggregati.
- D. lien.
- E. tonsillae.

2. While examining a spleen a student found out that the spleen is parenchymal organ. What does make up the parenchyma of this organ?

- A. peritoneum.
- B. white pulp.
- C. fibrous capsule.
- D. red pulp.
- E. smooth muscle.

3. The doctor operates on thyroid gland and takes into account that there are parathyroid glands on the posterior facet. How many parathyroid glands does the human usually have?

- A. 5
- B. 4
- C. 6
- D. 2
- E. 3

4. During cranial MRT-examination of 50-years old patient it was found that some gland is increased in sizes. The tumor of which endocrine gland can cause skull bones destruction?

- A. epiphysis
- B. glandula suprarenalis
- C. glandula thyroidea
- D. hypophysis
- E. thymus

5. Mother with 9-years old son visited a doctor. The doctor examined the oral cavity and found out inflammation of tonsils which are in tonsillar fossa. What are the names of these tonsils?

- A. lingual tonsils
- B. tubal tonsils
- C. mandibular nodes
- D. pharyngeal tonsils
- E. palatine tonsils

6. The tracheotomy was complicated by pus infection which had spreaded through the pretracheal space into the anterior mediastinum. The anterior mediastinum includes:

- A. pars descendens aortae
- B. cor et pericardium
- C. thymus

- D. *esophagus*
- E. *truncus sympathicus*

7. 12 – years old a boy has premature puberty. What gland of the diencephalon does product hormone which prevents premature puberty?

- A. *Epiphysis*
- B. *Hypophysis*
- C. *Hypothalamus*
- D. *Gl. suprarenalis.*
- E. *Mesencephalon*

8. After orchidectomy the young man complains of feminism signs. The cells within the testis that produce testosterone are:

- A. *Endoteliocyte*
- B. *Sertoli cells*
- C. *Seminiferous cells*
- D. *Myoid cells*
- E. *Interstitial Leydig cells*

9. The analysis of the blood have shown that woman has lower level of progesterone. This hormone is produced by:

- A. *Corpus albicans*
- B. *Connective tissure*
- C. *Medulla ovarii*
- D. *Tunica albuginea*
- E. *Corpus luteum*

10. Pirogoff tonsillar ring consists of paired and unpaired tonsils. What is the location of unpaired tonsil of oral cavity?

- A. *apex of tongue*
- B. *root of tongue*
- C. *facet inferior of tongue*
- D. *body of tongue*
- E. *dorsum of tongue*

ANSWERS:

1	A	6	C
2	B, D	7	A
3	B	8	E
4	D	9	E
5	E	10	B

Immune and lymphoid system test

1. *What is the difference between lymphatic capillaries and lymphatic vessels?*
 - a. *Diameter*
 - b. *Length*
 - c. *Amount*
 - d. *Wall structure*
 - e. *Type of branching*
2. *Lymphatic system is developed from the _____*
 - a. *Ectoderm*
 - b. *Mesoderm*
 - c. *Endoderm*
 - d. *Mesenchyme*
 - e. *Ectoderm and endoderm*
3. *What lymphatic vessel is the longest in the human body?*
 - a. *Truncus jugularis*
 - b. *Truncus bronchomediastinalis*
 - c. *Ductus thoracicus*
 - d. *Ductus lymphaticus dexter*
 - e. *Truncus subclavius*
4. *What is the name of initial part (segment) of the ductus thoracicus?*
 - a. *Cisterna chyli*
 - b. *Cisterna minor*
 - c. *Cisterna major*
 - d. *Truncus lumbalis*
 - e. *Truncus intestinalis*
5. *Where is ductus thoracicus flow into the left venous angle?*
 - a. *At the level of the III, IV, V thoracic vertebrae*
 - b. *At the level of the VI, VII thoracic vertebrae*
 - c. *At the level of the I thoracic vertebrae and VII, VI, V, IV, III cervical vertebrae*
 - d. *At the level of the I and II cervical vertebrae*
 - e. *At the level of the I and II lumbar vertebrae*
6. *Some children have predominantly mouth breathing due to excessive proliferation of lymphoid tissue. Proliferation of which structures is it due to?*
 - a. *Tonsils*
 - b. *Lingual tonsil*
 - c. *Tubal tonsils*
 - d. *Pharyngeal tonsil*
 - e. *Lymph nodes*
7. *During the surgery on the removal of the appendix, a doctor found in its wall elements that belong to the peripheral organs of the immune system. What kinds of elements are these?*
 - a. *Iliac nodes*
 - b. *Single lymphoid nodules*
 - c. *Clusters of lymphoid nodules*

- d. *Appendix nodes*
 - e. *Nodi lymphatici paracolici*
8. *On examination of the oral cavity, doctor found swelling, redness of the palate between arches. Which anatomical formation inflamed?*
- a. *Tonsilla Tubaria*
 - b. *Tonsilla Palatine*
 - c. *Tonsilla Adenoidea*
 - d. *Tonsilla Pharyngea*
 - e. *Tonsilla Lingualis*
9. *Where are the majority of lymph nodes found within the body?*
- a. *Head and neck*
 - b. *Abdomen*
 - c. *Heart*
 - d. *Limbs*
 - e. *Legs*
10. *Which type of lymphatic vessel tends to accompany arteries?*
- a. *Deep vessels*
 - b. *Superficial vessels*
 - c. *Thoracic duct*
 - d. *Capillaries*
 - e. *Capillaries and superficial vessels*
11. *The right lymphatic duct drains which part of the body?*
- a. *Upper left quadrant*
 - b. *Lower left quadrant*
 - c. *Upper right quadrant*
 - d. *Lower right quadrant*
12. *In the adolescent the thymus gland is involved in the development of which of the following systems?*
- a. *Nervous system*
 - b. *Vascular system*
 - c. *Immune system*
 - d. *Skeletal system*
 - e. *Respiratory system*

ANSWERS:

1	A, D	7	B
2	B	8	B
3	C	9	A
4	A	10	A
5	B	11	C
6	D	12	C

Immune and lymphoid system test

1. *What organ has no lymphatic capillaries?*
 - a. *Hepar*
 - b. *Cutis*
 - c. *Encephalon*
 - d. *Musculi*
 - e. *All organs*
2. *From which organ lymph outflows directly to the thoracic duct (ductus thoracicus)?*
 - a. *Cor*
 - b. *Thymus*
 - c. *Esophagus*
 - d. *Ren*
 - e. *Larynx*
3. *How many lymphatic ducts in the human body?*
 - a. *2*
 - b. *6*
 - c. *11*
 - d. *3*
 - e. *7*
4. *Where is ductus thoracicus located?*
 - a. *Between pars thoracica aortae, esophagus, columna vertebralis*
 - b. *Between esophagus, nervus vagus, vena cava superior, pulmones*
 - c. *Between columna vertebralis, pulmones*
 - d. *Between pulmones*
 - e. *Between vv. mediastinales*
5. *Inefficiency of orthodontic treatment of child caused by sustained mouth breathing, because nasal breathing is difficult. Which of the tonsils are hypertrophied?*
 - a. *Palate and tubal*
 - b. *Tubal*
 - c. *Lingual*
 - d. *Palate*
 - e. *Pharyngeal*
6. *During the examination of patient doctor found the hypertrophy and inflammation of lymphoid tissue, swelling of the mucous membrane between arches of the soft palate. Which tonsils normally contained in this place?*
 - a. *Tonsilla tubaria*
 - b. *Tonsilla pharyngealis*
 - c. *Tonsilla palatine*
 - d. *Tonsilla lingualis*
 - e. *Tonsilla adenoidea*
7. *16-year old girl was diagnosed with the dysfunction of the immune system organ which also belongs to the endocrine system. Choose its name.*
 - a. *lymph nodes*

- b. *palatine tonsils*
 - c. *spleen*
 - d. *pituitary*
 - e. *thymus*
8. *The man turned to the doctor for a sore throat. An examination of the patient revealed hypertrophy of lymphoid organ, located in tonsillar fossa. What is this organ?*
- a. *Tonsilla palatina*
 - b. *Tonsilla pharyngea*
 - c. *Tonsilla tubaria*
 - d. *Tonsilla lingualis*
 - e. *Tonsilla adenoidea*
9. *Which embryonic structure gives rise to the thymus gland?*
- a. *Third pharyngeal arch*
 - b. *Third pharyngeal cleft*
 - c. *Third pharyngeal pouch*
 - d. *Fourth pharyngeal pouch*
 - e. *Fourth pharyngeal arch*
10. *The cortical portion of the thymus gland is largely composed of which type of cell?*
- a. *Pneumocyte*
 - b. *Lymphocyte*
 - c. *Hepatocyte*
 - d. *Myocyte*
 - e. *Epitheliocyte*
11. *Where does the spleen in the abdomen lie?*
- a. *Upper right quadrant*
 - b. *Lower right quadrant*
 - c. *Lower left quadrant*
 - d. *Upper left quadrant*
12. *What is the clinical significance of 'vascular segments' of the spleen?*
- a. *Enables filtration of red blood cells*
 - b. *Isolates pathogens for cell-mediated immunity*
 - c. *Ensures rich arterial supply*
 - d. *Allows for subtotal splenectomy*
 - e. *Forms venous drainage*

ANSWERS:

1	C	7	E
2	C	8	A
3	A	9	C
4	A	10	B
5	E	11	D
6	C	12	D