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**АНГЛИЙСКИЙ ЯЗЫК
КОНСПЕКТ ЛЕКЦИЙ**

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Представленный вашему вниманию конспект лекций предназначен для подготовки студентов медицинских вузов к сдаче экзамена. Книга включает в себя полный курс лекций по английскому языку, написана доступным языком и будет незаменимым помощником для тех, кто желает быстро подготовиться к экзамену и успешно его сдать.

ВВОДНАЯ ЛЕКЦИЯ

History of medicine

Medicine is among the most ancient of human occupations. It began as an art and gradually developed into a science over the centuries. There are 3 main stages in medicine development: Medicine of Ancient Civilizations, Medicine of Middle Ages and Modern Medicine.

Early man, like the animals, was subject to illness and death. At that time medical actions were mostly a part of ceremonial rituals. The medicine-man practiced magic to help people who were ill or had a wound. New civilizations, which developed from early tribes, began to study the human body, its anatomic composition. Magic still played an important part in treating but new practical methods were also developing. The early Indians, e. g., set fractures and practiced aromatherapy. The Chinese were pioneers of immunization and acupuncture. The contribution of the Greeks in medicine was enormous. An early leader in Greek medicine was Aesculapius. His daughters, Hygeia and Panacea gave rise to dynasties of healers (curative medicine) and hygienists (preventive medicine). The division in curative and preventive medicine is true today. The ethic principles of a physician were summarized by another Greek, Hippocrates. They are known as Hippocrates Oath.

The next stage of Medicine's development was the Middle Ages. A very important achievement of that time was the hospital. The first ones appeared in the 15-th century in Oriental countries and later in Europe. Another advance of the Middle Ages was the foundation of universities during 13—14-th centuries. Among other disciplines students could study medicine. During 18-th century new discoveries were made in chemistry, anatomy, biology, others sciences. The advances of that time were invention of the stethoscope (by Rene Laennec), vaccination for smallpox, discovery of anesthetics and development of immunology and scientific surgery.

The next century is rise of bacteriology. Important discoveries were made by Louis Pasteur and Robert Koch. The development of scienti-

fic bacteriology made possible advances in surgery: using antiseptics and control of wound infection.

Medicine in the 20-th century made enormous contribution in the basic medical sciences. These are discovery of blood groups and vitamins, invention of insulin and penicillin, practice of plastic surgery and transplantation.

New words

medicine — медицина
ancient — древний
human — человеческий
occupation — занятие
art — искусство
to develop — развивать
science — наука
century — век
civilization — цивилизация
Middle ages — Средние века
modern — современный
animal — животное
subject — предмет
illness — заболевание
death — смерть
contribution — вклад
discovery — открытие
blood — кровь

Артикли

Перед каждым нарицательным существительным должен стоять артикль. В английском языке существуют два вида артиклей: неопределенный (indefinite) «A», «AN» и определенный (definite) «THE». Если слово употребляется в первый раз, используется неопределенный артикль «A», «AN». Во второй и последующие разы употребляется определенный артикль «THE». Артикль не употребляется, если перед существительным стоит притяжательное или указательное местоимение, другое существительное в притяжательном падеже, количественное числительное или отрицание «no».

Вставъте артикль, где необходимо.

1. This is ... book. It s my ... book.
2. Is this your ... pencil? No, it is not my pencil, it is my sister's pencil.
3. I have ... sister. My ... sister is ... engineer. My sister's ... husband is ... doctor.
4. I have no ... handbag.
5. Is this ... watch?
— No, it isn't ... watch, it's ... pen.
6. This ... pen is good, and that ... pen is bad.
7. I can see pencil on your ... table, but I can see pencil on, but I can see no ... paper.
8. Give me ... chair, please.
9. They have ... dog and two ... cats.
10. I have ... spoon in my ... plate, but I have no ... soup in it.

Answer the questions.

1. When the history of medicine began?
2. How did it begin?
3. How many the main stages are there in the history of medicine?
4. What practices medicine-men?
5. What role did magic play at those times?
6. Who began to study medicine?
7. Who were the pioneers of immunization and acupuncture?
8. Who was the early leader in Greek medicine?
9. When appeared the first hospitals?
10. What Louis Pasteur and Robert Koch discovered?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) medicine; b) theatre; c) doctor;
- 2) a) patient; b) lamp; c) pain;
- 3) a) dance; b) science; c) studying;
- 4) a) mushroom; b) human; c) man;
- 5) a) century; b) age; c) honey.

ЛЕКЦИЯ № 1. Cell

The cell is a smallest independent unit in the body containing all the essential properties of life. Many types of human cells can be grown in test tubes after being taken from the body. Cells which are functionally organized are often grouped together and operate in concert as a tissue, such as muscle tissue or nervous tissue. Various tissues may be arranged together to form a unit called organ as the kidney, liver, heart or lungs. Organs often function in groups called organ systems. Thus the esophagus, stomach, pancreas, liver and intestines constitute the digestive system.

Cells are characterized by a high degree of complexity and order in both structure and function. The cell contains a number

of structures called cell organelles. These are responsible for carrying out the specialized biochemical reactions characterizing each. The many chemical reactions taking place in a cell require the establishment of varied chemical microenvironment.

Carefully controlled transport mechanisms along with highly effective barriers — the cell membranes — ensure that chemicals are present in the proper region of the cell in appropriate concentration.

The cell membranes of a mixture of protein and lipid form its surroundings.

Membranes are an essential component of almost all cells organelles. The membrane allows only certain molecules to pass through it.

The most visible and essential organelle in a cell is the nucleus, containing genetic material and regulating the activities of the entire cell.

The area outside of the nucleus is called the cytoplasm. Cytoplasm contains a variety of organelles that have different functions.

New words

cell — клетка
independent — независимый
unit — единица
body — тело
all — все

life — жизнь
 human — человеческий
 together — вместе
 tissue — ткань
 organ systems — системы органов
 to function — функционировать
 to contain — содержать
 membranes — мембраны
 protein — протеин
 nucleus — ядро
 cytoplasm — цитоплазм
 different — различный

Спряжение глагола to be в Present Simple.

To be — быть, находиться, являться. После следующих местоимений он меняет свою форму.

Спряжение глагола to be в Present Simple Таблица 1

I } am я	you, they, we } are ТЫ, ВЫ, ОНИ, МЫ
He, she, it } is он, она, оно	

For example.

1. I am a pupil. I am not a pupil. Am I a pupil?
2. She is a girl. She is not a girl. Is she a girl?
3. You are a good friend. You are not a good friend. Are you a good friend?

Поставьте глагол to be в правильную форму, заполнив пропуски.

1. I ... a pupil.
2. My father ... not a teacher, he ... a scientist.
3. ... your sister a teacher?
4. Mary ... a painter.
5. ... they at home?
6. My father ... a worker.
7. She ... at work.
8. ... you a doctor?

9. He ... a pilot.
10. We ... students.
11. They ... carpenters.
12. ... they at home?
13. they ... not at home.
14. He ... at work.
15. ... your sister a typist?
16. ... your brother at school?
17. ... your sister in the cabinet?
18. My sister ... at home.
19. ... this your cat?
20. She ... an actress.
21. This ... my bag.
22. He ... professor.
23. Helen ... a singer.
24. ... you an engineer?
25. He ... Russian.

***Переведите на английский язык,
употребляя глагол to be в Present Simple.***

1. Я ученик. Я в школе.
2. Мой брат художник. Он не инженер.
3. Моя сестра на работе. Она врач.
4. Он студент, а не учитель.
5. Вы студент? — Нет, я ученик.
6. Моя сестра дома. Она больна.
7. Мы не в школе. Мы дома.
8. Мой брат ученик. Он в школе.
9. Ваша мама дома? — Нет, она на работе.
10. Ваш двоюродный брат дома? — Нет, он в школе.
11. Твоя сестра здорова сейчас? — Да, она здорова.
12. Ваша сестра учительница? — Нет, она студентка.
13. Твой папа на работе? Нет, он на даче.
14. Твоя сестра машинистка? — Да. Она машинистка.
15. Мой дедушка не ученый, он геолог.
16. Моя мама не учительница. Она врач.
17. Чья это ручка? — Это моя ручка.

18. Чья это книга? — Это ваша книга.
19. Чей это стол? — Это стол моего брата.
20. Чья это сумка? — Это сумка моей мамы.
21. Чей это карандаш? — Это карандаш моей сестры.
22. Это твоя тетрадь? — Да, это моя тетрадь.
23. Это тетрадь твоего брата? — Нет, это моя.
24. Где ваш стол? — Он посередине комнаты.
25. Где твоя ручка? — Она в моем кармане.
26. Где твоя тетрадь? — Она на столе.

Answer the questions.

1. What is the cell consists of?
2. What is a membrane?
3. Is cell the smallest independent unit of the body?
4. What can be grown in test — tubes?
5. What can various tissues form, when they are together?
6. What are the organ system consist of?
7. What are cell characterized by?
8. What are cell organelles?
9. What are membranes?
10. What is the cytoplasm?

Make the sentences of your own using the new words (10 sentences).

Find the verb to be in the text. Explain why it is used in such a way?

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) cell; b) body; c) flower;
- 2) a) life; b) plate; c) people;
- 3) a) test-tube; b) microscope; c) pen;
- 4) a) curtain; b) body; c) tissue;
- 5) a) spoon; b) kidney; c) liver.

ЛЕКЦИЯ № 2. Tissue

A tissue is a group of cells working together to do a special job. A histologist is one who specializes in the study of tissues. The cells, of which the tissues are made, contain from 60 to 99% water. Gases, liquids and solids dissolve in the water. Chemical reactions that are necessary for proper body function are carried on much more readily in a water solution. The water solution and other materials in which the tissues are bathed is slightly salty. This substance is called tissue fluid. It must be mentioned that an insufficiency of tissues fluid is called dehydration and an abnormal accumulation of this fluid caused a condition called edema.

Tissue classification: The 4 main groups of tissues are:

- 1) epithelial tissue forms elands, covers surfaces and lines cavities;
- 2) connective tissue holds all parts of the body in Place. This can be fat, cartilage, bone or blood. Blood sometimes is considered a sort of tissue, since it contains cells and performs many of the functions of tissues. However; the blood has many other unique characteristics;
- 3) nerve tissue conducts nerve impulses all over the body;
- 4) the muscle tissue is designed for power-producing contractions.

The surface of the body and of the tubes or passages leading to the exterior and the surface of the various cavities in the body are lined by cells which are closely approximated to each other; thus have a small amount of intercellular substance. This lining cellular layer is called epithelium. An epithelial layer may be one or many cells in thickness. When it is composed of a single layer, it is called a simple epithelium; when two or more cells in thickness, it is stratified. The nature and consistency of intercellular substance, the matrix, and the amount and arrangement of fibers furnish the basis for the subdivision of connective tissue into three main groups: connective tissue proper, cartilage and bone. In connective tissue the intercellular substance is soft; in cartilage it is firm, yet flexible and elastic; in bone it is rigid due to the deposition of calcium salt in the matrix. In multicellular organisms certain cells developed to a high degree the properties of irritability and conductivity. These cells form the nervous tissues.

The nervous system of higher animals is characterized by the multiplicity of cellular forms and intercellular connections and by the complexity of its functioning. This multiplicity and complexity is the chief feature that distinguishes the nervous tissues from other tissues which are essentially of uniform structure and function.

Muscle tissue is composed of elongated cells which have the power of contracting or reducing their length. This property of contraction is ultimately a molecular phenomenon and is due to the presence of protein molecules. The following three types of muscle tissue occur in the body.

Smooth muscle tissue is found in sheets or tubes forming the walls of many hollow or tubular organs, for example the bladder, the intestines of blood vessels. The cells forming this tissue are long spindle-shaped with a central oval nucleus. They are usually packed together with a little connective tissue between them.

Striated muscle tissue is composed of cylindrical fibres often of great length in which separate cells cannot be distinguished. Many small nuclei are found in the fibres just under the surface. Cardiac muscle resembles striated muscle in its structure, but smooth muscle in its action.

New words

tissue — ткань
group — группа
to work — работать
to do — делать
special — особенный, специальный
job — работа
water — вода
gas — газ
liquid — жидкость
epithelial — эпителиальный
layer — слой
muscle — мышца
to occur — встречаться
body — тело
flexible — гибкий
elastic — эластичный

nucleus — ядро
smooth — гладкий
fibre — волокно
cardiac — сердечный

Неопределенный артикль *a (an)* может употребляться только с исчисляемыми существительными, стоящими в единственном числе. Перед неисчисляемыми существительными или существительными во множественном числе неопределенный артикль опускается. Определенный артикль *the* употребляется и с исчисляемыми, и с неисчисляемыми существительными как в единственном, так и во множественном числе.

E. g. This is a book. The book is interesting (исчисляемое в единственном числе).

This is — meat. The meat is fresh (неисчисляемое).

These are — books. The books are good (множественное число).

Вставьте артикль, где необходимо.

1. This is ... pen. ... pen is red.
2. These are pencils. ... pencils are black.
3. This is ... soup. ... soup is tasty.
4. In the morning I eat ... sandwich and drink ... tea
5. She gave me ... coffee and ... cake. ... coffee was hot and ... cake was tasty.
6. Do you like ... ice-cream?
7. I see ... book in your ... hand. Is ... book interesting?
8. She bought ... meat, ... butter and ... potatoes yesterday.
9. She also bought ... cake. ... cake was very ... tasty. We ate ... cake with ... tea
10. This is ... bag. ... bag is brown.
11. It is my sister's ... bag.
12. And this is my ... bag. It is ... yellow.
13. This is ... tree. ... tree is green.
14. I can see ... boys. ... boys are playing.
15. I have ...bicycle. ... bicycle is black. My friend has no ... bicycle.
16. Our ... room is large.
17. We wrote ... dictation yesterday ... dictation was long.

18. She has two ... daughters and one ... son. Her ... son is ... pupil.
19. My ... brother's ... friend has no ... dog.
20. This ... pencil is broken. Give me that ... pencil, please.
21. She has ... ball. ... ball is ... big.
22. I got ... letter from my ... friend yesterday. ... letter was interesting.

Answer the questions.

1. What is tissue?
2. What are the tissues made of?
3. How many per cents of water do the cells contain?
4. What is dissolved in water?
5. What reactions are necessary for proper body function?
6. What substance is called tissue fluid?
7. How many groups are in the tissue classification?
8. What is lining cellular layer called?
9. What cells form the nervous tissues?
10. Where is smooth muscle tissue found?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) tissue; b) body; c) pen;
- 2) a) water; b) cell; c) circle;
- 3) a) muscle; b) arm; c) cold;
- 4) a) elastic; b) smooth; c) brick;
- 5) a) fibre; b) cardiac; c) line.

ЛЕКЦИЯ № 3. Epidermis

The integument consists of the skin (epidermis and dermis) and associated appendages (sweat glands, sebaceous glands, hairs, and nails). Considered the largest body organ, the integument comprises approximately 16% of total body weight. It is a highly specialized organ that functions to protect the body from injury, desiccation, and infection. It also participates in sensory reception, excretion, thermoregulation, and maintenance of water balance.

Epidermis is the outermost layer of the integument. It is a stratified squamous epithelial layer of ectodermal origin.

Layers of the epidermis from deep to superficial consist of four strata. Stratum basale (stratum germinativum) is a proliferative basal layer of columnar-like cells that contain the fibrous protein keratin. Stratum spinosum is a multilaminar layer of cuboidal-like cells that are bound together by means of numerous cytoplasmic extensions and desmosomal junctions.

Stratum granulosum consists of flat polygonal cells filled with basophilic keratohyalin granules. Viewed at the electron microscopic level, these cells also contain numerous membrane-coating granules. Stratum corneum is the superficial stratum of dead cells and consists of several to many layers of flat, anucleated, and cornified (keratinized) cells. In the epidermis of the palms and soles, a thin, transitional zone of flat eosinophilic or pale-staining anucleated cells may occur as the stratum lucidum. This layer is found only in regions with a thick stratum corneum.

Cells of the epidermis: keratinocytes are the most numerous and are responsible for the production of the family of keratin proteins that provide the barrier function of the epidermis.

Melanocytes are derivatives of neural crest ectoderm. They are found in the dermis and are also scattered among the keratinocytes in the basal layers of the epidermis. These dendritic cells produce the pigment melanin in the form of melanosomes that are transferred to keratinocytes.

Langerhans cells are dendritic cells but are members of the immune system and function as antigen-presenting cells. They have also been

found in other parts of the body, including the oral cavity and lymph nodes.

Merkel cells are found in the basal epidermis and appear function in concert with nerve fibers that are closely associated with them. At the electron microscopic level, their cytoplasm contains numerous membrane-bound granules that resemble those of catecholamine-producing cells.

New words

epidermis — эпидермис
dermis — дерма
largest — самый большой
approximately — приблизительно
weight — вес
to protect — защищать
injury — рана
cytoplasmic — цитоплазматический
several — несколько
level — уровень
flat — плоский
palm — ладонь
thick — толстый
pigment — пигмент
melanin — меланин
nerve — нерв
closely — тесно

Запомните следующие словосочетания, в которых артикль не употребляется.

- 1) at — school;
- 2) at — home;
- 3) at — work.

Вставьте артикль, где необходимо.

1. I have two ... sisters. My ... sisters are ... students.
2. We are at ... home.
3. My ... brother is not at ... home, he is at ... school.

4. My ... mother is at ... work. She is ... doctor.
5. I am not ... doctor.
6. I have no ... sisters.
7. He is not ... pilot.
8. I have thirty-two ... teeth.
9. He has ... child.
10. She has two ... children. Her children are at ... school.
11. Is your father at ... home? — No, he is at ... work.
12. Where is your ... brother? — He is at ... home.

Answer the questions.

1. What is epidermis?
2. What is the largest body organ?
3. How many per cents does the integument comprise of total body weight?
4. What is the main function of the integument?
5. Where it also participates in?
6. What is the outermost layer of the integument?
7. What is stratum granulosum consists of?
8. Where is the a thin, transitional zone of flat eosinophilic?
9. What keratin proteins provide?
10. What cells produce the pigment melanin?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) rain; b) epidermis; c) dermis;
- 2) a) weight; b) person; c) poster;
- 3) a) palm; b) foot; c) shoes;
- 4) a) brush; b) pigment; c) skin;
- 5) a) lash; b) wound; c) injury.

ЛЕКЦИЯ № 4. Dermis

Dermis is a connective tissue layer of mesodermal origin subjacent the epidermis and its basement membrane. The dermis-epidermal junction, especially in thick skin, is characterized by numerous papillary interdigitations of the dermal connective tissue and epidermal epithelium. This increases the surface area of attachment and brings blood vessels in closer proximity to the epidermal cells. The epidermis, like epithelia in general, is devoid of blood vessel. Histologically, dermis consists of two identifiable regions.

Papillary layer, associated principally with the dermal papillae, is the most superficial layer. It consists of a loosely packed, irregular meshwork of collagen fibrils that contain fine blood vessels and nerve endings.

Reticular layer is the deeper dermal layer and consists of coarse collagen bundles intertwined with elastic fibers in a gel matrix. This layer is a typical dense irregular connective tissue.

HYPODERMIS: this layer of loose vascular connective tissue is infiltrated with adipocytes and corresponds to the superficial fascia of gross anatomy. However, since it contains the deepest portions of the cutaneous glands and hairs, it is also an important part of the skin. The hypodermis fastens the skin to underlying muscles and other structures.

New words

dermis — дерма
connective — соединительный
membrane — мембрана
junction — соединение
to be characterized by — характеризоваться чем-то
numerous — значительный
to increase — увеличивать
surface — поверхность
area — площадь

bring — приносить
to consist of — состоять из
to contain — содержать
collagen — коллагеновый

Если перед существительным употребляется прилагательное, оно стоит между артиклем и существительным.

E. g. This is a book. This is a good book.

Вставьте артикль, где необходимо

1. We have ... large ... family.
2. My granny often tells us ... long ... interesting ... stories.
3. My ... father is ... engineer. He works at ... factory. ... factory is large.
4. My ... mother is ... doctor. She works at ... large ... hospital. She is at ... work now.
5. My ... aunt is ... teacher. She works at ... school. ... school is good. My ... aunt is not at ... school now.
6. She is at ... home. She is drinking ... tea and eating ... jam. ... jam is sweet.
7. I am at home, too. I am drinking ... tea and eating ... sandwich. ... sandwich is tasty.
8. My sister is at ... school. She is ... pupil.
9. My cousin has ... big ... black ... cat. My cousin's ... cat has two ... kittens.
10. ... cat likes ... milk. ... kittens like ... milk, too.
11. I am ... engineer.
12. My ... son is ... pupil.
13. He is ... good ... pupil.
14. This is ... house.
15. This is my ... pencil.
16. You have some ... pencils, but I have no ... pencil. Give me ... pencil, please.
17. I like your ... beautiful ... flower. Give me ... flower, please.
18. My ... mother is at ... home. She is reading ... interesting ... book.
19. My ... father is not at ... home. He is at ... work. He is ... doctor.

20. He is ... good ... doctor. He works at ... hospital. ... hospital is large.

Answer the questions.

1. What is dermis?
2. What does dermis consist of?
3. What is the dermis-epidermal junction characterized by?
4. What increases the surface area of attachment?
5. What is the epidemis devoid of?
6. What is principally associated with the dermal papillae?
7. What is reticular layer consists of?
8. What is typical dense irregular connective tissue?
9. What does epidermis consists of?
10. What contains the deepest portions of the cutaneous glands?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) skin; b) knife; c) dermis;
- 2) a) fire; b) membrane; c) cell;
- 3) a) connective; b) collagen; c) table;
- 4) a) nose; b) book; c) mouth;
- 5) a) ear; b) throat; c) skirt.

ЛЕКЦИЯ № 5. Cutaneous appendages

Cutaneous appendages are all derivatives of the epidermis.

Eccrine (merocrine) sweat glands are simple, coiled, tubular glands that are widely distributed over the body. Secretory portions are tightly coiled and consist of a single layer of columnar-like pyramidal cells. They extend deep within the dermis or hypodermis, where they are surrounded by myoepithelial cells, which aid in the discharge of secretion by contraction.

Duct portions, composed of two cuboidal cell layers, are corkscrew-shaped and open onto the epidermal surface. The luminal diameter of the duct is less than that of the secretory coil. These glands are important in thermal regulation. When hypotonic sweat is released onto the body surface, heat is lost by water evaporation.

Control of the eccrine glands is mainly by the innervation of cholinergic fibers.

Apocrine sweat glands are also simple, coiled, tubular glands but are much less abundant in their distribution than eccrine glands. They can be found in the axillary, areolar, and anal regions.

Secretory portions of these glands are composed of a single layer of cuboidal or columnar cells. They are larger and have a much wider luminal diameter than eccrine sweat glands. Myoepithelial cells surround the secretory cells within the basement membrane and contract to facilitate secretion.

Duct portions are similar to those of eccrine sweat glands but open onto hair follicles instead of onto the epidermal surfaces.

Functions of these glands in humans is not at all clear. In other mammals, apocrine sweat glands are widely distributed over the body and serve a variety of functions related to olfaction and behavior. Specialized apocrine glands in the ear canal (ceruminous glands) produce a secretion in conjunction with adjacent sebaceous glands to form the protective earwax (cerumen). Apocrine sweat is normally odorless when secreted but becomes noticeable due to the activity of cutaneous bacteria. Control of the apocrine glands is hormonal and via the inner-

vation of adrenergic fibers. These glands do not begin to function until puberty.

Sebaceous glands are simple, branched holocrine acinar glands. They usually discharge their secretions onto the hair shaft within hair follicles. These glands are found in the dermis throughout the skin, except on the palms and soles.

Secretory portions consist of peripherally located, flattened stem cells that resemble basal keratinocytes. Toward the center of the acini, enlarged differentiated cells are engorged with lipid. Death and fragmentation of cells nearest the duct portion result in the holocrine mechanism of secretion.

Duct portions of sebaceous glands are composed of stratified squamous epithelium that is continuous with the hair cuticle and epidermal surface.

Functions involve the lubrication of both hairs and cornified layers of the skin, as well as resistance to desiccation.

Control of sebaceous glands is hormonal. Enlargement of the acini occurs at puberty.

Hairs are long, filamentous projections consisting of dead keratinized epidermal cells. Each hair derives from an epidermal invagination called the hair follicle, which possesses a terminal hair bulb, located in the dermis or hypodermis, from which the hair shaft grows. Bundles of smooth muscle cells, called arrector pili muscles, are attached to the hair follicle at one end and the papillary dermis at the other. Contraction of these muscles raise the hairs and dimple the epidermis («goose flesh»). The follicles and associated sebaceous glands are known as pilosebaceous units.

Nails, like hair, are a modified stratum corneum of the epidermis. They contain hard keratin that forms in a manner similar to the formation of hair. Cells continually proliferate and keratinize from the stratum basale of the nail matrix.

New words

cutaneous — кожный

appendage — покров

coiled — намотанный

tubular — трубчатый

widely — широко
to distribute — распространять
columnar-like — колоночноподобный
pyramidal — пирамидальный
surface — поверхность
duct portions — части трубочки
corkscrew-shaped — имеющий форму штопора
luminal — люминал
thermal — тепловой
innervation — иннервация
abundant — в изобилии
to facilitate — облегчать

Часто, при первом упоминании предмета, тем не менее не рекомендуется перед ним употреблять определенный артикль:

- 1) если упоминаемый предмет является единственным в мире:
E. g. The sun is shining brightly;
- 2) если этот предмет является определенным по ситуации:
E. g. Put the book on the table.

Вставьте артикль, где необходимо.

1. What's ... weather like today? — ... weather is fine.
2. ... sun is yellow.
3. ... sky is grey today.
4. ... earth is ... planet.
5. We had ... English lesson yesterday. ... teacher asked me many ... questions. ... questions were difficult.
6. Where is your ... brother? — He is at ... home. He is in his ... room. He is sitting at ... table. He is doing his ... homework. ... homework is difficult.
7. Our ... cat is sitting on ... sofa.
8. It is very dark in ... room. Turn on ... light, please.
9. Nick went into ... bathroom, turned on ... water and washed his hands.
10. This is ... good ... book. Take ... book from ... table. Put this ... book into ... bookcase.

11. ... weath er is fine today. ... sky is blue. ... sun is shining brightly in ... blue ... sky.
12. This is ... boy. ... boy is ... school. He is ... pupil.
13. This ... boy is my ... brother's friend.
14. He has ... cat, but he has no ... dog.
15. He likes his ...cat.
16. He gives... cat ... milk every day.
17. Yesterday I received ... letter from my ... friend. ... letter was interesting.
18. We live in ... big house. I like ... house very much.
19. Are you ... worker? — No, I am ... student.
20. Is this ... table? — Yes, this is a table.

Answer the questions.

1. What are all derivatives of the epidermis?
2. What do secretory portions consist of?
3. How much do secretory portions extend?
4. What are duct portions composed of?
5. In what regulation are glands important?
6. What is surrounded by myoepithelial cells?
7. What is the result in the holocrine mechanism of secretion?
8. What are duct portions of sebaceous glands composed of?
9. What does each hair derive from?
10. What contain hard keratin?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) cutaneous; b) skin; c) face;
- 2) a) cold; b) heat; c) thermal;
- 3) a) mouth; b) nose; c) arm;
- 4) a) nail; b) hair; c) skin;
- 5) a) neck; b) head; c) string.

ЛЕКЦИЯ № 6. Matter

Matter is anything that occupies space, possesses mass and can be perceived by our sense organs. It exists in nature in three, usually interconvertible physical states: solids, liquids and gases. For instance, ice, water and steam are respectively the solid, liquid and gaseous states of water. Things in the physical world are made up of a relatively small number of basic materials combined in various ways. The physical material of which everything that we can see or touch is made is matter. Matter exists in three different states: solid, liquid and gaseous. Human senses with the help of tools allow us to determine the properties of matter. Matter can undergo a variety of changes — physical and chemical, natural and controlled.

Chemistry and physics deal with the study of matter, its properties, changes and transformation with energy. There are two kinds of properties: physical — colour, taste, odour, density, hardness, solubility and ability to conduct electricity and heat; in solids the shape of their crystals is significant, freezing and boiling points of liquids.

Chemical properties are the changes in composition undergone by a substance when it is subjected to various conditions. The various changes may be physical and chemical. The physical properties are temporary. In a chemical change the composition of the substance is changed and new products are formed. Chemical properties are permanent.

It is useful to classify materials as solid, liquid or gas (though water, for example, exists as solid (ice), as liquid (water) and as gas (water vapour). The changes of state described by the terms solidify (freeze), liquify (melt), vapourise (evaporate) and condense are examples of physical changes. After physical change there is still the same material. Water is water whether it is solid, liquid or gas. Also, there is still the same mass of material. It is usually easy to reverse a physical change.

New words

matter — материя
anything — все
to occupy — занимать

space — пространство
to possesses — владеть, обладать
mass — масса
sense — чувство
organ — орган
steam — пар
to exist — существовать
can — мочь
to undergo — подвергать
variety — разнообразие
change — перемена
physical — физический
chemical — химический
natural — природный
transformation — трансформация
colour — цвет
taste — вкус
odour — запах
density — плотность
hardness — твердость
solubility — растворимость
ability — возможность
to conduct — проводить
permanent — постоянный

Существует огромное количество так называемых застывших словосочетаний, в которых артикль употребляется или отсутствует традиционно. Эти словосочетания приходится заучивать наизусть.

Запомните следующие конструкции.

There is a ...
Where is the ...?

Запомните также следующие предложения.

The (book) is on the (table).
Но: The (book) is on a little (table).

Вставъте артикль, где необходимо.

1. Where is ... soup? — ... soup is in ... big saucepan on ... gas-cooker.
2. Where are ... cut lets? — ... cutlets are in ... refrigerator on ... little plate.
3. There is no ... bread on ... table. Where In ... bread?
4. There is ... little brown coffee-table in our ... room in ... front of ... sofa
5. Where is ... table in your ... room?
6. There is ... thick carpet on ... floor in my mother's room.
7. Is your brother at ... home? — No, he is at ... work. He works at ... big factory. He is ... engineer.
8. My sister has many ... books. ... books are in ... big bookcase.
9. ... weather is fine today. Let's go and play in ... yard.
10. There are many ... children in ... yard. They are playing with ... ball.
11. Where is ... cat? — ... cat is on ... sofa
12. Where is ... book? — ... book is on ... shelf.
13. Where are ... flowers? — ... flowers are in ... beautiful vase.
14. Where is ... vase? — ... vase is on ... little table near ... window.
15. Open ... win dow, please. ... weather is fine today.
16. I can see ... sun in ... sky. I can see ... nice little bird. ... bird is sitting in ... big tree. ... tree is green.
17. There is ... little white cloud in ... sky.
18. We have ... large room.
19. There is ... big sofa in ... room and ... little lamp on ... wall over ... sofa
20. I like to sit on ... sofa and read ... good book.

Answer the questions.

1. What is matter?
2. What does matter occupy?
3. Where does matter exist?
4. What are things in the physical world made up of?
5. What states does matter exist in?
6. What can matter undergo?
7. How many kinds of properties are there?

8. Are chemical properties permanent?
9. What may the various changes be?
10. Is it easy to reverse a physical change?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) nothing; b) anything; c) everything;
- 2) a) sense; b) feeling; c) gas;
- 3) a) ring; b) odour; c) taste;
- 4) a) colour; b) green; c) table;
- 5) a) feet; b) arms; c) molecule.

ЛЕКЦИЯ № 7. Skeletal system

The components of the skeletal system are derived from mesenchymal elements that arise from mesoderm and neural crest. Mesenchymal cells differentiate into fibroblasts, chondroblasts, and osteoblasts, which produce connective tissue, cartilage, and bone tissue, respectively. Bone organs either develop directly in mesenchymal connective tissue (intramembranous ossification) or from preformed cartilage models (endochondral ossification). In general, the skeletal muscles differentiate from paraxial mesoderm. The splanchnic mesoderm gives rise to cardiac and smooth muscle.

The integument consists of the epidermis and its derivatives (glands, hairs, nails), and the underlying dermis. The epidermis is derived from ectoderm, whereas the dermis is formed from mesenchyme. Melanocytes, which may occur in both layers, originate from neural crest.

The skeletal system develops from paraxial mesoderm, which forms a column of tissue blocks, called the somites, on either side of the neural tube. Each somite becomes differentiated into a ventromedial part, the sclerotome, and a dorsolateral part, the dermomyotome. By the end of the fourth week, the sclerotome cells form embryonic connective tissue, known as mesenchyme. Mesenchyme cells migrate and differentiate to form fibroblasts, chondroblasts, or osteoblasts.

Bone organs are formed by two methods.

Flat bones are formed by a process known as intramembranous ossification, in which bones develop directly within mesenchyme.

Long bones are formed by a process known as endochondral ossification, in which mesenchymal cells give rise to hyaline cartilage models that subsequently become ossified.

Skull formation. The neurocranium provides protection around the brain, and the viscerocranium forms the skeleton of the face.

Neurocranium is divided into two portions:

The membranous neurocranium consists of flat bones that surround the brain as a vault. The bones appose one another at sutures and fontanelles, which allow overlap of bones during birth and remain mem-

ranous until adulthood. Palpation of the anterior fontanelle, where the two parietal and frontal bones meet, provides information about the progress of ossification and intracranial pressure.

The cartilaginous neurocranium (chondro-cranium) of the base of the skull is formed by fusion and ossification of number of separate cartilages along the median plate.

Viscerocranium arises primarily from the first two pharynge arches.

Appendicular system: The pectoral and pelvic girdles and the limbs comprise the appendicular system.

Except for the clavicle, most bones of the system are end chondral. The limbs begin as mesenchymal buds with an apical ectodermal ridge covering, which exerts an inductive influence over the mesenchyme.

Bone formation occurs by ossification of hyaline cartilage models.

The process begins at the end of the embryonic period in the primary ossification centers, which are located in the shaft, or diaphysis, of the long bones. At the epiphyses, or bone extremities, ossification begins shortly after birth.

The cartilage that remains between the diaphysis and the epiphyses of a long bone is known as the epiphysial plate. It is the site of growth of long bones until they attain their final size and the epiphysial plate disappears.

Vertebral column.

During the fourth week, sclerotome cells migrate medially to surround the spinal cord and notochord. After proliferation of the caudal portion of the sclerotomes, the vertebrae are formed, each consisting of the caudal part of one sclerotome and cephalic part of the next.

While the notochord persists in the areas of the vertebral bodies, it degenerates between them, forming the nucleus pulposus. The latter, together with surrounding circular fibers of the annulus fibrosis, forms the intervertebral disc.

New words

skeletal — скелетный
mesoderm — мезодерма
neural — нервный
crest — гребень
cartilage — хрящ

fibroblasts — фибробласты
chondroblasts — хондробласты
osteoblasts — остеобласты
paraxial — параксиальный
which — который
may — мочь, может
flat — плоский
bone — кость
to provide — снабжать
protection — защита
long — длинный

Запомните следующее застывшее словосочетание.

In front

Запомните следующие конструкции, требующие неопределенного артикля.

I have a ...
He has a ...
I see a ...
I am a ...
He is a ...
She is a ...
This is a ...
That is a ...
It is a ...
There is a ...

Вставьте артикль, где необходимо.

1. We have ... big dog. ... dog is very clever.
2. My friend has ... very good computer.
3. This ... boy is big. He is ... student.
4. There is ... very big piano in ... hall.
5. This is ... tree and that is not ... tree. It's ... bush.
6. I am ... boy. I am ... pupil. I learn at ... school.
7. My sister is at ... work. She is ... secretary. She works at ... large office.

8. This is ... very difficult question. I don't know ... answer to it.
9. Do you see ... little girl with ... big ball in her ... hands? She is ... pupil of our ... school.
10. There was ... beautiful flower in this ... vase yesterday. Where is ... flower now?

Answer the questions.

1. Where the components of the skeletal system are derived from?
2. What do mesenchymal cells differentiate into?
3. What produces connective tissue, cartilage, and bone tissue?
4. What does the splanchnic mesoderm give rise to?
5. What does the integument consist of?
6. What is the skeletal system developed from?
7. How many portions is neurocranium divided into?
8. What does the membranous neurocranium consist of?
9. Where does viscerocranium arise primarily?
10. During what week do sclerotome cells migrate?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) bone; b) pen; c) skeletal;
- 2) a) strong; b) weak; c) powerful;
- 3) a) water; b) rain; c) steam;
- 4) a) wind; b) storm; c) easy;
- 5) a) hot; b) sun; c) winter.

ЛЕКЦИЯ № 8. Muskular system

Skeletal (voluntary) system.

The dermomyotome further differentiates into the myotome and the dermatome.

Cells of the myotome migrate ventrally to surround the intraembryonic coelom and the somatic mesoderm of the ventrolateral body wall. These myoblasts elongate, become spindle-shaped, and fuse to form multinucleated muscle fibers.

Myofibrils appear in the cytoplasm, and, by the third month, cross-striations appear. Individual muscle fibers increase in diameter as myofibrils multiply and become arranged in groups surrounded by mesenchyme.

Individual muscles form, as well as tendons that connect muscle to bone.

Trunk musculature: By the end of the fifth week, body-wall musculature divides into a dorsal epimere, supplied by the dorsal primary ramus of the spinal nerve, and a ventral hypomere, supplied by the ventral primary ramus.

Epimere muscles form the extensor muscles of the vertebral column, and hypomere muscles give rise to lateral and ventral flexor musculature.

The hypomere splits into three layers. In the thorax, the three layers form the external costal, internal intercostal, and transverse thoracic muscle.

In the abdomen, the three layers form the external oblique, internal oblique, and transverse abdomii muscles.

Head musculature.

The extrinsic and intrinsic muscles of the tongue are thought to be derived from occipital myotomes that migrate forward.

The extrinsic muscles of the eye may derive from preoptic myotomes that originally surround the prochordal plate.

The muscles of mastication, facial expression, the pharynx, and the larynx are derived from different pharyngeal arches and maintain their innervation by the nerve of the arch of origin.

Limb musculature originates in the seventh week from soma mesoderm that migrates into the limb bud. With time, the limb musculature splits into ventral flexor and dorsal extensor groups.

The limb is innervated by spinal nerves, which penetrate the limb bud mesodermal condensations. Segmental branches of the spinal nerves fuse to form large dorsal and ventral nerves.

The cutaneous innervation of the limbs is also derived from spinal nerves and reflects the level at which the limbs arise.

Smooth muscle: the smooth muscle coats of the gut, trachea, bronchi, and blood vessels of the associated mesenteries are derived from splanchnic mesoderm surrounding the gastrointestinal tract. Vessels elsewhere in the body obtain their coat from local mesenchyme.

Cardiac muscle, like smooth muscle, is derived from splanchnic mesoderm.

New words

migrate — мигрировать
ventral — брюшной
to surround — окружать
somatic — соматический
cytoplasm — цитоплазма
spindle-shaped — веретенообразный
to fuse — плавить
cross-striations — поперечные бороздчатости
to appear — появляться
extensor — разгибающая мышца
dorsal — спинной
primary — первичный
ramus — ветвь
split — раскол
extrinsic — внешний
intrinsic — внутренний

vertebral — позвоночный
arche — дуга
abdomen — живот
facial — лицевой
expression — выражение
to penetrate — проникать
segmental — сегментальный
branch — ветвь

Запомните следующие застывшие словосочетания.

In the middle
In the corner
To the right
To the left

Вставьте артикль, где необходимо.

1. There is ... thick red ... carpet in my ... room. ... carpet is on ... floor in ... front of ... sofa.
2. Where is ... table? — His ... table is near ... window.
3. I can see ... fine ... vase on ... shelf. Is it your ... vase?
4. We have no ... piano in our ... living-room.
5. My ... uncle is ... married. He has ... beautiful wife. They have ... son, but they have no ... daughter.
6. I can see ... nice ... coffee-table in ... middle of ... room to ... right of ... door. It is ... black and ... red. I like ... coffee-table.
7. Our ... TV-set is on ... little ... table in ... corner of ... room.
8. There is ... beautiful picture in my father's ... study. ... picture is on ... wall to ... left of ... window.
9. My aunt's flat is in ... new house.
10. There is ... living-room, ... bedroom, ... study, ... bathroom and ... kitchen in ... flat.
11. ... bedroom is ... large room with ... two windows.
12. ... room is light as ... windows are large.
13. There are ... white curtains on ... windows.
14. There are ... two beds with ... large pillows on them.

15. There are ... small tables near ... beds.
16. There are ... lamps on them. To the left of ... door there is ... dressing-table with ... looking — glass on it.
17. There is ... low chair at the dressing — table.
18. There are ... several pictures on ... pale green walls.
19. There is ... thick carpet on ... floor.
20. ... carpet is dark green. ... room is very cosy.

Answer the questions.

1. What does the muscular system consist of?
2. What surround the intraembryonic coelom?
3. What form do myoblasts become?
4. Where myofibrils appear?
5. By what week body-wall musculature are divided?
6. What is the limb innervated by?
7. What does trunk musculature consist of?
8. Where is the cutaneous innervation of the limbs derived from?
9. Where is cardiac muscle derived from?
10. What do smooth muscles coat?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) abdomen; b) back; c) belly;
- 2) a) last; b) primary; c) first;
- 3) a) facial; b) lateral; c) appearance;
- 4) a) textbook; b) backbone; c) vertebral;
- 5) a) dark; b) night; c) day.

ЛЕКЦИЯ № 9. Skeleton

The bones of our body make up a skeleton. The skeleton forms about 18% of the weight of the human body.

The skeleton of the trunk mainly consists of spinal column made of a number of bony segments called vertebrae to which the head, the thoracic cavity and the pelvic bones are connected. The spinal column consists of 26 spinal column bones.

The human vertebrae are divided into differentiated groups. The seven most superior of them are the vertebrae called the cervical vertebrae. The first cervical vertebra is the atlas. The second vertebra is called the axis.

Inferior to the cervical vertebrae are twelve thoracic vertebrae. There is one rib connected to each thoracic vertebrae, making 12 pairs of ribs. Most of the rib pairs come together ventrally and join a flat bone called the sternum.

The first pairs of ribs are short. All seven pairs join the sternum directly and are sometimes called the «true ribs». Pairs 8, 9, 10 are «false ribs». The eleventh and twelfth pairs of ribs are the «floating ribs».

Inferior to the thoracic vertebrae are five lumbar vertebrae. The lumbar vertebrae are the largest and the heaviest of the spinal column. Inferior to the lumbar vertebrae are five sacral vertebrae forming a strong bone in adults. The most inferior group of vertebrae are four small vertebrae forming together the coccyx.

The vertebral column is not made up of bone alone. It also has cartilages.

New words

skeleton — скелет

make up — составлять

weight — вес

trunk — туловище

mainly — главным образом
thoracic cavity — грудная впадина
axis — ось
spinal column — позвоночник
inferior — низший
rib — ребро
pair — пара
sacral — сакральный
coccyx — копчик
floating — плавающий
forming — формирующий
cartilage — хрящ

Если после конструкции there is (there are) стоит неисчисляемое существительное во множественном числе, вместо опущенного неопределенного артикля часто (не обязательно) употребляется слово «some».

Вставьте артикль, где необходимо.

1. There is ... sofa in ... corner of ... room.
2. There are ... cushions on ... sofa.
3. There are ... books on ... shelf. Give me ... book, please.
4. Look into ... refrigerator. What can you see on ... shelves?
5. There is ... butter in ... butter-dish.
6. There is ... sausage, but there is no ... cheese.
7. There are ... eggs, ... apples.
8. There is ... orange, ... lemon, and ... some jam in ... little vase.
9. There is juice in this ... cup. May I drink ... juice?
10. There are ... girls in ... yard, but I can see no ... boys. Where are ... boys?
11. ... boys are playing football at ... stadium.
12. I have ... colour TV-set. ... TV-set is on ... little table in ... corner of ... room.
13. There is ... book, ... pen, and ... paper on my ... writing-desk.
14. My ... brother is ... teacher. He works at ... school.

15. He has ... very good books. His ... books are in ... big bookcase.
16. There is ... tea in my ... glass. There is no ... tea in my ... friend's ... glass.
17. His ... glass is empty.
18. Where is ... coffee-table in your ... room? — ... coffee-table is in ... front of ... sofa
19. There is ... cup on ... coffee-table and ... newspapers.
20. There is ... coffee in ... cup.

Answer the questions.

1. What do the bones of our body make up?
2. How many per cents does the skeleton form?
3. What does the skeleton of the trunk mainly consist of?
4. How many bones does the spinal column consist of?
5. What groups are the human vertebrae divided into?
6. How many groups are the most superior?
7. How is the first cervical vertebra called?
8. Are the first pairs of ribs short?
9. How is the second vertebra called?
10. What forms the coccyx?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

ЛЕКЦИЯ № 10. Muscles

Muscles are the active part of the motor apparatus; their contraction produces various movements.

The muscles may be divided from a physiological standpoint into two classes: the voluntary muscles, which are under the control of the will, and the involuntary muscles, which are not.

All muscular tissues are controlled by the nervous system. The involuntary muscles are controlled by a specialized part of the nervous system.

When muscular tissue is examined under the microscope, it is seen to be made up of small, elongated threadlike cells, which are called muscle fibres, and which are bound into bundles by connective tissue.

There are three varieties of muscle fibres:

- 1) striated muscle fibres, which occur in voluntary muscles;
- 2) unstriated muscles which bring about movements in the internal organs;
- 3) cardiac or heart fibres, which are striated like (1), but are otherwise different. Both unstriated and cardiac muscles are involuntary.

All living cells can move to some degree, but this ability is highly developed in muscles. Muscle tissue comprises about 40% of human weight. Muscle consists of threads, or muscle fibers, supported by connective tissue, which act by fiber contraction: the fibers can shorten to two — thirds of their resting length. There are two types of muscles smooth and striated. Smooth, or «involuntary» muscles are found in the walls of all the hollow organs and tubes of the body, such as blood vessels and intestines. These react slowly to stimuli from the autonomic nervous system. The striated, or «voluntary» muscles of the body mostly attach to the bones and move the skeleton. Under the microscope their fibres have a cross — striped appearance. Striated muscle is capable of fast contractions. The heart wall is made up of special type of striated muscle fibres called cardiac muscle. Muscles vary greatly in structure and function in different organs and animals: some inverteb-

rates have only smooth muscles, while all the arthropods have only striated muscles. The body is composed of about 600 skeletal muscles. In the adult about 35—40% of the body weight is formed by the muscles. According to the basic part of the skeleton all the muscles are divided into the muscles of the trunk, head and extremities.

According to the form all the muscles are traditionally divided into three basic groups: long, short and wide muscles. Long muscles compose the free parts of the extremities. The wide muscles form the walls of the body cavities. Some short muscles, of which stapedus is the smallest muscle in the human body, form facial musculature.

Some muscles are called according to the structure of their fibres, for example radiated muscles; others according to their uses, for example extensors or according to their directions, for example, — oblique. The muscles are formed by a mass of muscle cells. The muscle fibres are connected together by connective tissue. There are many blood vessels and nerves in the muscles.

Great research work was carried out by many scientists to determine the functions of the muscles. Three basic methods of study were used: experimental work on animals, the study of the muscles on a living human body and on the cadavers. Their work helped to establish that the muscles were the active agents of motion and contraction.

New words

muscles — мышцы
active — активный
part — часть
motor apparatus — двигательный аппарат
various — различный
movement — движение
elongated — удлинённый
threadlike — нитевидный
to be bound — быть связанным
some — некоторый
degree — степень
this — этот
ability — возможность

capable — способность
scientist — ученый
basic — основной
experimental — экспериментальный
work — работа

Запомните застывшие словосочетания.

In the morning. In the evening to come home.
In the afternoon. At night to leave home for work (school).
To go to bed. to go to school at half past five.
To go to work, to go home at a quarter past five.

Вставьте артикль, где необходимо.

1. My ... friend has to get up early in ... morning because he goes to ... school.
2. That's why he usually goes to ... bed early in ... evening.
3. ... weather was very bad in ... morning yesterday.
4. ... sky was grey and it was raining.
5. But in ... middle of ... day ... weather began to change.
6. ... rain stopped and ... sun appeared from behind ... clouds.
7. In ... afternoon it was very warm.
8. I did not want to stay at ... home and went into ... yard.
9. There were ... boys and ... girls in ... yard.
10. We played in ... yard till late in ... evening.
11. When I came ... home, I drank ... tea, ate ... sandwich and went to ... bed at once.
12. I slept very well at ... night.
13. My brother is ... pupil. He goes to ... school. He goes to ... school in ... morning. He has five or six ... lessons every day. In ... afternoon he goes home. At ... home he does his ... homework.
14. In ... evening he reads ... books. He usually goes to ... bed at ... half past ten. At ... night he sleeps.
15. My father goes to ... work in ... morning and comes ... home in ... evening.
16. I get up at ... half past seven in ... morning and go to ... bed at ... quarter to eleven in ... evening.

17. When does your mother leave ... home for ... work?
18. She leaves ... home for ... work at ... quarter past eight.
19. When do you leave ... home for ... school?
20. I leave ... home for ... school at ... half past ... eight.

Answer the questions.

1. What are the muscles?
2. What contraction produces various movements?
3. What may the muscles be divided from?
4. What does the nervous system control?
5. What does the muscular tissue consist of?
6. How many varieties of muscle fibres are there?
7. How many per cents does muscle tissue comprise?
8. For how many groups are all the muscles traditionally divided?
9. How sometimes are muscles called?
10. What does connective tissue connect?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) work; b) job; c) rest;
- 2) a) class; b) student; c) sea;
- 3) a) home; b) house; c) garage;
- 4) a) lift; b) down; c) rise;
- 5) a) white; b) pink; c) scarlet.

ЛЕКЦИЯ № 11. Bones

Bone is the type of connective tissue that forms the body's supporting framework, the skeleton. In addition, bones act as levers for muscles and serve to protect the internal organs from injury. They always act as a storehouse for calcium and phosphorus. The bone marrow inside the bones is the body's major producer of both red and white blood cells.

Bones vary somewhat according to a person's age and sex. The bones of women are generally lighter than those of men, while children's bones are more resilient than those of adults and tend to bend rather than fracture when abnormal pressure is applied to them. Bones also respond to certain physical physiological changes. For example, bones tend to atrophy, or waste away, when muscular activity in a region is decreased, as when a limb is afflicted with a paralytic disease.

Bones are generally classified in two ways. When classified on the basis of their shape, they fall into four categories: flat bones, such as the ribs; long bones, such as the thigh bone; short bones, such as the wrist bones; and irregular bones, such as the vertebrae. When classified on the basis of how they develop, bones are divided into two groups: endochondral bones and intramembraneous bones. Endochondral bones, such as the long bones and the bones at the base of the skull, develop from cartilage tissue. Intramembraneous bones, such as the flat bones of the roof of the skull, are not formed from cartilage but develop under or within a connective tissue membrane. Although endochondral bones and intramembraneous bones form in different ways, they have the same structure.

The formation of bone tissue (ossification) begins early in embryological development, when the embryo is two months old. The bones continue to grow during childhood and adolescence, reaching their full size when the person is about 25.

Most adult bone is composed of two types of tissue: an outer layer of compact bone and an inner layer of spongy bone. Compact bone is

strong and dense. Spongy bone is light and porous and contains bone marrow. The amount of each type of tissue varies in different bones. The flat bones of the skull consist almost entirely of compact bone, with very little spongy tissue. In a long bone, such as the thigh bone, the shaft, called the diaphysis, is made up largely of compact bone. While the ends, called epiphyses, consist mostly of spongy bone. In a long bone, marrow is also present inside the shaft, in a cavity called the medullary cavity.

Surrounding every bone, except at the surface where it meets another bone, is a fibrous membrane called the periosteum. The outer layer of the periosteum consists of a network of densely packed collagen fibres and blood vessels. This layer serves for the attachment of tendons, ligaments, and muscles to the bone and is also important in bone repair.

The inner layer of the periosteum has many fibres, called fibres of Sharpey, which penetrate the bone tissue, anchoring the periosteum to the bone. The inner layer also has many bone-forming cells, or osteoblasts, which are responsible for the bone's growth in diameter and the production of new bone tissue in cases of fracture, infection.

In addition to the periosteum, all bones have another membrane, the endosteum. It lines the marrow cavity as well as the smaller cavities within the bone. This membrane, like the inner layer of the periosteum, contains osteoblasts, and is important in the formation of new bone tissue.

Bone tissue consists largely of a hard substance called the matrix. Embedded in the matrix are the bone cells, or osteocytes. Bone matrix consists of both organic and inorganic materials. The organic portion is made up chiefly of collagen fibres. The inorganic portion of matrix constitutes about two thirds of a bone's total weight. The chief inorganic substance is calcium phosphate, which is responsible for the bone's hardness. If the calcium were removed from a bone, the bone would lose its rigidity and become flexible. If the organic portion were burned out, or calcined, the bone would retain its shape but crumble under the slightest pressure. In the formation of intramembraneous bone, certain cells of the embryonic connective tissue congregate in the area where the bone is to form. Small blood vessels soon invade the area, and the cells, which have clustered in strands, undergo certain changes to be-

come osteoblasts. The cells then begin secreting collagen fibers and an intercellular substance. This substance, together with the collagen fibers and the connective tissue fibers already present, is called osteoid. Osteoid is very soft and flexible, but as mineral salts are deposited it becomes hard matrix. The formation of endochondral bone is preceded by the formation of a cartilaginous structure similar in shape to the resulting bone. In a long bone, ossification begins in the area that becomes the center of the shaft. In this area, cartilage cells become osteoblasts and start forming bone tissue in the same manner as intramembraneous bone is formed. This process spreads toward either end of the bone, but while this is happening the cartilage cells at each end also become osteoblasts and start forming bone. The only areas where cartilage is not soon replaced by bone tissue are the regions where the shaft joins the two epiphyses. These areas, called epiphyseal plates, are responsible for the bone's continuing growth in length. As the bone grows, each epiphyseal plate forms new cartilage, which is then replaced by bone. When the epiphyseal plates stop forming cartilage, the bone stops growing. The bone's growth in diameter is due to the addition of layers of bone around the outside of the shaft. As they are formed, layers of bone on the inside of the shaft are removed. Thus, when a long bone grows in diameter, the compact bone of the shaft does not get thicker, but the marrow cavity gets larger. In all bones, the matrix is arranged in layers called lamellae. In compact bone, the lamellae are arranged concentrically around blood vessels, and the space containing each blood vessel is called a Haversian canal. The osteocytes are located between the lamellae, and the canaliculi containing their cellular extensions connect with the Haversian canals, allowing the passage of nutrients and other materials between the cells and the blood vessels. Besides the blood vessels in the Haversian canals, bone tissue contains many smaller blood vessels that extend from the periosteum and enter the bone through small openings called canals of Volkmann. These vessels lead to those in the Haversian canals. In long bones there is an additional blood supply, the nutrient artery, which represents the chief blood supply to the marrow. The structure of spongy is similar to that of compact bone. However, there are fewer Haversian canals, and the lamellae are arranged in a less regular fashion, forming spicules and strands known as trabeculae.

New words

bone — кость
in addition — в дополнение
to serve — служить
to protect — защищать
internal — внешний
calcium — кальций
phosphorus — фосфор
inside — внутри
major — главный
red — красный
white — белый
blood cells — кровяные клетки
age — возраст
sex — пол
changes — перемены
to tend — иметь тенденцию
atrophy — атрофия
spongy — губчатый
outer — внешний
tendon — сухожилие
ligament — связка
responsible — ответственный, надежный
inner — внутренний
flexible — гибкий
periosteum — надкостница
osteoblast — остеобласт (клетка, образующая кость)
rigidity — неподвижность
to retain — удерживать, сохранять
shape — движение
but — но
to crumble — крошиться
to congregate — собираться
epiphyseal — относящийся к эпифизу
shaft — ствол, тело (длинной) кости, диафиз

spicules — выросты, отростки

strand — пучок

known as — известный как

***Перед названиями месяцев и дней недели
артикуль не употребляется.***

School begins in September.

We rest on Sunday.

Запомните следующие застывшие словосочетания.

After — work

After — school

From — work

From — school

***Перед порядковыми числительными
употребляется определенный артикуль.***

Our classroom is on the second floor.

Today is the tenth of May.

Вставьте артикуль, где необходимо.

1. There are three rooms and ... kitchen in our new flat.
2. My new dress is made of ... silk.
3. If you want to write something on ... blackboard, you must have ... piece of ... chalk.
4. Are there any pupils in ... classroom?
5. I have ... new English book. ... book is very interesting.
6. There is ... garden in ... front of our school. ... garden is not large, but it is very nice.
7. ... May is ... fifth month of the year.
8. ... Saturday is ... sixth day of the week.
9. ... Sunday is ... day off.
10. My friends live in ... small town. It is ... new town.
11. ... streets in ... town are broad and straight.

12. There are ... beautiful buildings in them.
13. ... town is very green, and so ... air is fresh.
14. There are ... beautiful parks and gardens in ... town.
15. ... people like to go there after ... work.
16. In ... evening you can hear ... sounds of ... music from ... parks.
17. There are ... schools, ... libraries, ... hospital, ... theatre, ... cine-
mas, ... polyclinics and ... kindergartens in ... town.
18. This is ... classroom. ... classroom is huge and light.
19. There is ... picture on ... wall.
20. What is... date today? It is ... seventh of ... December.

Answer the questions.

1. What do bones form?
2. How do bones act?
3. What is the body's major producer of both red and white blood
cells?
4. What tendencies do bones have?
5. In how many ways are bones generally classified?
6. When does the formation of bone tissue begin?
7. Is compact bone strong or not?
8. What is called periosteum?
9. In what way does the bone lose its rigidity and become flexible?
10. Where are the osteocytes located?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

ЛЕКЦИЯ № 12. Skull

The extensive chapter covers the major bones of the skeleton as well as their associated muscles and tendons. Blood supply and innervation are reviewed for each muscle group. Bones of the skull may be classified as belonging to the neurocranium (the portion of the skull that surrounds and protects the brain) or the viscerocranium (i. e., the skeleton of the face). Osteology: bones of the neurocranium: Frontal, Parietal, Temporal, Occipital, Ethmoid, Sphenoid.

Bones of the viscerocranium (surface): Maxilla, Nasal, Zygomatic, Mandible. Bones of the viscerocranium (deep): Ethmoid, Sphenoid, Vomer, Lacrimal, Palatine, Inferior nasal concha. Articulations: Most skull bones meet at immovable joints called sutures. The sole exception is the temporomandibular joint, a synovial joint that has a hinge-gliding movement. The coronal suture is between the frontal and the parietal bones. The sagittal suture is between two parietal bones. The lambdoid suture is between the parietal and the occipital bones. The bregma is the point at which the coronal suture intersects the sagittal suture and is the site of the anterior fontanelle in an infant.

The lambda is the point at which the sagittal suture intersects the lambdoid suture and is the site of the posterior fontanelle in an infant. The pterion is the point on the lateral aspect of the skull where the greater wing of the sphenoid, parietal, frontal, and temporal bones converge. The temporomandibular joint is between the mandibular fossa of the temporal bone and the condylar process of the mandible.

The parotid gland is the largest of the salivary glands and has a dense connective tissue capsule. Structures found within the substance of this gland include the following: Motor branches of the facial nerve. CN VII enters the parotid gland after emerging from the stylomastoid foramen at the base of the skull. Superficial temporal artery and vein. The artery is a terminal branch of the external carotid artery.

External carotid artery: Retromandibular vein, which is formed from the maxillary and superficial temporal veins.

FACE: The muscles of facial expression are derived from the second pharyngeal arch and are supplied by motor branches of CN VII Таблица 2.

Muscles of the scalp	Muscles of the mouth
Frontalis	Levator labii superioris alaeque nasi
Occipitalis	Levator labii superioris
Muscles of the ear	Zygomaticus minor
Anterior auricular	Zygomaticus major
Superior auricular	Levator anguli oris (caninus)
Posterior auricular	Risorius
Muscles of the rim of the orbit	Depressor anguli oris (triangularis)
Orbicularis oculi	Depressor labii inferioris
Corrugator supercilii	Mentalis (quadratus labii inferioris)
Muscles of the nose	Buccinator
Procerus	Orbicularis oris
Nasalis	Muscle of the neck
Platysma	Nasalis

Great auricular nerve, which is a cutaneous branch of the cervical plexus. Auriculotemporal nerve, which is a sensory branch of V3. It supplies the TMJ and conveys postganglionic parasympathetic fibers from the otic ganglion to the parotid gland. Parotid (Stensen's) duct, which enters the oral cavity at the level of the maxillary second molar. The facial artery is a branch of the external carotid artery in the neck. It terminates as the angular artery near the bridge of the nose. The facial vein parallels the course of the facial artery. It terminates by joining the anterior branch.

New words

extensive — обширный
to cover — покрывать
brain — мозг
frontal — лобная
parietal — теменная

temporal — височная
occipital — затылочная
ethmoid — решетчатая
sphenoid — сфеноидальная
maxilla — верхняя челюсть
nasal — носовой
zygomatic — скуловой
mandible — нижняя челюсть
ethmoid — решетчатая
sphenoid — клиновидная
vomer — сошник
lacrimal — слезная
palatine — небная
nasal concha — носовая раковина

Запомните следующие застывшие словосочетания.

to have (cook, make, prepare) — breakfast
— lunch
— tea
— dinner
— supper

Вставьте артикль, где необходимо.

1. ... third lesson today is ... lesson of English.
2. Pete, go to ... blackboard.
3. After school I usually go ... home.
4. My father always comes from ... work late: at eight o'clock or at ... half past night.
5. But on ... Friday he comes ... home early: at half past four or at ... quarter to five.
6. On ... Satur day and on ... Sunday he does not go to ... work.
7. I go to ... school in ... morning, so I get up early.
8. I usually get up at ... quarter past seven.
9. I go to ... bathroom, turn on ... water and wash my face and hands.
10. My father and mother also get up early in ... morning.

11. My mother works at ... office.
12. She is ... typist.
13. My father is ... doctor.
14. He works at ... polyclinic.
15. We have ... breakfast in ... kitchen.
16. We eat ... porridge and ... eggs.
17. We drink ... tea
18. My father and mother leave ... home for ... work at ... half past eight.
19. My father goes to polyclinic, and my mother goes to ... office.
20. I don't leave ... home with my parents.

Answer the questions.

1. What does the extensive chapter cover?
2. What are blood supply and innervation reviewed for?
3. How may bones of the skull be classified?
4. Enumerate the bones of the neurocranium?
5. Enumerate the bones of the viscerocranium (deep)?
6. Enumerate the bones of the viscerocranium (surface)?
7. What is the lambda?
8. Where are the muscles of facial expression derived from?
9. What are the muscles of the scalp?
10. What are the muscles of the nose?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

ЛЕКЦИЯ № 13. Neck

Cervical vertebrae: There are seven cervical vertebrae of which the first two are atypical. All cervical vertebrae have openings in their transverse processes, the foramina transversaria which, when aligned, produce a canal that transmits the vertebral artery and vein.

Atlas: This is the first cervical vertebra (C1). It has no body and leaves a space to accommodate the dens of the second cervical vertebra. Axis: This is the second cervical vertebra (C2). It has a tooth-shaped process, the dens (odontoid process), which articulates with the atlas as a pivot joint. Movement at this joint allows lateral rotation of the head. Hyoid bone is a small U-shaped bone, which is suspended by muscles and ligaments at the level of vertebra C3. It occupies the angle of the throat that separates the neck from the floor oral cavity.

Laryngeal prominence is formed by the lamina of the thyroid cartilage. It is more prominent in men than in women and children.

Cricoid cartilage. The arch of the cricoid, another laryngeal cartilage, is palpable below the thyroid cartilage and superior to the first tracheal ring (vertebral level C6). Triangles of the neck: The neck is divided into a posterior and an anterior triangle by the sternocleidomastoid muscle. These triangles are subdivided by smaller muscles into six smaller triangles. Posterior triangle is bound by the sternocleidomastoid, the clavicle, and the trapezius. The floor of the posterior triangle is formed by the splenius capitis, the levator scapulae, and the medial and posterior scalene muscles. Occipital triangle is located above the inferior belly of the omohyoid muscle. Its contents include the following: CN XI is the cranial nerve that supplies motor innervation to the trapezius and sternocleidomastoid muscles Cutaneous branches of the cervical plexus are the lesser occipital, great auricular, transverse cervical, and supraclavicular nerves.

Subclavian (omoclavicular, supraclavicular) triangle is located below the inferior belly of the omohyoid. Its contents include the following: Brachial plexus supraclavicular portion — roots, trunk the

branches of which enter this region from behind the scalenus anterior muscle. The branches include the dorsal scapular, long thoracic, subclavius, and suprascapular nerves.

The third part of the subclavian artery enters the subclavian triangle from behind the scalenus anterior muscle anterior to the brachial plexus. Branches include the transverse cervical and suprascapular arteries.

The subclavian vein passes superficial to scalenus anterior muscle. It receives the external jugular vein, a superficial vein that crosses the sternocleidomastoid muscle.

Anterior triangle is bound by the sternocleidomastoid muscle the midline of the neck, and the inferior border of the body of the mandible. Muscular triangle is bound by the sternocleidomastoid muscle, the superior belly of the omohyoid muscle, and the midline of the neck. Its contents include the infrahyoid (strap) muscles, which function to control movements the hyoid bone and larynx during speech and deglutition (swallowing). Carotid (vascular) triangle is bound by the sternocleidomastoid muscle, the superior belly of the omohyoid muscle and the posterior belly of the digastric muscle. The carotid triangle contains the following: Internal jugular vein; Common carotid artery, bifurcates at the upper border of the thyroid cartilage (i. e., vertebral level C3) to form the internal and external carotid arteries. The external carotid artery has six branches (i. e., the superior thyroid; the ascending pharyngeal, the lingual, the facial, the occipital, and the posterior auricular arteries). The supply structures of the neck and face; vagus nerve; hypoglossal nerve; internal and external laryngeal branches of the superior laryngeal branch of the vagus nerve. The internal laryngeal nerve conveys sensory information from the laryngeal mucosa above the level of the vocal folds, and the external laryngeal nerve supplies motor fibers to the cricothyroid, an intrinsic muscle of the larynx. Digastric (submandibular) triangle is bound by the anterior and posterior bellies of the digastric muscle and the inferior border of the body of the mandible. The floor of this triangle is formed by the hyoglossus and mylohyoid muscles. It contains the submandibular salivary gland. Submental triangle is bound by the anterior belly of the digastric muscle, the hyoid bone, and the midline of the neck. The floor of this

triangle is formed by the mylohyoid muscle. It contains the submental lymph nodes. Root of neck: This area communicates with the superior mediastinum through the thoracic inlet. Structures of the region include the following: subclavian artery and vein. The subclavian artery passes posterior to the scalenus anterior muscle, and the vein passes anterior to it. Branches of the artery include: vertebral artery; thyrocervical trunk, which gives rise to the inferior thyroid, the transverse cervical, and the suprascapular arteries; Internal thoracic artery.

Phrenic nerve is a branch of the cervical plexus, which arises from C3, C4, and C5. It is the sole motor nerve to the diaphragm. It crosses the anterior scalene muscle from lateral to medial to enter the thoracic inlet.

Recurrent laryngeal nerve is a branch of the vagus nerve. This mixed nerve conveys sensory information from the laryngeal mucosa below the level of the vocal folds and provides motor innervation to all the intrinsic muscles of the larynx except the cricothyroid muscle.

Thoracic duct terminates at the junction of the left subclavian and the left internal jugular veins. On the right side of the body, the right lymphatic duct terminates in a similar fashion.

Fascias of the neck: Superficial investing fascia encloses the platysma, a muscle of facial expression, which has migrated to the neck.

Deep investing fascia surrounds the trapezius and sternocleidomastoid muscles.

Retropharyngeal (visceral) fascia surrounds the pharynx.

Prevertebral fascia invests the prevertebral muscles of the neck (i. e., longus colli, longus capitis). This layer gives rise to a derivative known as the alar fascia.

The major muscle groups and their innervations. A simple method of organizing the muscles of the neck is based on two basic principles: (1) The muscles may be arranged in group according to their functions; and (2) all muscles in a group share common innervation with one exception in each group.

Group 1: Muscles of the tongue. All intrinsic muscles plus all but one of the extrinsic muscles (i. e., those containing the suffix, *glossus*)

of the tongue are supplied by CN XII. The one exception is palatoglossus, which is supplied by CN X.

Group 2: Muscles of the larynx. All but one of the intrinsic muscles of the larynx are supplied by the recurrent laryngeal branch of the vagus nerve. The sole exception is the cricothyroid muscle, which is supplied by the external laryngeal branch of the vagus.

Group 3: Muscles of the pharynx. All but one of the longitudinal and circular muscles of the pharynx are supplied by CNs X and XI (cranial portion). The sole exception is the stylopharyngeus muscle, which is supplied by CN IX.

Group 4: Muscles of the soft palate. All but one of the muscles of the palate are supplied by CNs X and XI (cranial portion). The sole exception is the tensor veli palatini, which is supplied CN V3.

Group 5: Infrahyoid muscles. All but one of the infrahyoid muscles are supplied by the ansa cervicalis of the cervical plexus (C1, C2, and C3). The exception is the thyrohyoid, which is supplied by a branch of C1. (This branch of C1 also supplies the geniohyoid muscle).

New words

neck — шея
cervical — цервикальный
vertebrae — позвоночник
transverse — поперечный
artery — артерия
vein — вена
atlas — атлант (первый шейный позвонок)
axis — ось
movement — движение
joint — сустав
to allow — позволять
lateral — боковой
rotation — вращение
head — голова
cricoid cartilage — перстневидный хрящ гортани
posterior — следующий

triangle — треугольник
 subdivided — подразделен
 scapulae — лопатка
 medial — медиальный
 scalene — лестничная мышца
 brachial plexus — плечевое сплетение
 to receive — получать
 vagus nerve — блуждающий нерв
 hypoglossal nerve — подъязычный нерв
 laryngeal branches — гортанные ветви

Запомните следующие застывшие словосочетания.

Застывшие словосочетания Таблица 3.

After breakfast	Before breakfast
After lunch	Before lunch
After tea	Before tea
After dinner	Before dinner
After supper	Before supper
At breakfast	For breakfast
At lunch	For lunch
At tea	For tea
At dinner	For dinner
At supper	For supper

Заполните пропуски, где необходимо.

1. Every day my husband goes to ... work, my son goes to ... school and I go to ... institute.
2. There is ... new school at ... corner of our street.
3. My daughter came ... home from ... school on ... Monday and said to me: « There will be ... parents' meeting on ... tenth of February at six o'clock in ... evening.
4. ... teacher told us ... very interesting story at ... lesson.
5. When ... bell rang, pupils went into ... classroom.
6. We are usually at ... school from nine o'clock in ... morning till two o'clock in ... afternoon.
7. We don't go to ... school on ... Sunday.

8. What do you do after ... breakfast? — After ... breakfast I go to ... school.
9. My granny likes to read I ... book after ... lunch.
10. ... people usually have ... breakfast in ... morning.
11. They have ... dinner in ... afternoon.
12. In ... evening ... people have ... supper.
13. Who cooks ... dinner in your family?
14. Yesterday father told us ... very interesting story at ... breakfast.
15. What did you have for ... lunch at ... school Wednesday?
16. We had ... salad and ... tea.
17. My mother never has ... supper with ... family.
18. She does not like to eat in ... evening.
19. When do you clean your teeth in ... morning: before breakfast or after ... breakfast?
20. Usually I have ... tea for ... lunch.

Answer the questions.

1. How many vertebrae are in the cervical vertebrae?
2. How many of them are atypical?
3. How is the first cervical vertebra called?
4. How is the second cervical vertebra called?
5. What does the second cervical vertebra have?
6. What movement pivot joint allows to do?
7. What is the form of hyoid bone?
8. Where is subclavian triangle located?
9. With help of what is digastric triangle bound by?
10. What are the fascias of the neck?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

ЛЕКЦИЯ № 14. Thoracic wall

There are 12 thoracic vertebrae. The vertebrae have facets on their bodies to articulate with the heads of ribs; each rib articulates with the body of the numerically corresponding vertebra and the one below it. The thoracic vertebrae have faces on their transverse processes to articulate with the tubercles of the numerically corresponding ribs. Sternum: the manubrium articulates with the clavicle and the first rib. It meets the body of the sternum at the sternal angle an important clinical landmark.

The body articulates directly with ribs 2—7; it articulates inferiorly with the xiphoid process at the xiphisternal junction. The xiphoid process is cartilaginous at birth and usually ossifies and unites with the body of the sternum around age 40.

Ribs and costal cartilages: there are 12 pairs of ribs, which are attached posteriorly to thoracic vertebrae.

Ribs 1—7 are termed «true ribs» and attach directly to the sternum by costal cartilages.

Ribs 8—10 are termed «false ribs» and attach to the costal cartilage of the rib above. Ribs 11 and 12 have no anterior attachments, and are therefore classified as both «floating ribs» and false ribs. The costal groove is located along the inferior border of each rib and provides protection for the intercostal nerve artery, and vein, ribs 1, 2, 10, 11, and 12 are atypical. Muscles: external intercostal muscles.

There are 11 pairs of external intercostal muscles. Their fibers run anteriorly and inferiorly in the intercostal spaces from the rib above to the rib below.

These muscles fill the intercostal spaces from the tubercles of ribs posteriorly to the costochondral junctions anteriorly; they are replaced anteriorly by external intercostal membranes. Internal intercostal muscles: there are 11 pairs of internal intercostal muscles. Their fibers run posteriorly and inferiorly in the intercostal spaces deep to the external layer.

These muscles fill the intercostal spaces anteriorly from the sternum to the angles of the ribs posteriorly; they are replaced posteriorly by internal intercostal membranes.

Innermost intercostal muscles: the deep layers of the internal intercostal muscles are the innermost intercostal muscles.

These muscles are separated from the internal intercostal muscles by intercostal nerves and vessels.

Subcostalis portion: Fibers extend from the inner surface of the angle of one rib to the rib that is inferior to it.

Fibers may cross more than one intercostal space, Transversus thoracis portion: Fibers attach posteriorly to the sternum. Fibers cross more than one intercostal space.

Internal thoracic vessels, branches of the subclavian arteries, run anterior to these fibers. Intercostal structures

Intercostal nerves: there are 12 pairs of thoracic nerves, 11 intercostal pairs, and 1 subcostal pair.

Intercostal nerves are the ventral primary rami of thoracic spinal nerves. These nerves supply the skin and musculature of the thoracic and abdominal walls.

Intercostal arteries: there are 12 pairs of posterior and anterior arteries, 11 intercostal pairs, and 1 subcostal pair.

Anterior intercostal arteries.

Pairs 1—6 are derived from the internal thoracic arteries.

Pairs 7—9 are derived from the musculophrenic arteries.

There are no anterior intercostal arteries in the last two spaces; these spaces are supplied by branches of the posterior intercostal arteries.

Posterior intercostal arteries: the first two pairs arise from the superior intercostal artery, a branch of the costocervical trunk of the subclavian artery.

Nine pairs of intercostal and one pair of subcostal arteries arise from the thoracic aorta.

Intercostal veins: Anterior branches of the intercostal veins drain to the internal thoracic and musculophrenic veins.

Posterior branches drain to the azygos system of veins.

Lymphatic drainage of intercostal spaces: anterior drainage is to the internal thoracic (parasternal) nodes.

Posterior drainage is to the paraaortic nodes of the posterior mediastinum.

New words

thoracic — грудной
wall — стенка
below — под
sternum — грудина
clavicle — ключица
xiphisternal — грудинный
true — правдивый
false — фальшивый
groove — углубление
above — над
anteriorly — раньше
intercostal — межреберный
subcostal — подкостный
portion — часть
transversus — поперечный
musculophrenic — мышечный грудобрюшной
paraaortic — парааортальный
mediastinum — средостение

Запомните следующее застывшее словосочетание.

I to watch _ TV

Если перед существительным стоит вопросительное или относительное местоимение, артикль опускается.

E. g. What _ colour is your cat?

I want to know what _ book you are reading.

Заполните пропуски, где необходимо.

1. My ... aunt and my ... uncle are ... doctors.
2. They work at ... hospital.
3. They get up at seven o'clock in ... morning.

4. They go to ... bed at eleven o'clock.
5. I work in ... morning and in ... after noon.
6. I don't work in ... evening. I sleep at ... night.
7. When do you leave ... home for ... school?
8. I leave ... home at ... quarter past eight in ... morning.
9. What does your mother do after ... breakfast?
10. She goes to ... work.
11. Is there ... sofa in your ... living-room?
12. Yes, there is ... cosy little ... sofa in ... living-room.
13. Where is ... sofa? — It is in ... corner of ... room to ... left of ... door.
14. I like to sit on this ... sofa in ... front of ... TV-set in ... evening.
15. There is ... nice coffee-table near ... window.
16. There are ... newspapers on ... coffee-table.
17. There is ... tea in ... glass.
18. When do you watch ... TV? — I watch TV in ... evening.
19. We have ... large colour TV-set in our ... room.
20. There is ... beautiful vase on ... TV-set. There are ... flowers in ... vase.

Answer the questions.

1. How many thoracic vertebrae are there?
2. What does each rib articulate with?
3. What does the manubrium articulates with?
4. With how many ribs does the body articulates directly?
5. How many pairs of ribs are there?
6. How are termed ribs 1—7?
7. How are termed ribs 8—10?
8. How are classified ribs 11—12?
9. How many pairs of thoracic nerves are there?
10. What does intercostal nerves supply?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

ЛЕКЦИЯ № 15. Blood

Blood is considered a modified type of connective tissue. Mesodermal in origin, it is composed of cells and cell fragments (erythrocytes, leukocytes, platelets), fibrous proteins (fibrinogen — fibrin during clotting), and an extracellular amorphous ground substance of fluid and proteins (plasma). Blood carries oxygen and nutrients to all cells of the body and waste materials away from cells to the kidney and lungs. It also contains cellular elements of the immune system as well as humoral factors. This chapter will discuss the different elements of blood and the processes by which they are formed.

Formed elements of the blood

The formed elements of the blood include erythrocytes, leukocytes, and platelets.

Erythrocytes, or red blood cells, are important in transporting oxygen from the lungs to tissues and in returning carbon dioxide to the lungs. Oxygen and carbon dioxide carried in the RBC combine with hemoglobin to form oxyhemoglobin and carbaminohemoglobin, respectively.

Mature erythrocytes are denucleated, biconcave disks with a diameter of 7—8 μm . The biconcave shape results in a 20—30% increase in surface area compared to a sphere.

Erythrocytes have a very large surface area: volume ratio that allows for efficient gas transfer. Erythrocyte membranes are remarkably pliable, enabling the cells to squeeze through the narrowest capillaries. In sickle cell anemia, this plasticity is lost, and the subsequent clogging of capillaries leads to sickle crisis. The normal concentration of erythrocytes in blood is 3,5—5,5 million/ mm^3 in women and 4,3—5,9 million/ mm^3 in men. Higher counts in men are attributed to the erythrogenic androgens. The packed volume of blood cells per total volume of known as the hematocrit. Normal hematocrit values are 46% for women and 41—53% for men.

When aging RBCs develop subtle changes, macrophages in the bone marrow, spleen, and liver engulf and digest them. The iron is car-

ried by transferring in the blood to certain tissues, where it combines with apoferritin to form ferritin. The heme is catabolized into biliverdin, which is converted to bilirubin. The latter is secreted with bile salts.

Leukocytes, or white blood cells, are primarily with the cellular and humoral defense of the organism foreign materials. Leukocytes are classified as granulocytes (neutrophils, eosinophils, basophils) and agranulocytes (lymphocytes).

Granulocytes are named according to the staining properties of their specific granules. Neutrophils are 10—16 μ m in diameter.

They have 3—5 nuclear lobes and contain azurophilic granules (lysosomes), which contain hydrolytic enzymes for bacterial destruction, in their cytoplasm. Specific granules contain bactericidal enzymes (e. g., lysozyme). Neutrophils are phagocytes that are drawn (chemotaxis) to bacterial chemoattractants. They are the primary cells involved in the acute inflammatory response and represent 54—62% of leukocytes.

Eosinophils: they have a bilobed nucleus and possess acid granulations in their cytoplasm. These granules contain hydrolytic enzymes and peroxidase, which is discharged into phagocytic vacuoles.

Eosinophils are more numerous in the blood during parasitic infections and allergic diseases; they normally represent only 3% of leukocytes.

Basophils: they possess large spheroid granules, which are basophilic and metachromatic, due to heparin, a glycosaminoglycan. Their granules also contain histamine.

Basophils degranulate in certain immune reactions, releasing heparin and histamine into their surroundings. They also release additional vasoactive amines and slow reacting substance of anaphylaxis (SRS-A) consisting of leukotrienes LTC₄, LTD₄, and LTE₄. They represent less than 1% — of leukocytes.

Agranulocytes are named according to their lack of specific granules. Lymphocytes are generally small cells measuring 7—10 μ m in diameter and constitute 25—33% of leukocytes. They contain circular dark-stained nuclei and scanty clear blue cytoplasm. Circulating lymphocytes enter the blood from the lymphatic tissues. Two principal types of immunocompetent lymphocytes can be identified using immunologic and biochemical techniques: T lymphocytes and B lymphocytes.

T cells differentiate in the thymus and then circulate in the peripheral blood, where they are the principal effectors of cell-mediated im-

munity. They also function as helper and suppressor cells, by modulating the immune response through their effect on B cells, plasma cells, macrophages, and other T Cells.

B cells differentiate in bone marrow and possibly in the gut-associated lymphatic tissues (GALT). They are the principal mediators of humoral immunity through their production of antibodies. Once activated by contact with an antigen, they differentiate into plasma cells, which synthesize antibodies that are secreted into the blood, intercellular fluid, and lymph. B lymphocytes also give rise to memory cells, which differentiate into plasma cells only after the second exposure to the antigen. They are responsible for the secondary, or amnestic response that occurs when the body is exposed to an antigen for a second time. Monocytes vary in diameter from 15—18 μm and are the largest of the peripheral blood cells. They constitute 3—7% of leukocytes.

Monocytes possess an eccentric U-shaped or kidney-shaped nucleus. The cytoplasm has a ground-glass appearance and fine azurophilic granules.

Their nuclei stain lighter than lymphocyte nuclei because of their loosely arranged chromatin.

Monocytes are the precursors for members of the mononuclear phagocyte system, including tissue macrophages (histiocytes), osteoclasts, alveolar macrophages, and Kupffer cells of the liver.

Platelets (thromboplastids) are 2—3 μm in diameter.

They are a nuclear, membrane-bound cellular fragments derived by cytoplasmic fragmentation of giant cells, called megakaryocytes, in the bone marrow.

They have a short life span of approximately 10 days.

There are normally 150 000—400 000 platelets per mm^3 of blood. Ultrastructurally, platelets contain two portions: a peripheral, light-staining hyalomere that sends out fine cytoplasmic processes, and a central, dark-staining granulomere that contains mitochondria, vacuoles, glycogen granules, and granules. Platelets seal minute breaks in blood vessels and maintain endothelial integrity by adhering to the damaged vessel in a process known as platelet aggregation. Platelets are able to form a plug at the rupture site of a vessel because their membrane permits them to agglutinate and adhere to surfaces.

Platelets aggregate to set up the cascade of enzymatic reactions that convert fibrinogen into the fibrin fibers that make up the clot.

New words

blood — кровь
to be considered — рассматриваться
modified — измененный
mesodermal — мезодермальный
erythrocytes — эритроциты
leukocytes — лейкоциты
platelets — тромбоциты
fibrous proteins — волокнистые белки
cellular — клеточный
elements — элементы
immune — иммунный
humoral — гуморальный
important — важный
transporting — транспортировка
carbon — углерод
dioxid — диоксид
to contain — содержать
circular — проспект
dark-stained — запятнанный
nuclei — ядра
scanty — скудный
precursors — предшественники
short — короткий
life — жизнь
span — промежуток
approximately — приблизительно
peripheral — периферийный
light-staining — легкое окрашивание
to aggregate — настраивать
to set up — устанавливать

Вставьте артикль, где необходимо.

1. He has ... small family.
2. He has ... father and ... mother.
3. He has no ... brother, but he has ... sister.
4. His sister is ... pupil.

5. She is ... good girl, and she had ... many Russian books, but she has no ... English books.
6. There is ... writing-desk in ... room. ... writing-desk is good.
7. There is ... lamp on ... writing desk.
8. My uncle has ... large family. They are six in ... family.
9. My father is ... engineer.
10. He works at ... big factory.
11. We have ... good library.
12. Our books are in ... big bookcase.
13. In your sister ... married?
14. What do you do after ... breakfast?
15. I go to ... school.
16. When do you come ... home?
17. I come ... home at ... half past two.
18. Do you like to watch TV in ... evening?
19. There is ... paper on ... writing-desk.
20. My ... books and ... exercise-books are on ... writing-desk, too.

Вставте артикль, где необходимо.

1. What ... colour is your new ... hat?
2. It is ... white.
3. Is there ... refrigerator in your ... kitchen?
4. Where is ... refrigerator in your ... kitchen?
5. It is in ... corner of ... kitchen.
6. There are ... mirror in our ... living-room.
7. There are ... flowers in ... vase.
8. I have ... tea in my ... cup.
9. He has no ... coffee in his ... cup.
10. What ... book did take from ... library on ... Tuesday?
11. I have books, ... exercise-books and pens.
12. I work ... an office.
13. Whose ... those pen?

Answer the questions.

1. How is the blood considered?
2. What is the blood composed of?
3. What does blood carry?
4. Where does the blood carry oxygen and nutrients?

5. What does the blood contain in the immune system?
6. What do the formed elements of the blood include?
7. How do we also call red blood cells?
8. What area do erythrocytes have?
9. What do eosinophils have?
10. What appearance does the cytoplasm have?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

ЛЕКЦИЯ № 16. Plasma

Plasma is the extracellular component of blood. It is an aqueous solution containing proteins, inorganic salts, and organic compounds. Albumin is the major plasma protein that maintains the osmotic pressure of blood. Other plasma proteins include the globulins (alpha, beta, gamma) and fibrinogen, which is necessary for the formation of fibrin in the final step of blood coagulation. Plasma is in equilibrium with tissue interstitial fluid through capillary walls; therefore, the composition of plasma may be used to judge the mean composition of the extracellular fluids. Large blood proteins remain in the intravascular compartment and do not equilibrate with the interstitial fluid. Serum is a clear yellow fluid that is separated from the coagulum during the process of blood clot formation. It has the same composition as plasma, but lacks the clotting factors (especially fibrinogen).

Lymphatic vessels

Lymphatic vessels consist of a fine network of thin-walled vessels that drain into progressively larger and progressively thicker-walled collecting trunks. These ultimately drain, via the thoracic duct and right lymphatic duct, into the left and right subclavian veins at their angles of junction with the internal jugular veins, respectively. The lymphatics serve as a one-way (i. e., toward the heart) drainage system for the return of tissue fluid and other diffusible substances, including plasma proteins, which constantly escape from the blood through capillaries. They are also important in serving as a conduit for channeling lymphocytes and antibodies produced in lymph nodes into the blood circulation.

Lymphatic capillaries consist of vessels lined with endothelial cells, which begin as blind-ended tubules or saccules in most tissues of the body. Endothelium is attenuated and usually lacks a continuous basal lamina. Lymphatic vessels of large diameter resemble veins in their structure but lack a clear-cut separation between layers. Valves are more numerous in lymphatic vessels. Smooth muscle cells in the media layer engage in rhythmic contraction, pumping lymph toward the venous system. Smooth muscle is well-developed in large lymphatic ducts.

Circulation of lymph is slower than that of blood, but it is nonetheless an essential process. It has been estimated that in a single day, 50% or more of the total circulating protein leaves the blood circulation at the capillary level and is recaptured by the lymphatics.

Distribution of lymphatics is ubiquitous with some notable exceptions, including epithelium, cartilage, bone, central nervous system, and thymus.

New words

plasma — плазма
extracellular — внеклеточный
component — компонент
aqueous — водный
solution — решение
proteins — белки
inorganic — неорганический
salts — соли
organic — органический
compounds — составы
albumin — альбумин
to maintain — поддерживать
globulins — глобулины
alpha — альфа
beta — бета
gamma — гамма
fibrinogen — фибриноген
equilibrium — равновесие
lymphatic — лимфатический
vessel — сосуд
endothelium — эндотелий
attenuated — уменьшенный
circulation — обращение
lymph — лимфа
distribution — распределение
ubiquitous — вездесущий
notable — известный

Перед названиями наук, учебных предметов и языков артикль не употребляется.

E. g. He studies _ chemistry.

I speak _ English.

Заполните пропуски, где необходимо.

1. My friend's ... flat is very comfortable.
2. There are ... three rooms in ... flat: ... living-room, ... study and ... bedroom.
3. ... living-room is not very large.
4. ... walls in ... living-room are blue.
5. There are ... pictures on ... walls.
6. There is ... table in ... middle of ... room with some chairs around it.
7. To ... left of ... door there is ... sofa.
8. Near ... sofa there are ... two large armchairs.
9. They are very ... comfortable.
10. There is ... piano in my friend's living-room.
11. ... piano is to ... right of .
12. ... doors of ... bedrooms and ... study are small.
13. When my grandfather was ... young man, he studied ... physics.
14. Do you speak ... Spanish?
15. My uncle is ... great specialist in ... biology.
16. Japanese is more difficult than ... French.
17. We listened to ... very interesting lecture.
18. My father speaks ... English and ... French, but he does not speak ... German.
19. We had ... lesson of ... mathematics yesterday.
20. We wrote ... test in ... mathematics.

Answer the questions.

1. What component of blood is plasma?
2. What components does the plasma have?
3. Where do large blood proteins remain?
4. Do large blood proteins equilibrate with the interstitial fluid?
5. What colour is serum?
6. Where is serum separated from?
7. What composition does the serum have?
8. What do lymphatic vessels consist of?
9. How do lymphatics serve?
10. How is developed the smooth muscle in large lymphatic ducts?

Make the sentences of your own using the new words (10 sentences).
Find the definite and indefinite articles in the text.

ЛЕКЦИЯ № 17. Hematopoietic tissue

Hematopoietic tissue is composed of reticular fibers and cells, blood vessels, and sinusoids (thin-walled blood channels). Myeloid, or blood cell-forming tissue, is found in the bone marrow and provides the stem cells that develop into erythrocytes, granulocytes, agranulocytes, and platelets. Red marrow is characterized by active hematopoiesis; yellow bone marrow is inactive and contains mostly fat cells. In the human adult, hematopoiesis takes place in the marrow of the flat bones of the skull, ribs and sternum, the vertebral column, the pelvis, and the proximal ends of some long bones. Erythropoiesis is the process of RBC formation. Bone marrow stem cells (colony-forming units, CFUs) differentiate into proerythroblasts under the influence of the glycoprotein erythropoietin, which is produced by the kidney.

Proerythroblast is a large basophilic cell containing a large spherical euchromatic nucleus with prominent nucleoli.

Basophilic erythroblast is a strongly basophilic cell with nucleus that comprises approximately 75% of its mass. Numerous cytoplasmic polyribosomes, condensed chromatin, no visible nucleoli, and continued hemoglobin synthesis characteristics of this cell.

Polychromatophilic erythroblast is the last cell in this line undergoes mitotic divisions. Its nucleus comprises approximately 50% of its mass and contains condensed chromatin which appears in a «checkerboard» pattern. The polychromasia of the cytoplasm is due to the increased quantity of acidophilic hemoglobin combined with the basophilia of cytoplasmic polyribosomes.

Normoblast (orthochromatophilic erythroblast) is a cell with a small heterochromatic nucleus that comprises approximately 25% of its mass. It contains acidophilic cytoplasm because the large amount of hemoglobin and degenerating organelles. The pyknotic nucleus, which is no longer capable of division, is extruded from the cell.

Reticulocyte (polychromatophilic erythrocyte) is an immature acidophilic denucleated RBC, which still contains some ribosomes and mitochondria involved in the synthesis of a small quantity of hemoglobin. Approximately 1% of the circulating RBCs are reticulocytes.

Erythrocyte is the mature acidophilic and denucleated RBC. Erythrocytes remain in the circulation approximately 120 days and are then recycled by the spleen, liver, and bone marrow.

Granulopoiesis is the process of granulocyte formation. Bone marrow stem cells differentiate into all three types of granulocytes.

Myeloblast is a cell that has a large spherical nucleus containing delicate euchromatin and several nucleoli. It has a basophilic cytoplasm and no granules. Myeloblasts divide differentiate to form smaller promyelocytes.

Promyelocyte is a cell that contains a large spherical indented nucleus with coarse condensed chromatin. The cytoplasm is basophilic and contains peripheral azurophilic granules.

Myelocyte is the last cell in this series capable of division. The nucleus becomes increasingly heterochromatic with subsequent divisions. Specific granules arise from the Golgi apparatus, resulting in neutrophilic, eosinophilic, and basophilic myelocytes.

Metamyelocyte is a cell whose indented nucleus exhibits lobe formation that is characteristic of the neutrophil, eosinophil, or basophil. The cytoplasm contains azurophilic granules and increasing numbers of specific granules. This cell does not divide. Granulocytes are the definitive cells that enter the blood. Neutrophilic granulocytes exhibit an intermediate stage called the band neutrophil. This is the first cell of this series to appear in the peripheral blood.

It has a nucleus shaped like a curved rod or band.

Bands normally constitute 0,5—2% of peripheral WBCs; they subsequently mature into definitive neutrophils.

Agranulopoiesis is the process of lymphocyte and monocyte formation. Lymphocytes develop from bone marrow stem cells (lymphoblasts). Cells develop in bone marrow and seed the secondary lymphoid organs (e. g., tonsils, lymph nodes, spleen). Stem cells for T cells come from bone marrow, develop in the thymus and, subsequently, seed the secondary lymphoid organs.

Promonocytes differentiate from bone marrow stem cells (monoblasts) and multiply to give rise to monocytes.

Monocytes spend only a short period of time in the marrow before being released into the bloodstream.

Monocytes are transported in the blood but are also found in connective tissues, body cavities and organs.

Outside the blood vessel wall, they are transformed into macrophages of the mononuclear phagocyte system.

Thrombopoiesis, or the formation of platelets, occurs in the red bone marrow.

Megakaryoblast is a large basophilic cell that contains a U-shaped or ovoid nucleus with prominent nucleoli. It is the last cell that undergoes mitosis.

Megakaryocytes are the largest of bone marrow cells, with diameters of 50 mm or greater. They undergo 4—5 nuclear divisions without concomitant cytoplasmic division. As a result, the megakaryocyte is a cell with polylobulated, polyploid nucleus and abundant granules in its cytoplasm. As megakaryocyte maturation proceeds, «curtains» of platelet demarcation vesicles form in the cytoplasm. These vesicles coalesce, become tubular, and eventually form platelet demarcation membranes. These membranes fuse to give rise to the membranes of the platelets.

A single megakaryocyte can shed (i. e., produce) up to 3,500 platelets.

New words

reticular — сетчатый
sinusoids — синусоиды
granulocytes — гранулоциты
agranulocytes — агранулоциты
active — активный
yellow — желтый
glycoprotein — гликопротеин
erythropoietin — эритропоэтин
large — большой
amount — количество
hemoglobin — гемоглобин
degenerating — вырождение
capable — способный
division — разделение
spherical — сферический
indented — зазубренный
condensed — сжатый
chromatin — хроматин

Запомните следующие застывшие словосочетания.

to play _ chess to play the piano
to play _ football to play the guitar
out of _ doors

Запомните, что перед обращением артикль опускается.

E. g. What are you doing, _ girls?

Заполните пропуски, где необходимо.

1. Do you play ... piano?
2. There is ... big black piano in our living-room.
3. It is at ... wall to ... left of ... door opposite ... sideboard.
4. My mother likes to play ... piano.
5. She often plays ... piano in ... evening.
6. ...boys like to play ... football.
7. What do you do in ... evening? — I often play ... chess with my grandfather.
8. Where are ... children? — Oh, they are out of ... doors. ... weather is fine today.
9. They are playing ... badminton in ... yard.
10. What ... games does your sister like to play?
11. She likes to play ... tennis.
12. Do you like to play ... guitar?
13. What ... colour is your guitar?
14. When we want to write ... letter, we take ... piece of ... paper and ... pen.
15. We first write our ... ad dress and ... date in ... right-hand corner.
16. Then on ... left-hand side we write ... greeting.
17. We must not forget to leave ... margin on ... left-hand side of ... page.
18. On ... envelope we write ... name and address of ... person who will receive it.
19. We stick ... stamp on ... top of right-hand corner.
20. We posted ... letter.

Answer the questions.

1. What is hematopoietic tissue composed of?
2. Where is myeloid found?

3. How is red marrow characterized?
4. What does yellow bone marrow contain?
5. Where does hematopoiesis take place in the human adult?
6. What is erythropoiesis?
7. What is myeloblast?
8. What is band neutrophil?
9. How long are megakaryocytes?
10. How many platelets can a single megakaryocyte shed?
11. Make the sentences of your own using the new words (10 sentences).
12. Find the definite and indefinite articles in the text.

ЛЕКЦИЯ № 18. Arteries

Arteries are classified according to their size, the appearance of their tunica media, or their major function.

Large elastic conducting arteries include the aorta and its large branches. Unstained, they appear yellow due to their high content of elastin.

The tunica intima is composed of endothelium and a thin sub jacent connective tissue layer. An internal elastic membrane marks the boundary between the intima and media.

The tunica media is extremely thick in large arteries and consists of circularly organized, fenestrated sheets of elastic tissue with interspersed smooth muscle cells. These cells are responsible for producing elastin and other extracellular matrix components. The outermost elastin sheet is considered as the external elastic membrane, which marks the boundary between the media and the tunica adventitia.

The tunica adventitia is a longitudinally oriented collection of collagenous bundles and delicate elastic fibers with associated fibroblasts. Large blood vessels have their own blood supply (vasa vasorum), which consists of small vessels that branch profusely in the walls of larger arteries and veins. Muscular distributing arteries are medium-sized vessels that are characterized by their predominance of circularly arranged smooth muscle cells in the media interspersed with a few elastin components. Up to 40 layers of smooth muscle may occur. Both internal and external elastic limiting membranes are clearly demonstrated. The intima is thinner than that of the large arteries.

Arterioles are the smallest components of the arterial tree. Generally, any artery less than 0,5 mm in diameter is considered to be a small artery or arteriole. A subendothelial layer and the internal elastic membrane may be present in the largest of these vessels but are absent in the smaller ones. The media is composed of several smooth muscle cell layers, and the adventitia is poorly developed. An external elastic membrane is absent.

New words

arteries — артерии

to be classified — классифицированный

according — соответственно
their — их
size — размер
appearance — вид
tunica — оболочка
major — главный
elastic — упругий
conducting — проведение
arteries — артерии
to include — включать
aorta — аорта
branches — ветви
up to — до
layers — слои
smooth — гладкий
may — может

Запомните следующие застывшие словосочетания.

In a loud voice
In a low voice
In an angry voice
In a thin voice

Заполните пропуски, где необходимо.

1. She shouted in ... low voice.
2. He told us the poem in ... loud voice.
3. The children asked ice-cream in ... thin voice.
4. The teacher cried at the pupils in ... angry voice.
5. Bill Robins was ... very rich man.
6. He was ... richest man in ... village.
7. Pete is ... tallest boy in our class.
8. Nick is ... shortest boy, but he is very strong.
9. He is ... stronger than many boys who are taller than he.
10. I think Nick is ... strongest boy in class.

Перед превосходной степенью прилагательных употребляется определенный артикль.

E. g. Asia is the largest continent.
My brother is the best pupil in his class.

Вставъте артикль, где необходимо.

1. Bill Robins was ... very rich man. He was ... richest man in ... village.
2. Pete is ... tallest boy in our class. Nick is ... shortest boy, but he is very strong.
3. He is ... stronger than many boys who are taller than he.
4. I think Nick is ... strongest boy in class.
5. Granny often tells us ... long stories. Today her story was still ... longer.
6. It was ... longest story. She began telling it after ... dinner and finished it before ... supper.
7. But ... story was very interesting. I think it was ... most interesting of Granny's stories.
8. Which was ... most difficult exercise in ... test-paper?
9. Which is ... best season of the yea?
10. February is ... shortest month of the year.

Answer the questions.

1. How are arteries classified?
2. What do large elastic conducting arteries include?
3. What is the tunica intima composed of?
4. What does an internal elastic membrane mark?
5. Is the tunica media thick?
6. Is the tunica adventitia a longitudinally oriented collection of collagenous bundles?
7. With what do the tunica adventitia associated?
8. What are muscular distributing arteries?
9. Up to how many layers of smooth muscle may occur?
10. What is the media composed of?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

ЛЕКЦИЯ № 19. Capillaries

Capillaries are thin-walled, narrow-diameter, low-pressure vessels that generally permit easy diffusion across their walls. Most capillaries have a cross-sectional diameter of 7—12 μm . They are composed of a simple layer of endothelium, which is the lining of the entire vascular system, and an underlying basal lamina. They are attached to the surrounding tissues by a delicate reticulum of collagen. Associated with these vessels at various points along their length are specialized cells called pericytes. These cells, enclosed within their own basal lamina, which is continuous with that of the endothelium, contain contractile proteins and thus may be involved in the control of capillary dynamics. They may also serve as stem cells at times of vascular repair. Capillaries are generally divided into three types, according to the structure of their endothelial cell walls.

Continuous (muscular, somatic) capillaries are formed by a single uninterrupted layer of endothelial cells rolled up into the shape of a tube and can be found in locations such as connective tissue, muscle, and nerve.

Fenestrated (visceral) capillaries are characterized by the presence of pores in the endothelial cell wall. The pores are covered by a thin diaphragm (except in the glomeruli of the kidney) and are usually encountered in tissues where rapid substance interchange occurs (e. g., kidney, intestine, endocrine glands).

Sinusoidal capillaries can be found in the liver, hematopoietic and lymphopoietic organs, and in certain endocrine glands. These tubes with discontinuous endothelial walls have a larger diameter than other capillaries (up to 40 μm), exhibit irregular cross-sectional profiles, have more tortuous paths, and often lack a continuous basal lamina. Cells with phagocytic activity (macrophages) are present within, or just subjacent to, the endothelium.

New words

capillaries — капилляры

to thin-walled — окруженный тонкой стеной

narrow-diameter — узкий диаметр
low-pressure — низкое давление
that — тот
generally — главным образом
permit — разрешение
easy — легкий
diffusion — распространение
cross-sectional — поперечный
to be composed — быть составленным
simple — простой
endothelium — эндотелий
lining — выравнивание
entire — весь
vascular — сосудистый
underlying — лежащий в основе
basal — основной
lamina — тонкая пластинка

***Правила употребления артикля
с географическими названиями.***

Определенный артикль употребляется перед названиями рек, каналов, морей, заливов, проливов, океанов, архипелагов, горных цепей.

Артикль не употребляется перед названиям озер, гор, островов, континентов, городов, стран.

Исключения:

the United States of America
the United Kingdom of Great Britain and Northern Ireland
the Netherlands
the Ukraine
the Crimea
the Congo

Answer the questions.

1. Describe capillaries: how do they like?
2. What diameter do the most capillaries have?

3. What are the capillaries composed of?
4. Where are the capillaries attached to?
5. What are pericytes?
6. What do pericytes contain?
7. Where can pericytes be involved?
8. Where can sinusoidal capillaries be found?
9. What diameter have sinusoidal capillaries?
10. With help of what are continuous (muscular, somatic) capillaries formed by?

Make the sentences of your own using the new words (10 sentences).

Find the definite and indefinite articles in the text.

ЛЕКЦИЯ № 20. Veins

Veins are low-pressure vessels that have larger lumina and thinner walls than arteries. In general, veins have more collagenous connective tissue and less muscle and elastic tissue than their arterial counterparts. Although the walls of veins usually exhibit the three layers, they are much less distinct than those of the arteries. Unlike arteries, veins contain one-way valves composed of extensions of the intima that prevent reflux of blood away from the heart. Veins can be divided into small veins or venules, medium veins, and large veins.

Venules are the smallest veins, ranging in diameter from approximately 15–20 μm (post-capillary venules) up to 1–2 mm (small veins). The walls of the smaller of these are structurally and functionally like those of the capillaries; they consist of an endothelium surrounded by delicate collagen fibers and some pericytes. In those vessels of increased diameter, circularly arranged smooth muscle cells occur surrounding the intima layer, but unlike in the small arteries, these cells are loosely woven and widely spaced. Venules are important in inflammation because their endothelial cells are sensitive to histamine released by local mast cells. This causes endothelial cells to contract and separate from each other, exposing a naked basement membrane. Neutrophils stick to the exposed collagen and extravasate (i. e., move out into the connective tissue). Histamine also causes local arterioles to relax, affecting a rise in venous pressure and increased leaking of fluid. This produces the classic signs of inflammation: redness, heat, and swelling.

Medium veins in the range of 1–9 mm in diameter have a well-developed intima, a media consisting of connective tissue and loosely organized smooth muscle, and an adventitia (usually the thickest layer) composed of collagen bundles, elastic fibers, and smooth muscle cells oriented along the longitudinal axis of the vessel. Venous valves are sheet-like outfoldings of endothelium and underlying connective tissue that form flaps to permit unidirectional flow of blood.

Large veins, such as the external iliac, hepatic portal, and vena cavae, are the major conduits of return toward the heart. The intima is similar to that of medium veins. Although a network of elastic fibers

may occur at the boundary between the intima and media, a typical internal elastic membrane as seen in arteries is not present. A tunica media may or may not be present. If present, smooth muscle cells are most often circularly arranged. The adventitia is the thickest layer of the wall and consists of elastic fibers and longitudinal bundles of collagen. In the vena cava, this layer also contains well-developed bundles of longitudinally oriented smooth muscle.

New words

vein — вена
low-pressure — низкое давление
to have — иметь
collagenous — коллагеновый
elastic — упругий
although — хотя
walls — стенки
contour parts — копии
unlike — в отличие от
extensions — расширения
intima — интима
to prevent — предотвратить
reflux — рефлюкс
sheet-like — подобный листу
inflammation — воспаление
because — потому что
longitudinal — продольный
flaps — откидные створки
external — внешний
iliac — подвздошный
hepatic — печеночник

Запомните следующие застывшие словосочетания:

To have a good time
From _ morning till night
All _ day long
A lot of
Перед названиями университетов артикль не употребляется.
E. g. I shall study at _ St. Petersburg University.
My grandfather graduated from _ Oxford University

Вставъте артикль, где необходимо.

1. Did you have ... good time in the country?
2. Oh yes. ... weather was fine.
3. We were out of ... doors from ... morning till ... night.
4. We played ... football, ... volley-ball and ... other games.
5. We came ... home late at ... night and went to ... bed at once.
6. Look at ... clock! It is ... quarter past ten. Go to ... bed at once.
7. ... sun rises in ... east and sets in ... west.
8. We spent last summer in ... Ukraine.
9. We often went to ... wood and gathered lot of ... mushrooms.
10. My friend likes to play ... chess. He is ready to play ... chess all ... day long.
11. Willi comes from ... very old country on ... Nile. It is called ... Ethiopia
12. ... Ethiopia is ... beautiful mountainous country.
13. Nick is ... young man. He wants to become ... engineer.
14. Very often in ... evening his new friends and he walk about ... city talking about their native countries.
15. Marina lives in ... Ukraine.
16. She lives in ... small village near ... Kiev.
17. She is ... librarian. In summer she has ... lot of work work.
18. I want to enter ... Moscow University.
19. My Friend lives in ... America.
20. He studies Indies ... history at ... Harvard University.

Answer the questions.

1. What are veins?
2. In general do veins have more collagenous connective tissue?
3. Do veins have less muscle and elastic tissue than their arterial counterparts?
4. What valves do veins contain?
5. How veins can be divided?
6. How much the venules are long?
7. Where are venules important?
8. Where do neutrophils stick to?
9. What do contain medium veins?
10. What are the major conduits of return toward the heart?

Make the sentences of your own using the new words (10 sentences).
Find the definite and indefinite articles in the text.

ЛЕКЦИЯ № 21. Heart

The heart is a muscular organ, composed primarily of cardiac muscle tissue, which contracts rhythmically to pump blood throughout the body. Structure of the heart wall: the walls of the heart are constructed in layers that are similar to those of the major blood vessels.

Endocardium is the innermost layer of the heart and is lined with endothelium. Veins, nerves, and components of the impulse conducting system are present in the subendocardial connective tissue layer.

Myocardium is composed of branching, anastomotic cardiac myocytes attached to one another by intercalated disks. Most of these cells are involved in the pumping function of the heart; others are specialized for the control of rhythmicity (impulse conducting system) or secretion (myocardial endocrine cells).

Epicardium is a serous membrane that forms the visceral lining of the pericardium. Its external mesothelium is supported by a loose connective tissue subepicardial layer.

Cardiac skeleton is composed mainly of dense connective tissue and consists of the annuli fibrosi, the trigonum fibrosum, and the septum membranaceum.

Cardiac valves are composed of dense fibrous tissue covered by endothelium. Unidirectional flow is maintained from the.

Right atrium to the right ventricle (tricuspid valve).

Right ventricle to the pulmonary artery (pulmonic semilunar valve).
Left atrium to the left ventricle (mitral/bicuspid valve).

Left ventricle to the aorta (aortic semilunar valve).

Tricuspid and mitral valves are attached to papillary muscles by cords of fibrous connective tissue (chordae tendineae) and prevent reflux of blood into the atria during ventricular contraction (systole). Semilunar valves (aortic and pulmonic) prevent reflux of blood back into the ventricles during ventricular relaxation (diastole).

Impulse conducting system of the heart consists of specialized cardiac myocytes that are characterized by automaticity and rhythmicity (i. e., they are independent of nervous stimulation and possess the ability to initiate heart beats). These specialized cells are located in the sinoatrial (SA) node (pacemaker), internodal tracts, atrioventricular (AV) node, AV bundle (of His), left and right bundle branches, and numerous smaller branches to the left and right ventricular walls. Impulse conducting myocytes are in electrical contact with each other and

with normal contractile myocytes via communicating (gap) junctions. Specialized wide-diameter impulse conducting cells (Purkinje myocytes), with greatly reduced myofilament components, are well-adapted to increase conduction velocity. They rapidly deliver the wave of depolarization to ventricular myocytes.

New words

heart — сердце
muscular — мышечный
cardiac — сердечный
which — который
contract — контракт
rhythmically — ритмично
to pump — качать
endocardium — эндокардиум
innermost — самый внутренний
components — компоненты
conducting system — проведение системы
to present — представлять
subendocardial — внутрисердечный
impulse — импульс
fibrosi — фиброзные кольца

Запомните следующие застывшие словосочетания.

What's the use?
At the cinema
At the theatre
At the shop
At the market
To the cinema
To the theatre
To the shop
To the market
To go for a walk

Вставьте артикль, где необходимо.

1. Once there lived ... man who was very fond of fold.
2. He used to say: «While I have my gold, I am ... happiest man in ... world».

3. And so all his life saved ... money.
4. One day he was traveling in ... desert of ... North Africa.
5. He lost his way. . He had no ... food or ... water.
6. He was almost dying of ... hunger.
7. ... heat was terrible.
8. There were only ... stones and ... sand around.
9. What is ... use of gold?
10. Let's go to ... shop. I must buy ... bread and milk.
11. I was at ... cinema yesterday.
12. What ... film did you see?
13. Oh, I saw ... very good film.
14. I think it is ... best film of ... year.
15. Do you oft go to ... theatre?
16. No, I don't. I like to go to ... theatre, but I ... very busy.
17. I work from ... morning till ... night.
18. I even have no ... time to play piano.
19. ... lot of ... tourists from ... different countries come to ... Paris.

Answer the questions.

1. What is the muscular organ?
2. What is heart primarily composed of?
3. What is the structure of the heart wall?
4. What is endocardium?
5. With what is endocardium lined?
6. What are present in the subendocardial connective tissue layer?
7. What is myocardium composed?
8. What is cardiac skeleton composed of?
9. What are cardiac valves composed of?
10. What do rapidly deliver the wave of depolarization to ventricular myocytes?

Make the sentences of your own using the new words (10 sentences).
Find the definite and indefinite articles in the text.

ЛЕКЦИЯ № 22. Lungs

Intrapulmonary bronchi: the primary bronchi give rise to three main branches in the right lung and two branches in the left lung, each of which supply a pulmonary lobe. These lobar bronchi divide repeatedly to give rise to bronchioles.

Mucosa consists of the typical respiratory epithelium and an underlying lamina propria similar to that of the trachea. However, a layer of loosely woven smooth muscle (muscularis mucosae), which separates the lamina propria from the submucosa, is present.

Submucosa consists of elastic tissue with fewer mixed glands than seen in the trachea.

Anastomosing cartilage plates replace the C-shaped rings found in the trachea and extra pulmonary portions of the primary bronchi. These plates become progressively smaller as airway diameter decreases.

Bronchioles do not possess cartilage, glands, or lymphatic nodules; however, they contain the highest proportion of smooth muscle in the bronchial tree. Bronchioles branch up to 12 times to supply lobules in the lung, which are bounded by connective tissue septa. The smallest conducting bronchioles are called terminal bronchioles.

Bronchioles are lined by ciliated, simple, columnar epithelium with nonciliated bronchiolar (Clara) cells. Goblet cells are present in large bronchioles. A smooth muscle layer interlaces the elastic fibers of the lamina propria. The musculature of the bronchi and bronchioles contracts following stimulation by parasympathetic fibers (vagus nerve) and relaxes in response to sympathetic fibers. Terminal bronchioles consist of low-ciliated epithelium with bronchiolar cells.

The costal surface is a large convex area related to the inner surface of the ribs.

The mediastinal surface is a concave medial surface.

The left lung has a deep cardiac impression.

The mediastinal surface contains the root, or hilus, of the lung.

The pulmonary ligament is a double fold of pleura hanging inferior to the root of the lung.

The diaphragmatic surface (base) is related to the convex surface of the diaphragm. It is more concave on the right due to the presence of the liver. The apex (cupola) protrudes into the root of the neck. It is crossed by the subclavian artery anteriorly.

The hilus is the point of attachment for the root of the lung. It contains the bronchi, pulmonary and bronchial vessels, lymphatics, and nerves. Lobes and fissures.

The right lung is divided by the oblique and horizontal fissures into three lobes: superior, middle and inferior.

The left lung has only one fissure, the oblique, which divides the lung into upper and lower lobes. The lingula of the upper lobe corresponds to the middle lobe of the right lung.

Bronchopulmonary segments of the lung are supplied by the segmental (tertiary) bronchus, artery, and vein. There are 10 on the right and 8 on the left.

Arterial supply: Right and left pulmonary arteries arise from the pulmonary trunk. The pulmonary arteries deliver deoxygenated blood to the lungs from the right side of the heart.

Bronchial arteries supply the bronchi and nonrespiratory portions of the lung. They are usually branches of the thoracic aorta.

Venous drainage. There are four pulmonary veins: superior right and left and inferior right and left. Pulmonary veins carry oxygenated blood to the left atrium of the heart.

The bronchial veins drain to the azygos system. They share drainage from the bronchi with the pulmonary veins.

Lymphatic drainage: Superficial drainage is to the bronchopulmonary nodes; from there, drainage is to the tracheobronchial nodes.

Deep drainage is to the pulmonary nodes; from there, drainage is to the bronchopulmonary nodes.

Bronchomediastinal lymph trunks drain to the right lymphatic duct and the thoracic duct.

Innervation of Lungs: Anterior and posterior pulmonary plexuses are formed by vagal (parasympathetic) and sympathetic fibers. Parasympathetic stimulation has a bronchoconstrictive effect. Sympathetic stimulation has a bronchodilator effect.

New words

lungs — легкие
intrapulmonary bronchi — внутрилегочные бронхи
the primary bronchi — первичные бронхи
to give — давать
to rise — повышать
lobar bronchi — долевые бронхи
to divide — разделять
repeatedly — неоднократно

loosely — свободно
woven — сотканный
smooth — гладкий
submucosa — подслизистая оболочка
costal — реберный
surface — поверхность
convex — выпуклый
apex — вершина
to protrude — высовывается
superior — выше
right — право
left — оставленный
inferior — низший
innervation — иннервация

***Образование множественного числа
существительных:***

a cat — cats
a dog — dogs
a car — cars
a watch — watches
a dress — dresses
a dish — dishes
a box — boxes
a potato — potatoes

***Запомните форму множественного числа
следующих существительных:***

a goose — geese
a tooth — teeth
a foot — feet
an ox — oxen
a man — men
a woman — women
a child — children
a mouse — mice
А также:
an englishman — englishmen
a frenchman — frenchmen
a german — germans

Существуют существительные, имеющие во множественном числе ту же форму, что и в единственном:

- a sheep — sheep
- a deer — deer
- a swine — swine

Поставьте следующие существительные во множественное число.

A park, a play, a table, a plate, a fox, a room, a lady, a knife, a hair, a bus, a match, a way, a house, a family, a flag, a town, a wolf, a country, a lion, a star, a mountain, a tree, a shilling, a king, the waiter, the queen, a man, the man, a woman, the woman, an eye, a shelf, a box, the city, a boy, a goose, the watch, a mouse, a dress, a toy, the sheet, a tooth, a child, the ox, a deer, the life, a tomato.

This tea-cup, this egg, that wall, that picture, this foot, that mountain, this lady, that window, this man, that match, this knife.

Answer the questions.

1. What do the primary bronchi give?
2. For how many main branches in the right lung give primary bronchi rise?
3. For how many main branches in the left lung give primary bronchi rise?
4. What for lobar bronchi divide repeatedly?
5. What does mucosa consist of?
6. What is submucosa consist of?
7. What lung has a deep cardiac impression?
8. Where is the diaphragmatic surface (base) related?
9. How many pulmonary veins are there?
10. How are anterior and posterior pulmonary plexuses formed by?

Make the sentences of your own using the new words (10 sentences).
Find the definite and indefinite articles in the text.

ЛЕКЦИЯ № 23. Respiratory system

The respiratory system is structurally and functionally adapted for the efficient transfer of gases between the ambient air and the bloodstream as well as between the bloodstream and the tissues. The major functional components of the respiratory system are: the airways, alveoli, and blood vessels of the lungs; the tissues of the chest wall and diaphragm; the systemic blood vessels; red blood cells and plasma; and respiratory control neurons in the brainstem and their sensory and motor connections. LUNG FUNCTION: provision of O₂ for tissue metabolism occurs via four mechanisms. Ventilation — the transport of air from the environment to the gas exchange surface in the alveoli. O₂ diffusion from the alveolar air space across the alveolar-capillary membranes to the blood.

Transport of O₂ by the blood to the tissues: O₂ diffusion from the blood to the tissues.

Removal of CO₂ produced by tissue metabolism occurs via four mechanisms. CO₂ diffusion from the tissues to the blood.

Transport by the blood to the pulmonary capillary-alveolar membrane.

CO₂ diffusion across the capillary-alveolar membrane to the air spaces of the alveoli. Ventilation — the transport of alveolar gas to the air. Functional components: Conducting airways (conducting zone; anatomical dead space).

These airways are concerned only with the transport of gas, not with gas exchange with the blood.

They are thick-walled, branching, cylindrical structures with ciliated epithelial cells, goblet cells, smooth muscle cells. Clara cells, mucous glands, and (sometimes) cartilage.

Alveoli and alveolar septa (respiratory zone; lung parenchyma).

These are the sites of gas exchange.

Cell types include: Type I and II epithelial cells, alveolar macrophages.

The blood-gas barrier (pulmonary capillary-alveolar membrane) is ideal for gas exchange because it is very thin (< 0,5 mm) and has a ve-

ry large surface area (50—100 m²). It consists of alveolar epithelium, basement membrane interstitium, and capillary endothelium.

New words

respiratory — дыхательный
structurally — структурно
functionally — функционально
adapted — приспособленный
efficient — эффективный
transfer — перемещение
gases — газы
ambient — окружающий
air — воздух
bloodstream — кровоток
airways — воздушные пути
alveoli — альвеолы
blood vessels — кровеносные сосуды
lungs — легкие
chest — грудь
diaphragm — диафрагма
the systemic blood vessels — системные кровеносные сосуды
red blood cells — красные кровяные клетки
plasma — плазма
respiratory control neurons — дыхательные нейроны контроля
brainstem — ствол мозга
sensory — сенсорный
motor connections — моторные связи
ventilation — вентиляция
transport — транспортировка
environment exchange — окружающая среда
surface — поверхность

Запомните!

Един. ч. — множ. ч.
this is — these are
that is — those are
there is — there are
it is — they are

***Поставьте слова в следующих предложениях
во множественное число.***

1. This is a star.
2. This is a boy.
3. This is a baby.
4. That is a plate.
5. That is a flower.
6. That is a bookshelf.
7. Is this a sofa?
8. Is this a bookcase?
9. Is this a man?
10. Is that a ball?
11. Is that a train?
12. Is that a plane?
13. Is the window open?
14. Is the door closed?
15. Is the boy near the window?
16. That is not a king.
17. That is not a queen.
18. That is not a bus.
19. That isn't a mountain.
20. That isn't a goose.
21. This isn't a mouse.
22. It is a sheep.
23. It is a cigarette.
24. It is a cat.
25. It is not a girl.
26. It isn't a bag.
27. It isn't a tree.
28. It is not a bad egg.
29. It is a good egg.
30. Is that a flower?
31. This man is an engineer.
32. That woman is my sister.
33. This child is my son.

34. That goose is big.
35. This mouse is white.
36. This man is a doctor.
37. That woman is my cousin. She is a teacher
38. That girl is my niece. She is a pupil.
39. This girl has a blue sweater.
40. This boy has a good coat.
41. My uncle has a large flat.
42. There is a table in the room.
43. I have a good pen. My pen is in my pocket.
44. There is a flower in the vase.
45. This child's foot is sore.

Answer the questions.

1. What is the respiratory system structurally adopted?
2. What does the respiratory system transfer?
3. What are the most major lung functions?
4. What do we breath in?
5. What do we breath out?
6. How is the oxygen delivered to the organs?
7. How is oxygen delivered to the organs?
8. What is metabolism?
9. What are the functional components?
10. What do cell types include?

Make the sentences of your own using the new words (10 sentences).

Find plural and single in the text.

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

1. a) palm; b) blood; c) vessel;
2. a) leg; b) tissue; c) metabolism;
3. a) airways; b) alveoli; c) arm;
4. a) intestines; b) cell; c) membrane;
5. a) oxygen; b) breath; c) carbon.

ЛЕКЦИЯ № 24. Lung volumes and capacities

Lung volumes — there are four lung volumes, which when added together, equal the maximal volume of the lungs. Tidal volume is the volume of one inspired or expired normal breath (average human = 0,5 L per breath). Inspiratory reserve volume is the volume of air that can be inspired in excess of the tidal volume. Expiratory reserve volume is the extra air that can be expired after a normal tidal expiration.

Residual volume is the volume of gas that remains in the lungs after maximal expiration (average human = 1,2 L).

Lung capacities are comprised of two or more of the lung volumes. Total lung capacity is the volume of gas that can be contained within the maximally inflated lungs (average human = 6 L).

Vital capacity is the maximal volume that can be expelled after maximal inspiration (average human = 4,8 L).

Functional residual capacity is the volume remaining in the lungs at the end of a normal tidal expiration (average human = 2,2 L).

Inspiratory capacity is the volume that can be taken into the lungs after maximal inspiration following expiration of a normal breath. Residual volume can not be directly measured by spirometry. Because FRC and TLC include the residual capacity, they can not be directly measured by spirometry either. Helium dilution techniques are used to determine these capacities. A forced vital capacity is obtained when a subject inspires maximally and then exhales as forcefully and as completely as possible. The forced expiratory volume (FEV1) is the volume of air exhaled in the first second. Typically, the FEV1 is approximately 80% of the FVC. In obstructive lung diseases, such as bronchial asthma, the FEV1 is reduced much more than the FVC, producing a low FEV1 / FVC. In restrictive lung diseases, such as pulmonary fibrosis, both the FEV1, and the FVC are reduced. This characteristically produces a normal or increased FEV1/ FVC.

GAS LAWS AS APPLIED TO RESPIRATORY PHYSIOLOGY:
Dalton's Law: In a gas mixture, the pressure exerted by each gas is independent of the pressure exerted by the other gases.

A consequence of this is as follows: partial pressure = total pressure x fractional concentration. This equation can be used to determine

the partial pressure of oxygen in the atmosphere. Assuming that the total pressure (or barometric pressure, P_B) is atmospheric pressure at sea level (760 mmHg) and the fractional concentration of O_2 is 21%, or 0,21 : $P_{O_2} = 760 \text{ mmHg} \times 0,21 = 160 \text{ mmHg}$. As air moves into the airways, the partial pressures of the various gases in atmospheric air are reduced because of the addition of water vapor (47 mmHg). Henry's Law states that the concentration of a gas dissolved in liquid is proportional to its partial pressure and its solubility coefficient (K_s). Thus, for gas X, $[X] = K_s \times P_x$

Fick's Law states that the volume of gas that diffuses across a barrier per unit time is given by:

$$V_{\text{gas}} = Y_x D_x (P_1 - P_2)$$

where A and T are the area and thickness of the barrier, P_1 and P_2 are the partial pressures of the gas on either side of the barrier and D is the diffusion constant of the gas. D is directly proportional to the solubility of the gas and inversely proportional to the square root of its molecular weight.

New words

lung — легкое
 volume — объем
 equal — равный
 the maximal — максимальный
 tidal — вдыхаемый и выдыхаемый
 inspired — вдохновенный
 expected — ожидаемый
 normal — нормальный
 breath — дыхание
 average — среднее число
 human — человек
 reserve — резервировать
 residual — остаточный
 helium — гелий
 dilution — растворение
 techniques — методы
 to be used to — использовать
 to determine — определять
 capacities — возможности

***Поставьте слова в следующих предложениях
во множественное число.***

1. This room is very large.
2. There is a match in the box.
3. Has this lady a knife?
4. There is a man and a woman in the street.
5. This lady is that gentleman's wife.
6. This shoe is too large for my foot.
7. The child is sitting on a bench.
8. My tooth is white.
9. This key is made of steel.
10. A potato is a vegetable and a cherry is a fruit.
11. This is my friend's study.
12. What is that child's name?
13. The cat has caught a mouse.
14. There was a lady, a gentleman, a boy and a girl in the room.
15. In the farm-yard we could see an ox, a sheep, a cow and a goose.
16. Is worker an Englishman or a German?
17. He is a Frenchman.
18. Why don't you eat this potato?
19. This strawberry is still green.
20. The withered leaf has fallen to the ground.
21. Can you see a bird in that tree?
22. Does your tooth still ache?
23. I held up my foot to the fire to warm it.
24. His child studies very well.
25. This man works at the office.
26. There is a new house in our street.
27. This story is very interesting.
28. I have hurt the foot.
29. The wolf has been shot.
30. He keeps his toy in a box.
31. Put this knife on that table.
32. I see a pupil.

Притяжательный падеж существительных / (Possessive case)

The child's toys — The children's toys

The boy's books — The boys' books

Перефразируйте следующие словосочетания и предложения, употребляя притяжательный падеж.

1. The room of my friend.
2. The questions of my daughter.
3. The wife of my brother.
4. The table of our teacher.
5. The poems of Shakespeare.
6. The voice of this girl.
7. The new club of the workers.
8. The letter of Pete.
9. The car of my parents.
10. The life of this woman.

Answer the questions.

1. How many lung volumes are there?
2. Are the lung volumes added together?
3. How can inspiratory reserve volume be inspired?
4. Can inspiratory reserve volume be expired after a normal tidal expiration?
5. What is residual volume?
6. How are lungs capacities be composed?
7. Is vital capacity the maximal volume?
8. What is the functional residual capacity?
9. What is the inspiratory capacity?
10. Can residual volume be directly measured by spirometry?

Make the sentences of your own using the new words (10 sentences).

Make your own sentences using possessive case (10 sentences).

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

1. a) volume; b) head; c) lung;
2. a) air; b) breathing; c) hot;
3. a) stomach; b) bronchi; c) lungs;
4. a) nose; b) trachea; c) finger;
5. a) eye; b) alveoli; c) bronchi.

ЛЕКЦИЯ № 25. Ventilation

Total ventilation (VT, minute ventilation) is the total gas flow into the lungs per minute. It is equal to the tidal volume (VT) x the respiratory rate (n). Total ventilation is the sum of dead space ventilation and alveolar ventilation.

Anatomic dead space is equivalent to the volume of the conducting airways (150 mL in normal individuals), i. e., the trachea and bronchi up to and including the terminal bronchioles. Gas exchange does not occur here. Physiologic dead space is the volume of the respiratory tract that does not participate in gas exchange. It includes the anatomic dead space and partially functional or nonfunctional alveoli (e. g., because of a pulmonan embolus preventing blood supply to a region of alveoli). In normal individuals, anatomic and physiologic dead space are approximately equal. Physiologic dead space can greatly exceed anatomic dead space in individuals with lung disease.

Dead space ventilation is the gas flow into dead space per minute. Alveolar ventilation is the gas flow entering functional alveoli per minute.

Alveolar ventilation: It is the single most important parameter of lung function. It cannot be measured directly. It must be adequate for removal of the CO₂ produced by tissue metabolism whereas the partial pressure of inspired O₂ is 150 mmHg, the partial pressure of O₂ in the alveoli is typically 100 mmHg because of the displacement of O₂ with CO₂. PAo₂ cannot be measured directly.

New words

total — общее количество
ventilation — вентиляция
flow — поток
per minute — в минуту
equal — равный

the conducting — проведение
airways — воздушные пути
exchange — обмен
tract — трактат
to be measured — быть измеренным
directly — непосредственно
displacement — смещение

***Перепишите следующие словосочетания
и предложения, употребляя притяжательный падеж.***

1. The handbags of these women.
2. The flat of my sister is large.
3. The children of my brother are at home.
4. The room of the boys is large.
5. The name of this girl is Helen.
6. The work of these students is interesting.
7. The dog of the brother.
8. The notebook of the teacher.
9. The friend of my friend.
10. The work of the scientist.

***Переведите на английский язык,
употребляя притяжательный падеж.***

1. Он показал мне письмо своей сестры.
2. Она взяла коньки своего брата.
3. Дайте мне тетради ваших учеников.
4. Принесите вещи ваших детей.
5. Вчера дети нашли птичье гнездо.
6. Это семья моего друга.
7. Чья это сумка? Это сумка Тома.
8. Чьи это словари? — Это словари студентов.
9. Вы видели книгу нашего учителя?
10. Мне нравится почерк этого мальчик.

Answer the questions.

1. How minutes does it take for total ventilation?
2. Is total ventilation equal to the tidal volume?
3. Describe the process of total ventilation?
4. Is anatomic dead space equipment to the volume of the conducting airways?
5. Does gas exchange occur in trachea and bronchi?
6. What is physiological dead space?
7. What does physiological dead space include?
8. Describe the alveolar ventilation?
9. What is the most important parameter of lung function?
10. What does tissue metabolism produce?

Make the sentences of your own using the new words (10 sentences).

Make your own sentences using possessive case (10 sentences).

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) nose; b) mouth; c) nail;
- 2) a) lungs; b) bronchi; c) stomach;
- 3) a) brain; b) rib; c) thorax;
- 4) a) tissue; b) bone; c) pelvis;
- 5) a) arm; b) shoulder; c) finger.

ЛЕКЦИЯ № 26. Air flow

Air moves from areas of higher pressure to areas of lower pressure just as fluids do. A pressure gradient needs to be established to move air.

Alveolar pressure becomes less than atmospheric pressure when the muscles of inspiration enlarge the chest cavity, thus lowering the intrathoracic pressure. Intrapleural pressure decreases, causing expansion of the alveoli and reduction of intra-alveolar pressure. The pressure gradient between the atmosphere and the alveoli drives air into the airways. The opposite occurs with expiration.

Air travels in the conducting airways via bulk flow (mL/min). Bulk flow may be turbulent or laminar, depending on its velocity. Velocity represents the speed of movement of a single particle in the bulk flow. At high velocities, the flow may be turbulent. At lower velocities transitional flow is likely to occur. At still lower velocities, flow may be laminar (streamlined). Reynold's number predicts the air flow. The higher the number, the more likely the air will be turbulent. The velocity of particle movement slows as air moves deeper into the lungs because of the enormous increase in cross-sectional area due to branching. Diffusion is the primary mechanism by which gas moves between terminal bronchioles and alveoli (the respiratory zone).

Airway resistance: The pressure difference necessary to produce gas flow is directly related to the resistance caused by friction at the airway walls. Medium-sized airways (> 2 mm diameter) are the major site of airway resistance. Small airways have a high individual resistance. However, their total resistance is much less because resistances in parallel add as reciprocals.

Factors affecting airway resistance: Bronchoconstriction (increased resistance) can be caused by parasympathetic stimulation, histamine (immediate hyper-sensitivity reaction), slow-reacting substance of anaphylaxis (SRS-A = leukotrienes C₄, D₄, E₄; mediator of asthma), and irritants. Bronchodilation (decreased resistance) can be caused by

sympathetic stimulation (via beta-2 receptors). Lung volume also affects airway resistance. High lung volumes lower airway resistance because the surrounding lung parenchyma pulls airways open by radial traction. Low lung volumes lead to increased airway resistance because there is less traction on the airways. At very low lung volumes, bronchioles may collapse. The viscosity or density of inspired gases can affect airway resistance. The density of gas increases with deep sea diving, leading to increased resistance and work of breathing. Low-density gases like helium can lower airway resistance. During a forced expiration, the airways are compressed by increased intrathoracic pressure. Regardless of how forceful the expiratory effort is, the flow rate plateaus and cannot be exceeded. Therefore, the air flow is effort-independent; the collapse of the airways is called dynamic compression. Whereas this phenomenon is seen only upon forced expiration in normal subjects, this limited flow can be seen during normal expiration in patients with lung diseases where there is increased resistance (e. g., asthma) or increased compliance (e. g., emphysema).

New words

to move — перемещаться
from — от
area — область
higher — выше
pressure — давление
lower — ниже
just — только
fluids — жидкости
gradient — градиент
to be established — быть установленным
intrapleural — внутриплевральный
to decrease — уменьшаться
causing — порождение
expansion — расширение
reduction — сокращение
intra-alveolar — внутриальвеолярный
atmosphere — атмосфера

opposite — напротив
expiration — истечение
collapse — коллапс
viscosity — вязкость
density — плотность

Местоимения some, any, no, every и их производные

Some обозначает некоторое количество.

Употребляется в следующих случаях.

1. Утвердительная форма: «We have some dictionaries».
2. Отрицательная форма: «We have no dictionaries».
3. Вопросительная форма: «Have you any dictionaries?»

Вставьте some, any, no.

1. There are ... pictures in the book.
2. Are there ... new students in your group?
3. There are ... old houses in our street.
4. Are there ... English text books on the desks? — Yes, there are
5. Are there ... maps on the walls? — No, there aren't
6. Are there ... pens on the desk? — Yes, there
7. Are there ... sweets in your bag? — Yes, there are
8. Have you got ... English books at home? — Yes, I have
9. There are ... beautiful pictures in the magazine.
10. I have ... nice gloves.
11. There are ... ink in my pen.
12. Is there ... paper on your table?
13. I have got ... exercise-books. Give me ..., please.
14. It is ... winter. There are ... leaves on the trees.
15. There are ... schools in this street.
16. Are the ... pictures in your book?
17. There are ... flowers here in winter.
18. I can see ... children in the yard. They are playing.
19. Are there ... new buildings your street?
20. There are ... people in the park because it is cold.

Answer the questions.

1. Where does air move from?
2. What does pressure gradient need?
3. Does alveolar pressure become less than atmospheric pressure?
4. Between what does the pressure gradient drive the air into the airway?
5. Via what does the air travel?
6. What may bulk flow be?
7. What does the bulk flow depend on?
8. What does velocity represent?
9. What may the flow be at high velocities?
10. What is the pressure difference needed for?

Make the sentences of your own using the new words (10 sentences).

Make your own sentences using SOME, ANY, NO, EVERY (10 sentences).

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) organism; b) salt; c) body;
- 2) a) health; b) rest; c) cold;
- 3) a) brick; b) blood; c) liquid;
- 4) a) hair; b) head; c) foot;
- 5) a) lamp; b) organ; c) tissue.

ЛЕКЦИЯ № 27. Mechanics of breathing

Muscles of respiration: inspiration is always an active process. The following muscles are involved: The diaphragm is the most important muscle of inspiration. It is convex at rest, and flattens during contraction, thus elongating the thoracic cavity. Contraction of the external intercostals lifts the rib cage upward and outward, expanding the thoracic cavity. These muscles are more important for deep inhalations. Accessory muscles of inspiration, including the scalene (elevate the first two ribs) and sternocleidomastoid (elevate the sternum) muscles, are not active during quiet breathing, but become more important in exercise. Expiration is normally a passive process. The lung and chest wall are elastic and naturally return to their resting positions after being actively expanded during inspiration. Expiratory muscles are used during exercise, forced expiration and certain disease states. Abdominal muscles (rectus abdominis, internal and external obliques, and transversus abdominis) increase intra-abdominal pressure, which pushes the diaphragm up, forcing air out of the lungs. The internal intercostal muscles pull the ribs downward and inward, decreasing the thoracic volume. Elastic properties of the lungs: the lungs collapse if force is not applied to expand them. Elastin in the alveolar walls aids the passive deflation of the lungs. Collagen within the pulmonary interstitium resists further expansion at high lung volumes. Compliance is defined as the change in volume per unit change in pressure ($\Delta V/\Delta P$). In vivo, compliance is measured by esophageal balloon pressure vs. lung volume at many points during inspiration and expiration. Each measurement is made after the pressure and volume have equilibrated and so this is called static compliance. The compliance is the slope of the pressure-volume curve. Several observations can be made from the pressure-volume curve.

Note that the pressure-volume relationship is different with deflation than with inflation of air (hysteresis). The compliance of the lungs is greater (the lungs are more distensible) in the middle volume and pressure ranges.

At high volumes and expanding pressures, the compliance is lower (the lungs are stiffer). Even when the lung has no expanding pressure, some air remains in the lungs. When saline is used to fill the lung, compliance is much greater (small pressure changes bring about large changes in volume). With saline inflation, there is little difference in the pressure-volume relationship with inflation or deflation. This indicates that the differences seen between inflation and deflation of air must be due to surface forces in the air-liquid interface of the alveoli.

Causes of decreased compliance: pulmonary fibrosis, pulmonary venous congestion and edema, deficiency of surfactant. Causes of increased compliance: emphysema, age.

New words

muscles — мускулы, мышцы
respiration — дыхание
inspiration — вдох
always — всегда
process — процесс
following — следующий
to be involved — быть вовлеченным
diaphragm — диафрагма
the most — наиболее
important — важный
inspiration — вдохновение
convex — выпуклый
rest — отдых
to flattens — сглаживаться
contraction — сокращение
elongating — удлинение
the thoracic cavity — грудная впадина
the thoracic — грудная клетка
the rib cage — грудное ребро
upward — вверх
outward — наружу
expanding — расширение
volume — объем
compliance — согласие

some — некоторые
to remain — остаться
saline — солончак
to fill — заполняться

Сравните следующие предложения.

1. After dinner he drank some juice. — После обеда он выпил некоторое количество сока.
2. He does not drink milk after dinner, he drinks juice. — Он не выпил молока после обеда, а выпил сок.
3. I brought some books from the library. — Я взял некоторое количество книг в библиотеке.
4. I like books. — Я люблю книги.

Вставьте some, any, no или оставьте пропуски незаполненными, ориентируясь по смыслу.

1. There is ... ink in my pen.
2. Is there ... snow in the treet this morning?
3. My mother likes ... musik.
4. Are there ... chess-players here?
5. There are ... diagrams in the new book.
6. Are there ... newspapers on the table?
7. Was there ... water in the glass or ... milk?
8. There was ... soap in the box; he used wash his hands.
9. There was ... soap in the box: it smells of ... soap.
10. There are ... letters for you on the table.
11. Do you like ... apples?
12. Were there ... of our teachers at the stadium?
13. There were ... students of our group at the consultation yesterday.
14. Will there be ... concerts at the club next month?
15. There were ... yellow and green pencils on the table.
16. People need ... oxygen for breathing.
17. Are there ... mistakes in my dictation?
18. There are ... juice in your cup.
19. My brother doesn't like ... carrots.
20. I have ... books now.

Answer the questions.

1. Is inspiration always an active process?
2. What muscles are involved in the mechanism of breathing?
3. What muscle is the most important of inspiration?
4. What does contraction of the external intercostals lift?
5. What muscles are more important for deep inhalations?
6. What muscles are not active during quiet breathing?
7. Is expiration normally a passive process?
8. Are the lung and chest wall elastic?
9. Where are expiratory muscles used in?
10. Where do the internal intercostal muscles pull the ribs?

Make the sentences of your own using the new words (10 sentences).

Make your own sentences using SOME, ANY, NO, EVERY (10 sentences).

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) air; b) muscles; c) organs;
- 2) a) eyes; b) brows; c) arms;
- 3) a) teeth; b) tongue; c) ligament;
- 4) a) coccyx; b) pelvis; c) shoulder;
- 5) a) elbow; b) arm; c) ear.

ЛЕКЦИЯ № 28. Surface tension forces

In a liquid, the proximity of adjacent molecules results large, intermolecular, attractive (Van der Waals) forces that serve to stabilize the liquid. The liquid-air surface produces inequality of forces that are strong on the liquid side and weak on the gas side because of the greater distance between molecules in the gas phase. Surface tension causes the surface to maintain as small an area as possible. In alveoli, the result a spherically-curved, liquid lining layer that tends to be pulled inward toward the center of curvature of the alveolus. The spherical surface of the alveolar liquid lining behaves in manner similar to a soap bubble. The inner and outer surface of a bubble exert an inward force that creates a greater pressure inside than outside the bubble. Interconnected alveoli of different sizes could lead to collapse of smaller alveoli (atelectasis) into larger alveoli, because of surface tension, the pressure inside the small alveolus (smaller radius of curvature) is greater than that of the larger alveolus. Without surfactant, gas would therefore move from smaller to larger alveoli, eventually producing or giant alveolus.

Pulmonary surfactant: Pulmonary surfactant is a phospholipid (comprised primarily of dipalmitoyl phosphatidylcholine) synthesized by type II alveolar epithelial cells. Surfactant reduces surface tension, thereby preventing the collapse of small alveoli. Surfactant increases the compliance of the lung and reduces the work of breathing.

Surfactant keeps the alveoli dry because alveolar collapse tends to draw fluid into the alveolar space. Surfactant can be produced in the fetus as early as gestational week 24, but is synthesized most abundantly by the 35 th week of gestation. Neonatal respiratory distress syndrome can occur with premature infants, and results in areas of atelectasis, filling of alveoli with transudate, reduced lung compliance, and V/Q mismatch leading to hypoxia and CO₂ retention.

New words

surface tension forces — поверхностные силы напряжения
liquid — жидкость
proximity — близость
adjacent — смежный

large — большой
intermolecular — межмолекулярный
to stabilize — стабилизироваться
surface — поверхность
to produce — производить
side — сторона
weak — слабый
greater — больше
distance — расстояние
between — между
phase — фаза
tension — напряженность
spherically-curved — сферически-кривой
lining — выравнивание
inward — внутрь
toward — к
curvature — искривление
spherical — сферический
similar — подобный
soap — мыло
inner — внутренний
to exert — проявить
interconnected — связанный
something — что-нибудь, что-то
everything — все

***Употребление something, anything, nothing
или everything***

1. Утвердительная форма:
I can see something on the table.
2. Отрицательная форма:
I can see nothing on the table. I cannot see any thing on the table.
3. Вопросительная форма:
Can you see anything on the table?

***Вставьте something, anything, nothing
или everything.***

1. ... is all right, the patient is much better today.
2. Is there ... interesting in the programme of the concert?

3. I could see ... : it was quite dark.
4. Give me ... to drink.
5. I didn't take any money with me, so I couldn't buy
6. My new eyeglasses are very good, I can see ... now.
7. I saw ... near the wood that looked like a tent.
8. Give me ... to read, please.
9. I don't know ... about your town. Tell me ... about it.
10. Please give me ... warm: it is cold here.
11. I understand ... now. Thank you for your explanation.
12. There is ... white in the box. What is it?
13. Is there ... that you want to tell me?
14. Where is the book? — It is on the table. — No, there is ... there.
15. I know ... about it.
16. Tell me ... about your family.

Answer the questions.

1. What forces serve to stabilize the liquid?
2. What does the liquid air produces?
3. Where are the liquid — air forces strong and weak?
4. Why are the liquid — air forces strong and weak?
5. What does the surface tension cause?
6. Where the liquid lining layer tend to be pulled?
7. In what manner does the spherical surface of the alveolar liquid lining behave?
8. What creates a greater pressure inside than outside the bubble?
9. Where interconnected alveoli of different sizes could lead?
10. What is a pulmonary surfactant?

Make the sentences of your own using the new words (10 sentences).

Make your own sentences using something, anything, nothing everything (10 sentences).

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) eyelashes; b) lips; c) eyelid;
- 2) a) skull; b) head; c) heart;
- 3) a) esophagus; b) vein; c) intestines;
- 4) a) knee; b) blood; c) vein;
- 5) a) capillaries; b) arteries; c) bones.

ЛЕКЦИЯ № 29. The nose

The respiratory system permits the exchange of oxygen and carbon dioxide between air and blood by providing a thin cellular membrane deep in the lung that separates capillary blood from alveolar air. The system is divided into a conducting portion (nasal cavity, pharynx, larynx, trachea, bronchi, bronchioles) that carries the gases during inspiration and expiration, and a respiratory portion (alveoli) that provides for gas exchange between air and blood.

The nose contains the paired nasal cavities separated by the nasal septum. Anteriorly, each cavity opens to the outside at a nostril (naris), and posteriorly, each cavity opens into the nasopharynx. Each cavity contains a vestibule, a respiratory area, and an olfactory area, and each cavity communicates with the paranasal sinuses.

Vestibule is located behind the nares and is continuous with the skin.

Epithelium is composed of stratified squamous cells that are similar to the contiguous skin.

Hairs and glands that extend into the underlying connective tissue constitute the first barrier to foreign particles entering the respiratory tract.

Posteriorly, the vestibular epithelium becomes pseudostratified, ciliated, and columnar with goblet cells (respiratory epithelium).

Respiratory area is the major portion of the nasal cavity.

Mucosa is composed of a pseudostratified, ciliated, columnar epithelium with numerous goblet cells and a subjacent fibrous lamina propria that contains mixed mucous and serous glands.

Mucus produced by the goblet cells and the glands is carried toward the pharynx by ciliary motion.

The lateral wall of each nasal cavity contains three bony projections, the conchae, which increase the surface area and promote warming of the inspired air. This region is richly vascularized and innervated.

Olfactory area is located superiorly and posteriorly in each of the nasal cavities.

The pseudostratified epithelium is composed of bipolar neurons (olfactory cells), supporting cells, brush cells, and basal cells. The re-

ceptor portions of the bipolar neurons are modified dendrites with long, nonmotile cilia.

Under the epithelium, Bowman's glands produce serous fluid, which dissolves odorous substances.

Paranasal sinuses are cavities in the frontal, maxillary, ethmoid and sphenoid bones' that communicate with the nasal cavities.

The respiratory epithelium is similar to that of the nasal cavities except that it is thinner.

Numerous goblet cells produce mucus, which drains to the nasal passages. Few glands are found in the thin lamina propria.

New words

respiratory system — дыхательный аппарат

exchange — обмен

oxygen — кислород

carbon — углерод

dioxide — диоксид

cellular — клеточный

membrane — мембрана

deep — глубоко

capillary — капилляр

conducting — проведение

portion — часть

nasal cavity — носовая впадина

pharynx — зев

larynx — гортань

trachea — трахея

bronchi — бронхи

bronchioles — бронхиолы

inspiration — вдохновение

expiration — истечение

the paired — соединенный

nasal septum — носовая перегородка

anteriorly — раньше

nostril — ноздря

posteriorly — сзади

vestibule — вестибулярный

respiratory area — дыхательная область
olfactory area — обонятельная область
paranasal sinuses — параназальные пазухи
somebody — кто-нибудь, кто-то

Употребление somebody, anybody, nobody или everybody.

1. Утвердительная форма:
He asked somebody to help him.
2. Отрицательная форма:
He asked nobody to help him. He did not ask anybody to help him.
3. Вопросительная форма:
Did he ask anybody to help him?

Вставьте somebody, anybody, nobody или everybody.

1. Has ... in this group got a dictionary?
2. ... left a magazine in our classroom yesterday.
3. The question was so difficult that ... could answer it.
4. I am afraid I shan't be able to find ... in the office now: it is too late.
5. ... knows that water is necessary for life.
6. Is there ... here who knows French?
7. You must find ... who can help you.
8. ... knew anything about America before Columbus discovered it.
9. I saw ... in the train yesterday who looked like you.
10. There is ... in the next room. I don't know him.
11. Please tell us the story. ... knows it.
12. Is there ... in my group who lives in the dormitory?
13. Has ... here got a red pencil?
14. ... can answer this question. It is very easy.
15. We haven't ... black stockings.
16. They have ... red boots, Kate.
17. I don't want ... today
18. I haven't got ... clean exercise-books.
19. We shall not buy ... in this shop.
20. Didn't you buy ... potatoes yesterday?

Answer the questions.

1. What does the respiratory system permit?
2. The exchange of what does the respiratory system permit?
3. What does the respiratory system provide deep in the lung?
4. What does separate capillary blood from alveolar air?
5. How is the respiratory system divided?
6. What does the nose contain?
7. What does each nasal cavity contain?
8. Where does each nasal cavity open to?
9. Where is vestibule located?
10. What is the major portion of the nasal cavity?

Make the sentences of your own using the new words (10 sentences).

Make the sentences of your own using somebody, anybody, nobody или everybody(10 sentences).

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) digestion; b) nose; c) air;
- 2) a) cavity; b) nose; c) organ;
- 3) a) breath; b) nasal cavity; c) cartilage;
- 4) a) mouth; b) lip; c) ear;
- 5) a) oxygen; b) carbon; c) hydrogen.

ЛЕКЦИЯ № 30. Nasopharynx and larynx

Nasopharynx is the first part of the pharynx.

It is lined by a pseudostratified, ciliated, columnar.

Epithelium with goblet cells: under the epithelium, a gland-containing connective tissue layer rests directly on the periosteum of the bone.

The cilia beat towards the oropharynx, which is composed of a stratified, squamous, nonkeratinized epithelium.

The pharyngeal tonsil, an aggregate of nodular and diffuse lymphatic tissue, is located on the posterior wall of the nasopharynx subjacent to the epithelium. Hypertrophy of this tissue as a result of chronic inflammation results in a condition known as adenoiditis. Larynx is a passageway that connects the pharynx to the trachea and contains the voicebox. Its walls are composed of cartilage held together by fibroelastic connective tissue.

The mucous layer of the larynx forms two pairs of elastic tissue folds that extend into the lumen. The upper pair are called the vestibular folds (or false vocal cords), and the lower pair constitute the true vocal cords. The epithelium of the ventral side of the epiglottis and of the vocal cords is composed of stratified, squamous, nonkeratinized cells. The remainder of the larynx is lined with ciliated, pseudostratified, columnar epithelium. All cilia, from the larynx to the lungs, beat upward toward the nasopharynx.

New words

nasopharynx — носоглотка
first — сначала
pseudostratified — псевдомногослойный
ciliated — снабженный ресничками
columnar — колоночный
epithelium — эпителий
goblet cells — кубические клетки

gland-containing — содержащий железу
connective tissue — соединительная ткань
layer — слой
directly — непосредственно
periosteum — надкостница
bone — кость
cilia beat — ресницы бьются
oropharynx — верхняя часть глотки
stratified — стратифицированный
squamous — чешуйчатый
nonkeratinized — некеритизированный
somewhere — где-нибудь, куда-нибудь, где-то, куда-то

***Употребление somewhere, anywhere, nowhere
или everywhere***

1. Утвердительная форма:
I saw this man somewhere.
2. Отрицательная форма:
I saw this man nowhere. I did not see this man anywhere.
3. Вопросительная форма:
Did you see this I man anywhere?

***Вставьте somewhere, anywhere, nowhere
или everywhere.***

1. I put my dictionary ... yesterday.
2. I can't find my bag ...
3. Of course, that is because you leave your books ...
4. You must go ... next summer.
5. Did you go ... on Sunday?
6. Let's go ...
7. I cannot find my glasses ...
8. I always put me gloves ... and then look for them for hours.
9. There are flags, banners and flowers ... on the streets.
10. I know that these books are...
11. Do you have ... for breakfast?
12. I can find her ...

Переведите на английский язык.

1. На столе что-то лежит.
2. Никто об этом ничего не знает.
3. В парке везде деревья и цветы.
4. В той комнате кто-то есть.
5. Марина живет где-то в центре.
6. Там никого нет.
7. У меня несколько друзей.
8. Я могу жить везде.
9. Где-то сейчас тепло.
10. Он нигде не мог найти красные розы.

Answer the questions.

1. What is the first part of the pharynx?
2. What is the nasopharynx lined by?
3. Where does a gland — containing connective tissue layer rest?
4. Where does the cilia beat?
5. What is oropharynx composed of?
6. What is located on the posterior wall of the nasopharynx?
7. What is the reason of adenoids?
8. What does the larynx connect?
9. What does the voicebox contain?
10. What is the voicebox composed of?

Make the sentences of your own using the new words (10 sentences).

Make the sentences of your own using somewhere, anywhere, nowhere или everywhere (10 sentences).

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) nasopharynx; b) intestines; c) pharynx;
- 2) a) throat; b) trachea; c) feet;
- 3) a) Adam`s apple; b) head; c) trachea;
- 4) a) lungs; b) coccyx; c) bronchi;
- 5) a) ear; b) tonsil; c) nose.

ЛЕКЦИЯ № 31. Trachea

The trachea, a hollow cylinder supported by 16—20 cartilaginous rings, is continuous with the larynx above and the branching primary bronchi below.

Mucosa of the trachea consists of the typical respiratory epithelium, an unusually thick basement membrane, and an underlying lamina propria that is rich in elastin. The lamina propria contains loose elastic tissue with blood vessels, lymphatics, and defensive cells. The outer edge of the lamina propria is defined by a dense network of elastic fibers.

Submucosa consists of dense elastic connective tissue with serous glands whose ducts open onto the surface of the epithelium.

Cartilage rings are C-shaped hyaline cartilage pieces whose free extremities point dorsally (posteriorly). They are covered by a perichondrium of fibrous connective tissue that surrounds each of the cartilages. Smooth muscle bundles (trachealis muscle) and ligaments span the dorsal part of each cartilage.

Adventitia consists of peripheral dense connective tissue that binds the trachea to surrounding tissues.

Primary bronchi

The trachea branches at its distal end into the two primary bronchi. Short extrapulmonary segments of the primary bronchi exist before they enter the lungs at the hilus and then branch further. The histologic structure of the walls of the extrapulmonary segment of the primary bronchi is similar to that of the tracheal wall.

New words

hollow — пустота
cylinder — цилиндр
supported — поддержанный
cartilaginous rings — хрящевые кольца
larynx — гортань
above — выше
branching — переход

primary bronchi — первичные бронхи
below — ниже
mucosa — слизистая оболочка
typical — типичный
respiratory epithelium — дыхательный эпителий
an unusually — нетипично
thick — толстый
basement — основание
underlying — основной
lamina — тонкая пластинка
rich — богатый
elastin — эластин
loose — свободный
vessel — сосуд
lymphatics — лимфатический
defensive cells — защитные клетки
outer — внешний
edge — край

Много: *MUCH, MANY, (A) LITTLE, (A) FEW*

Единственное число: *much* (используется только исчисляемыми существительными).

Ex. I have much time.

Множественное число: *many* (используется только с неисчисляемыми существительными)

Ex. I have many books.

Переведите на английский язык следующие пары слов.

Много тетрадей, много молока, много воды, много дней, много газет, много мела, много снега, много лет, много картин, много музыки, много мальчиков, много девочек, много чая, много лимонов, много мяса, много комнат, много учителей, много работы, много воздуха, много птиц, много машин.

Вставьте much или many.

1. Please, don't put ... pepper on the meat.
2. There were ... plates on the table.

3. I never eat ... bread with soup.
4. Why did you eat so ... ice-cream?
5. She wrote us ... letters from the coun try.
6. ... of these students don't like to look up words in the dictionary.
7. ... in this work was too difficult for me.
8. ... of their answers were excel lent.
9. ...of their conversation was about the in stitute.
10. There are ... new pictures in this room.

Answer the questions.

1. How many cartilaginous rings support the trachea?
2. What is the trachea continuous with?
3. What does mucosa of the trachea consist of?
4. What does the lamina propria contain?
5. With help of what is the outer edges of the lamina propria defined by?
6. What does submucosa consist of?
7. How are cartilage rings shaped?
8. What covers the cartilage rings?
9. What does adventitia consist of?
10. How do short extrapulmonary segments of the primary bronchi exist?

Make the sentences of your own using the new words (10 sentences).

Make the sentences of your own using *MUCH, MANY, (A) LITTLE, (A) FEW*(10 sentences).

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) vein; b) mucosa; c) trachea;
- 2) a) mucosa; b) organ; c) submucosa;
- 3) a) nerve; b) bone; c) organ;
- 4) a) brain; b) reflex; c) vertebra;
- 5) a) vision; b) eye; c) ear.

ЛЕКЦИЯ № 32. Respiratory bronchioles

Respiratory bronchioles are areas of transition (hybrids) between the conducting and respiratory portions of the airways. In addition to the typical bronchiolar epithelium of the terminal bronchioles, these passageways contain outpouchings of alveoli, which comprise the respiratory portion of this system.

Terminal bronchioles give rise to respiratory bronchioles.

Respiratory bronchioles branch to form two to three alveolar ducts, which are long sinuous tubes.

Alveolar sacs are spaces formed by two or more conjoined alveoli. They are lined by the simple squamous alveolar epithelium. Alveoli are the terminal, thin-walled sacs of the respiratory tree that are responsible for gas exchange. There are approximately 300 million alveoli per lung, each one 200—300 μm in diameter. Blood-air interface. Oxygen in the alveoli is separated from hemoglobin in the red blood cells of alveolar capillaries by five layers of membrane and cells: the alveolar epithelial cell (apical and basal membranes) and its basal lamina, the basal lamina of the capillary and its endothelial cell (basal and apical membranes), and the erythrocyte membrane. The total thickness of all these layers can be as thin as 0,5 μm .

Alveolar epithelium contains two cell types. Type I cells completely cover the alveolar luminal surface and provide a thin surface for gas exchange. This simple squamous epithelium is so thin (–25 nm) that its details are beyond the resolution of the light microscope.

Type II cells are rounded, plump, cuboidal-like cells that sit on the basal lamina of the epithelium and contain membrane-bound granules of phospholipid and protein (lamellar bodies). The contents of these lamellar bodies are secreted onto the alveolar surface to provide a coating of surfactant that reduces alveolar surface tension.

Alveolar macrophages (dust cells) are found on the surface of the alveoli.

Derived from monocytes that extravasate from alveolar capillaries, alveolar macrophages are part of the mononuclear — clear phagocyte sy-

stem. Dust cells, as their name implies, continuously remove particles and other irritants in the alveoli by phagocytosis.

New words

respiratory bronchioles — дыхательные бронхиолы

transition — переход

hybrids — гибриды

respiratory portions — дыхательные части

airways — воздушные трассы

in addition — кроме того

bronchiolar — бронхиолярный

terminal bronchioles — предельные бронхиолы

passageway — проходы

to comprise — включить

branch — ветвь

ducts — трубочки

sinuous tubes — извилистые трубы

to be lined by — быть выровненным

simple — простой

thin-walled — окруженный тонкой стеной

sacs — мешочки

respiratory tree — дыхательное дерево

responsible — ответственный

approximately — приблизительно

hemoglobin — гемоглобин

apical — апикальный

basal — основной

Мало:

little (единственное число)

few (множественное число)

Переведите на английский язык следующие пары слов.

Мало домов, мало чая, мало чашек, мало яблок, мало окон, мало бумаги, мало кофе, мало статей, мало радости, мало супу, мало деревьев, мало травы, мало детей, мало игрушек, мало света,

мало парт, мало колбасы, мало сока, мало книг, мало цветов, мало соли, мало друзей, мало дворцов.

Вставьте little или few.

1. I have ... time.
2. He has ... English books.
3. There is ... in my pen. Have you got anyink?
4. There aren't ... bear in the zoo.
5. Tom Canty was the son of poor parents and had very ... clothes.
6. There is too ... soup in my plate.
7. The ... children returned from the wood very sad.
8. There is too... light in the room.
9. There are very ... people in the room.
10. There are ... vegetables in the basket.

Answer the questions.

1. What are respiratory bronchioles?
2. Between what are there areas of respiratory bronchi?
3. What the passageways xontain?
4. What comprises the respiratory portion of the system?
5. What bronchioles give to respiratory bronchioles?
6. What are long sinuous tubes?
7. What are alveolar sacs?
8. How are alveolar sacs lined by?
9. What are alveolar sacs formed by?
10. How many alveoli per lung are there?

Make the sentences of your own using the new words (10 sentences).

Make the sentences of your own using: little, few (10 sentences).

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) part; b) complete; c) portion;
- 2) a) skin; b) breastbone; c) tissue;
- 3) a) hearing; b) ear; c) breathing;
- 4) a) fever; b) temperature; c) health;
- 5) a) neck; b) bronchi; c) trachea

ЛЕКЦИЯ № 33. Pleura

Visceral pleura is a thin serous membrane that covers the outer surface of the lungs. A delicate connective tissue layer of collagen and elastin, containing lymphatic channels, vessels, and nerves, supports the membrane. Its surface is covered by simple squamous mesothelium with microvilli.

Parietal pleura is that portion of the pleura that continues onto the inner aspect of the thoracic wall. It is continuous with the visceral pleura and is lined by the same mesothelium.

Pleural cavity is a very narrow fluid-filled space that contains monocytes located between the two pleural membranes. It contains no gases and becomes a true cavity only in disease (e. g., in pleural infection, fluid and pus may accumulate in the pleural space). If the chest wall is punctured, air may enter the pleural space (pneumothorax), breaking the vacuum, and allowing the lung to recoil. Parietal pleura lines the inner surface of the thoracic cavity; visceral pleura follows the contours of the lung itself.

Pleural cavity: The pleural cavity is the space between the parietal and visceral layers of the pleura. It is a sealed, blind space. The introduction of air into the pleural cavity may cause the lung to collapse (pneumothorax).

It normally contains a small amount of serous fluid elaborated by mesothelial cells of the pleural membrane.

Pleural reflections are areas where the pleura changes direction from one wall to the other. The sternal line of reflection is where the costal pleura is continuous with the mediastinal pleura behind the sternum (from costal cartilages 2—4). The pleural margin then passes inferiorly to the level of the sixth costal cartilage. The costal line of reflection is where the costal pleura becomes continuous with the diaphragmatic pleura from rib 8 in the midclavicular line, to rib 10 in the midaxillary line, and to rib 12 lateral to the vertebral column. Pleural recesses are potential spaces not occupied by lung tissue except during deep inspiration. Costodiaphragmatic recesses are spaces below the inferior borders of the lungs where costal and diaphragmatic pleura

ra are in contact. Costomediastinal recess is a space where the left costal and mediastinal parietal pleura meet, leaving a space due to the cardiac notch of the left lung. This space is occupied by the lingula of the left lung during inspiration.

In nervation of the parietal pleura: The costal and peripheral portions of the diaphragmatic pleura are supplied by intercostal nerves.

The central portion of the diaphragmatic pleura and the mediastinal pleura are supplied by the phrenic nerve.

New words

visceral — висцеральный
 pleura — плевра
 delicate — тонкий
 collagen — коллаген
 elastin — эластин
 containing — содержание
 lymphatic channels — лимфатические сосуды
 nerves — нервы
 to support — поддерживать
 covered — покрытый
 squamous — чешуйчатый
 microvilli — микроворсинки
 parietal pleura — париетальная плевра
 onto aspect — в аспекте
 visceral pleura — висцеральная плевра
 inspiration — вдохновение
 costal — реберный

Степени сравнения прилагательных Таблица 4.

Односложные и двусложные прилагательные		
Положительная степень	Сравнительная степень	Превосходная степень
Small	Smaller	The smallest
Large	Larger	The largest
Big	Bigger	The biggest
Happy	Happier	The happiest

Особые случаи образования степеней сравнения Таблица 5.

Положительная степень	Сравнительная степень	Превосходная степень
Old	Elder older	The eldest, the oldest
Far	Farther	The farthest
Good	Better	The best
Bad	Worse	The worst

Образуйте сравнительную и превосходную степень следующих прилагательных. Не забудьте употреблять определенный артикль перед превосходной степенью прилагательных.

Hot, long, short, clever, silly, great, red, black, white, thin, thick, fat, nice, warm, cold, merry small, tall, high, weak, strong, heavy, light, green, dry, clean, dirty, wide, deep, brave.

Переведите на английский язык.

Старый, старше, самый старый, самый старший, мой старший брат, мой старый друг, дальше, самый дальний, самый длинный, короче, счастливый, счастливее, самый счастливый, самый лучший, самый черный, длиннее, хуже, лучше, теплее, ее лучший друг, ее младший сын, его старший сын.

Answer the questions.

1. What is visceral pleura?
2. Is visceral pleura a thin serous membrane or not?
3. What contains lymphatic channels, vessels, and nerves?
4. What covers delicate connective tissue layer?
5. Which portion of the pleura is parietal pleura?
6. What kind of space is pleural cavity?
7. What do pleural cavity contain?
8. In which way air may enter the pleural space?
9. What do normally contain a small amount of serous fluid?
10. What is supplied by intercostal nerves?

Make the sentences of your own using the new words (10 sentences).

Find the verb to be in the text. Explain why it is used in such a way?

ЛЕКЦИЯ № 34. Nasal cavities

The anatomical structures that play a central role in the respiratory system are located in the head and neck as well as the thorax.

Nasal cavities are separated by the nasal septum, which consists of the vomer, the perpendicular plate of the ethmoid bone, and the septal cartilage. The lateral wall of each nasal cavity features three scroll-shaped bony structures called the nasal conchae. The nasal cavities communicate posteriorly with the nasopharynx through the choanae. The spaces inferior to each concha are called meatus. The paranasal sinuses and the nasolacrimal duct open to the meati. The inferior concha is a separate bone, and the superior and middle conchae are parts of the ethmoid bone.

Inferior meatus. The only structure that opens to the inferior meatus is the nasolacrimal duct. This duct drains lacrimal fluid (i. e., tears) from the medial aspect of the orbit to the nasal cavity.

Middle meatus: the hiatus semilunaris contains openings of frontal and maxillary sinuses and anterior ethmoidal air cells. The bulla ethmoidalis contains the opening for the middle ethmoidal air cells.

Superior meatus contains an opening for the posterior ethmoidal air cells.

Sphenoethmoidal recess is located above the superior concha and contains an opening for the sphenoid sinus.

Innervation: Somatic innervation. General sensory information from the lateral wall and septum of the nasal cavity is conveyed to the CNS by branches of V₁ and V₂.

Autonomic innervation. Preganglionic parasympathetic fibers destined to supply the glands of the nasal mucosa and the lacrimal gland travel in the nervus intermedius and the greater superficial petrosal branches of the facial nerve (CN VII). These fibers synapse in the pterygopalatine ganglion, which is located in the pterygopalatine fossa. Postganglionic fibers traveling to the mucous glands of the nasal cavity, paranasal air sinuses, hard and soft palate, and the lacrimal gland follow branches of V₂ and in some cases V₁, to reach their destinations.

New words

anatomical — анатомический
play — игра
central role — центральная роль
respiratory system — дыхательная система
head — голова
neck — шея
nasal cavities — носовые впадины
to be separated — быть отделенным
the perpendicular plate — перпендикулярная пластина
ethmoid — решетчатый
septal — относящийся к перегородке
nasal conchae — носовой раковина
communicate — взаимодействовать
posteriorly — сзади
paranasal — параносовой
sinuses — пазухи
nasolacrimal — назолакримальный
duct — трубочка
drain — проток
tears — слезы
orbit — орбита
hiatus — пауза
maxillary — верхнечелюстной
bulla — пузырь

Поставьте глагол to be в правильную форму, заполнив пропуски.

1. I ... a pupil.
2. My father ... not a teacher, he ... a scientist.
3. ... your sister a teacher?
4. Mary ... a painter.
5. ... they at home?
6. My father ... a worker.
7. She ... at work.
8. ... you a doctor?
9. He ... a pilot.

10. We ... students.
11. They ... carpenters.
12. ... they at home?
13. they ... not at home
14. He ... at work.
15. ... your sister a typist?
16. ... your brother at school?
17. ... your sister in the cabinet?
18. My sister ... at home.
19. ... this your cat?
20. She ... an actress.
21. This ... my bag.
22. He ... professor.
23. Helen ... a singer.
24. ... you an engineer?
25. He ... Russian.

***Переведите на английский язык,
употребляя глагол to be в Present Simple.***

1. Я ученик. Я в школе.
2. Мой брат художник. Он не инженер.
3. Моя сестра на работе. Она врач.
4. Он студент, а не учитель.
5. Вы студент? — Нет, я ученик.
6. Моя сестра дома. Она больна.
7. Мы не в школе. Мы дома.
8. Мой брат ученик. Он в школе.
9. Ваша мама дома? — Нет, она на работе.
10. Ваш двоюродный брат дома? — Нет, он в школе.
11. Твоя сестра здорова сейчас? — Да, она здорова.
12. Ваша сестра учительница? — Нет, она студентка.
13. Твой папа на работе? Нет, он на даче.
14. Твоя сестра машинистка? — Да. Она машинистка.
15. Моя мама не учительница. Она врач.
16. Чья это ручка? — Это моя ручка.
17. Чья это книга? — Это ваша книга.
18. Чей это стол? — Это стол моего брата.
19. Чья это сумка? — Это сумка моей мамы.

20. Чей это карандаш? — Это карандаш моей сестры.
21. Это твоя тетрадь? — Да, это моя тетрадь.
22. Это тетрадь твоего брата? — Нет, это моя.
23. Где ваш стол? — Он посередине комнаты.
24. Где твоя ручка? — Она в моем кармане.
25. Где твоя тетрадь? — Она на столе.
26. Мой дедушка не ученый, он геолог.

Answer the questions.

1. What is the cell consists of?
2. What is a membrane?
3. Is cell the smallest independent unit of the body?
4. What can be grown in test — tubes?
5. What can various tissues form, when they are together?
6. What are the organ system consist of?
7. What are cell characterized by?
8. What are cell organelles?
9. What are membranes?
10. What is the cytoplasm?

Make the sentences of your own using the new words (10 sentences).

Find the verb to be in the text. Explain why it is used in such a way?

Find one word, which is a little bit different in meaning from others

(найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) cell; b) body; c) flower;
- 2) a) life; b) plate; c) people;
- 3) a) test-tube; b) microscope; c) pen;
- 4) a) curtain; b) body; c) tissue;
- 5) a) spoon; b) kidney; c) liver.

ЛЕКЦИЯ № 35. Pharynx and related areas

The pharynx is a passageway shared by the digestive and respiratory systems. It has lateral, posterior, and medial walls through out, but is open interiorly in its upper regions, communicating with the nasal cavity and the oral cavity. The anterior wall of the laryngopharynx is formed by the larynx. The pharyngeal wall consists of a mucosa, a fibrous layer, and a muscularis, which is composed of an inner longitudinal layer (i. e., stylopharyngeus, palatopharyngeus, salpingopharyngeus) and an outer circular layer (i. e., superior, middle, inferior constrictor muscles).

Nasopharynx is the region of the pharynx located directly posterior to the nasal cavity. It communicates with the nasal cavity through the choanae (i. e., posterior nasal apertures).

The torus tubarius is the cartilaginous rim of the auditory tube. The pharyngeal recess is the space located directly above and behind the torus tubarius; it contains the nasopharyngeal tonsil. The salpingopharyngeal fold is a ridge consisting of mucosa and the underlying salpingopharyngeus muscle, which runs down the wall of the pharynx from the torus tubarius.

Oropharynx is the region of the pharynx located directly posterior to the oral cavity. It communicates with the oral cavity through a space called the fauces. The fauces are bounded by two folds, consisting of mucosa and muscle, known as the anterior and posterior pillars.

The anterior pillar of the fauces, also known as the palatoglossal fold, contains the palatoglossus muscle.

The posterior pillar of the fauces, also known as the palatopharyngeal fold, contains the palatopharyngeus muscle. The tonsillar bed is the space between the pillars that houses the palatine tonsil.

Laryngopharynx is the region of the pharynx that surrounds the larynx. It extends from the tip of the epiglottis to the cricoid cartilage. Its lateral extensions are known as the piriform recess.

Oral cavity: the portion of the oral cavity that is posterior to the lips and anterior to the teeth is called the vestibule. The oral cavity proper has a floor formed by the mylohyoid and geniohyoid muscles, which

support the tongue. It has lateral walls, consisting of the buccinator muscles and buccal mucosa, and a roof formed by the hard palate anteriorly and the soft palate posteriorly. Its posterior wall is absent and is replaced by an opening to the oropharynx, which is flanked by the pillars of the fauces.

The palate separates the nasal and oral cavities.

Hard palate is formed by the palatine process of the maxilla and the horizontal palate of the palatine bone. Its mucosa is supplied with sensory fibers from CN V2.

Soft palate consists of a fibrous membrane, the palatine aponeurosis, covered with mucosa. The portion that hangs down in the midline is the uvula, which contains the musculus uvulae. Two additional muscles (i. e., levator palati, tensor palati) insert into the palatine aponeurosis.

The tongue is a mobile, muscular organ necessary for speech. It is divisible into an anterior two-thirds and a posterior one-third by the sulcus terminalis.

Muscles of the tongue. These include the intrinsic and extrinsic muscles (i. e., palatoglossus, styloglossus, hyoglossus, genioglossus). All of the muscles are innervated by CN XII except the palatoglossus, which is supplied by CN X. Arterial supply: The tongue is supplied by the lingual branch of the external carotid artery.

Venous drainage. The lingual veins, which lie on the under-surface of the tongue, drain to the internal jugular veins.

Lymphatic drainage. The tip of the tongue drains to the submental nodes, and the remainder of the anterior two-thirds drains first to submandibular, then to deep cervical nodes. The posterior one-third drains directly to deep cervical nodes.

New words

shared — разделенный
digestive — пищеварительный
anteriorly — раньше
upper — верхний
regions — области
communicating — взаимодействие
oral cavity — полость рта
anterior wall — передняя стенка

pharyngeal — глоточный
 mucosa — слизистая оболочка
 fibrous layer — волокнистый слой
 longitudinal — продольный
 circular layer — круглый слой
 superior — выше
 middle — середина
 posterior nasal apertures — задние носовые апертуры
 torus tubarius — трубный валик
 auditory space — носоглоточный
 nasopharyngeal tonsil — миндалина
 fold — сгиб

**Спряжение глагола to be (быть) в Past Simple Tense
 (Past Indefinite Tense) Таблица 6.**

I was	I was not
He was	He was not
She was	She was not
It was	It was not
We were	We were not
You were	You were not
They were	They were not

Was I?	Yes, I was	No, I wasn't
Was he?	Yes, he was	No, he wasn't
Was she?	Yes, she was	No, she wasn't
Was it?	Yes, it was	No, it wasn't
Were we?	Yes, we were	No, e weren't
Were you?	Yes, you were,	No, you were
Were they?	Yes, they were	???

Переведите на английский язык, используя таблицу 6.

1. Я был учеником.
2. Он был летчиком.
3. Она была доктором.
4. Мы были школьниками.
5. Они были рабочими.
6. Ты был рабочим.
7. Они были учениками.

8. Я был дома.
9. Он был в школе
10. Она была в кино?
11. Мы были в парке.
12. Они были в театре?
13. Она была молодая в то время?
14. Он был старый.
15. Она не была учительницей.
16. Они были сильные.
17. Она была больна.
18. Вы были больны?
19. Он был болен?
20. Я не был болен.
21. Я был болен вчера.
22. Она не была больна.
23. Мы были в кино.
24. Они не были в кино.
25. Они не были в школе.
26. Они были дома.
27. Вы были в парке вчера?
28. Он был в школе вчера?
29. Он был рабочим.
30. Она была актрисой.

Answer the questions.

1. What is the pharynx?
2. What shares the pharynx?
3. What has the pharynx?
4. What forms the anterior wall of the laryngopharynx?
5. What the pharyngeal wall consists of?
6. What is nasopharynx?
7. Where is nasopharynx located?
8. What is the torus tubarius?
9. What is located directly above and behind the torus tubarius?
10. What is located between the pillars that houses the palatine tonsil?

Make the sentences of your own using the new words (10 sentences).
Find the verb to be in the text. Explain why it is used in such a way?

ЛЕКЦИЯ № 36. Oral cavity

The oral cavity forms in the embryo from an in-pocketing of the skin, stomodeum; it is, thus, lined by ectoderm. Functionally, the mouth forms the first portion of both the digestive and respiratory systems. Various special structures are found in, or associated with, the mouth.

In humans the margins of the lips mark the junction between the outer skin and the inner mucous lining of the oral cavity. The roof of the mouth consists of the hard palate and, behind this, the soft palate which merges into the oropharynx. The lateral walls consist of the distensible cheeks. The floor of the mouth is formed principally by the tongue and the soft tissues that lie between the two sides of the lower jaw, or mandible.

The tongue, a muscular organ in the mouth, provides the sense of taste and assists in chewing, swallowing, and speaking. It is firmly anchored by connective tissues to the front and side walls of the pharynx, or throat, and to the hyoid bone in the neck.

The posterior limit of the oral cavity is marked by the fauces, an aperture which leads to the pharynx. On either side of the fauces are two muscular arches covered by mucosa, the glossopalatine and pharyngopalatine arches; between them lie masses of lymphoid tissue, the tonsils. These are spongy lymphoid tissues composed mainly of lymphocytic cells held together by fibrous connective tissue. Suspended from the posterior portion of the soft palate is the soft retractable uvula. The palate develops from lateral folds of the primitive upper jaw. The palate of mammals consists of two portions. The hard palate, more anterior in position, underlies the nasal cavity. The soft palate hangs like a curtain between the mouth and nasal pharynx.

The hard palate has an intermediate layer of bone, supplied anteriorly by paired palatine processes of the maxillary bones, and posteriorly by the horizontal part of each palate bone. The oral surface of the hard palate is a mucous membrane covered with a stratified squamous epithelium. Anteriorly in humans there are four to six transverse palatine ridges: these diminish in prominence between fetal life and old age. A submucosal layer contains mucous glands and binds the

membrane firmly to the periosteum of the bony component. Above the bone is the mucous membrane that forms the floor of the nasal cavity.

The soft palate is a backward continuation from the hard palate. Its free margin connects on each side with two folds of mucous membrane, the palatine arches, enclosing a palatine tonsil. In the midline the margin extends into a fingerlike projection called uvula. Both the hard and soft palate bear a seam, or raphe, along the midline. The oral side of the soft palate continues as the covering of the hard palate, and the submucosa contains mucous glands. The intermediate layer is a sheet of voluntary muscle.

Besides separating the nasal passages from the mouth, the hard palate is a firm plate, against which the tongue manipulates food. In swallowing and vomiting the soft palate is raised to separate the oral from the nasal portion of the pharynx. This closure prevents food from passing upward into the nasopharynx and nose. The closing action also occurs in speech.

New words

oral cavity — полость рта
forms — формы
embryo — эмбрион
in-pocketing — в присваивании
functionally — функционально
mouth — рот
special — особенный
structures — структуры
associated — связанный
humans — люди
margins — края
lips — губы
mark — марка
junction — соединение
hard — трудно
merges — слияния
distensible — растяжимый
cheeks — щеки
principally — преимущественно
tongue — язык

taste — вкус
 to assists — помогать
 chewing — жевание
 swallowing — глотание
 speaking — разговор
 limit — предел

**Спряжение глагола to be (быть) в Future Simple Tense
 (Future Indefinite Tense) Таблица 7**

I shall be	I shall not be
He will be	He will not be
She will be	She will not be
It will be	It will not be
We shall be	We shall not be
You will be	You will not be
They will be	They will not be

Shall I be?	Yes, I shall	No, I shan't
Will he be?	Yes, he will	No, he won't
Will she be?	Yes, she will	No, she won't
Will it be?	Yes, it will	No, it won't
Shall we be?	Yes, we shall	No, we shan't
Will you be?	Yes, you will	No, you won't
Will they be?	Yes, they will	No, they won't

Вставьте глагол to be в Present, Past или Future Simple.

1. My father ... a teacher.
2. He ... a pupil twenty years ago.
3. I ... a doctor when I grow up.
4. My sister ... not ... at home tomorrow.
5. She ... at school tomorrow.
6. ... you ... at home tomorrow?
7. ... your father at work yesterday?
8. My sister ... ill last week.
9. She ... not ill now.

10. Yesterday we ... at the theatre.
11. Where ... your mother now? — She ... in the kitchen.
12. Where ... you yesterday? — I ... at the cinema
13. When I come home tomorrow, all my family ... at home.
14. ... your little sister in bed now? — Yes, she ...
15. ... you little ... at school tomorrow? — Yes I
16. When my granny ... young, she ... an actress.
17. My friend ... in Moscow now.
18. He ... in St. Petersburg tomorrow.
19. Where ... your books now?
20. They ... in my bag.

Answer the questions.

1. What the oral cavity forms?
2. What is lined by ectoderm?
3. Does mouth form the first portion of both the digestive and respiratory systems?
4. What does the roof of the mouth consist of?
5. What is situated behind hard palate?
6. What do the lateral walls consist of?
7. What is the floor of the mouth formed principally by?
8. What does the palate develop?
9. What is the intermediate layer?
10. In what cases is the soft palate raised to separate the oral from the nasal portion of the pharynx?

Make the sentences of your own using the new words (10 sentences).
Find the verb to be in the text. Explain why it is used in such a way?

ЛЕКЦИЯ № 37. Oral glands

All mammals are well supplied with oral glands. There are numerous small glands, such as the labial glands of the lips, buccal glands of the cheeks, lingual glands of the tongue, and palatine glands of the palate. Besides these, there are larger paired sets in mammals that are quite constant from species to species and are commonly designated as salivary glands. The parotid gland, near each ear, discharges into the vestibule. The submaxillary or submandibular gland lies along the posterior part of the lower jaw; its duct opens well forward under the tongue. The sublingual gland lies in the floor of the mouth. It is really a group of glands, each with its duct. Saliva is a viscid fluid containing a mixture of all the oral secretions. It contains mucus, proteins, salts, and the enzymes ptyalin and maltase. Most of the ptyalin in human saliva is furnished by the parotid gland. The digestive action of saliva is limited to starchy food. Other uses of saliva include the moistening of food for easier manipulation by the tongue, the consequent facilitation of swallowing, and a lubrication by mucus that ensures a smoother passage of food down the esophagus to the stomach. The daily amount of saliva produced by an adult is about 1,5 quarts. Tonsils are spongy lymphoid tissues at the back of the throat, composed mainly of lymphocytic cells held together by fibrous connective tissue. There are three types of tonsils. The palatine tonsils, usually referred to as « the tonsils», are visible between the arches that extend from the uvula to the floor of the mouth. The pharyngeal tonsils, usually referred to as the adenoids, lie at the back of the throat. The lingual tonsils are on the upper surface of each side of the back of the tongue. The tonsils function to protect the pharynx and the remainder of the body from infectious organisms that become trapped in the mucous membrane lining the mouth, nose and throat. Chronic or acute inflammation of the tonsils, called the tonsillitis, may serve as a source of infection elsewhere in the body.

Tongue

The tongue, a muscular organ in the mouth, provides the sense of taste and assists in chewing, swallowing, and speaking. It is firmly

anchored by connective tissues to the front and side walls of the pharynx, or throat, and to the hyoid bone in the neck.

The mammalian tongue is divided into two parts by a V-shaped groove, the terminal sulcus. At the apex of this V is a small blind pit, the foramen cecum. The larger part, or body, of the tongue belongs to the floor of the mouth, whereas the root forms the front wall of the oral pharynx. The body of the tongue is separated from the teeth and gums by a deep groove. A midline fold, the frenulum, is near the tip on the undersurface. The upper surface of the body, called the dorsum, has a velvety appearance because of filiform papillae. Distributed among these are occasional larger, rounded fungiform papillae and some large conical papillae. Immediately in front of the groove separating the body of the tongue from the root is a series of still larger vallate papillae arranged in a V-shaped row. The apex of the V points down the throat. Posteriorly along each side of the body of the tongue and near the root, is a series of parallel folds constituting the foliate papillae. The surface of the root of the tongue, which belongs to the pharynx, has no papillae but bears nodules containing lymphoid tissue.

New words

mammals — млекопитающие
supplied — поставляемый
glands — железы
numerous — многочисленный
labial — губной
buccal — относящийся ко рту или щеке
lingual — языковой
palatine — небный
paired sets — соединенные ячейки
designated — определяемый
salivary glands — слюнные железы
parotid — околоушная железа
gland — железа
discharges — увольнения
vestibule — преддверие
submaxillary — верхнечелюстной
submandibular — нижнечелюстной
lie — ложь

along — вперед
sublingual — подязыковой

Present Continuous Tense (действие происходит в процессе, совершается в тот момент, когда о нем говорят) = (now, at the moment)

**Спряжение глагола to work
в Present Continuous Tense Таблица 8**

I am working	I am not working
He is working	He is not working
She is working	She is not working
It is working	It is not working
We are working	We are not working
You are working	You are not working
They are working	They are not working

Am I working?	Yes, I am	No, I am not
Is he working?	Yes, he is	No, he isn't
Is she working?	Yes, she is	No, she isn't
Is it working?	Yes, it is	No, it isn't
Are we working?	Yes, we are	No, we aren't
Are you working?	Yes, you are	No, you aren't
Are they working?	Yes, they are	No, they aren't

***Раскройте скобки, употребляя глаголы
в Present Continuous.***

(NOW)

1. The boys (to run) about in the garden.
2. I (to do) my homework.

3. John and his friends (to go) to the library.
4. Ann (to sit) at her desk. She (to study) geography.
5. A young man (to stand) at the window. He (to smoke) a cigarette.
6. The old man (to walk) about the room,
7. The dog (to lie) on the floor.
8. You (to have) a break?
9. What language you (to study)?
10. Who (to lie) on the sofa?

Переведити на английскй язык.

1. Я читаю.
2. Он не пишет.
3. Мы не работаем.
4. Вы читаете?
5. Он спит?
6. Коля и Миша играют в футбол.
7. Катя играет на рояле.
8. Она не поет.
9. Моя сестра спит.
10. Папа пьет чай?

Answer the questions.

1. Are all mammals well supplied with oral glands?
2. Enumerate small glands?
3. Where are the parotid gland situated?
4. Where is submaxillary located?
5. What is saliva?
6. What limits the digestive action of saliva?
7. How much is the daily amount of saliva?
8. How is the mammalian tongue divided?
9. What provides the sense of taste?
10. From what the body of the tongue is separated?

Make the sentences of your own using the new words (10 sentences).
Find the verb to be in the text. Explain why it is used in such a way?

ЛЕКЦИЯ № 38. The digestive tract structure

The gastrointestinal tract and associated organs are collectively called the digestive system. This system is responsible for receiving food and breaking it down by using enzymes from the glands and by the movement of the various parts of the intestinal tract; for absorption of these components into the blood; and for eliminating undigested food and certain metabolic wastes from the body. The alimentary canal extends from the mouth to the anus. It is a long tube varying in size and shape depending on what function the particular part performs. The tract has a very good blood supply, because food, once it is broken down, has to be absorbed into the bloodstream. The mouth contains the tongue and the teeth and communicates with the salivary glands situated round it. Behind the nose and mouth is the pharynx. Leading from the pharynx is a muscular tube called the esophagus which passes down the thoracic cavity to the stomach. The stomach lies below the diaphragm in the upper left side, of the abdominal cavity. The opening into the small intestine is called the pylorus and is closed by the pyloric sphincter. The small intestine is a muscular tube coiled up in the abdominal cavity. It is divided into three parts; the duodenum, the jejunum, and the ileum. The large intestine, also a muscular tube but with wider lumen than the small intestine, is often called the colon. It is divided into several different parts: the cecum, the ascending colon, the transverse colon, the descending colon, the rectum and the anal canal. The glands belonging to the digestive system are the salivary glands, the liver and the pancreas.

Stomach is probably the most distensible of any in the human body. The proximal portion is the cardiac portion; the portion above the entrance of the esophagus is the fundus; the distal portion is the pyloric part; and the body is between the fundus and the pyloric part.

The coats of the stomach are four: an outer, peritoneal or serous coat; a muscular coat, made up of longitudinal, oblique, and circular fibres; a submucous coat; and the mucous coat or membrane forming the inner lining.

Gastric glands, which are in mucous coat, secrete gastric juice containing hydrochloric acid and other digestive enzymes into the cavity of the stomach. The glands of the fundus and body are important in the secretion of gastric juice.

The shape of the stomach varies from individual to individual and from time to time in the same individual depending upon the degree of digestion, degree of contraction, and the age and the body-built of the individual. Frequently it is more J-shaped than U-shaped so that its greater curvature can even lie in the greater pelvis. Cardia and fundus are relatively fixed and, hence, tend to move only with the respiratory excursions of the diaphragm.

New words

gastrointestinal tract — желудочно-кишечный тракт
associated — связанный
collectively — все вместе
digestive system — пищеварительная система
responsible — ответственный
receiving — получение
food — пища (еда)
breaking — ломка (нарушение)
using — использование
enzymes — ферменты
intestinal tract — кишечный тракт
absorption — поглощение
eliminating — устранение
undigested — неусвоенный
metabolic wastes — метаболические
alimentary — отходы
extends — пищевой
anus — задний проход
tube — труба
tract — трактат
round — вокруг
esophagus — пищевод
diaphragm — диафрагма
abdominal — брюшной
pylorus — пилорус

pyloric sphincter — пилорический сфинктер
coiled up — свернутый

Future simple tense
(действие совершится в будущем)

Спряжение глагола to work в Future simple tense Таблица 9

I will (work)	I will not (work)
He will (work)	He will not (work)
she will (work)	she will not (work)
It will(work)	It will not (work)
We will (work)	We will not (work)
You will (work)	You will not (work)
They will (work)	They will not (work)

They will not (work)	Yes, I will	No, I will not
They will not (work)	Yes, he will	No, he will not
Will she (work)?	Yes, she will	No, she will not
Will they(work)?	Yes, they will	No, she will not
Will you(work)?	Yes, you will	No, you will not
Will we(work)?	Yes, we will	No, you will not

Раскройте скобки, употребляя глаголы в Present Continuous, Present Simple или в Future Simple.

1. When you (to get) up every day? — I (to get) up at seven o'clock.
2. My brother usually (not to get) up at seven o'clock. As a rule, he (to get) up at six o'clock, but tomorrow he (to get) up at seven o'clock.
3. Why she (to come) home so late to morrow?
4. We (to go) to the country the day after tomorrow.
5. Our friends always (to go) to the country for the week-end.
6. Look! The kitten (to play) with its tail.

7. Your parents (to watch) TV now?
8. My sister (not to rest) now. She (to help) mother in the kitchen.
She (to help) mother in the kitchen every day.
9. Where she (to go) tomorrow?
10. She (to go) to the country with us tomorrow?
11. They (to stay) at home tomorrow.
12. What you (to do) now? I (to see) that you (not to read).
13. When you (to finish) your homework? It (to be) very late, it (to be) time to go to bed.
14. How you usually (to spend) evenings?
15. What you (to do) in the country next summer?
16. They (not to drink) ten now. I (to think) they (to watch) TV.
17. What your father (to drink) in the evening?

Answer the questions.

1. How are the gastrointestinal tract and associated organs collectively called?
2. What is the digestive system responsible for?
3. Where does the alimentary canal extend?
4. What shape do the alimentary canal have?
5. Has the tract a very good blood supply?
6. Why the tract has a very good blood supply?
7. What is behind the nose and the mouth?
8. What leads from the pharynx?
9. Under what does the stomach lie?
10. How does the shape of the stomach vary?

Make the sentences of your own using the new words (10 sentences).
Find the verb to be in the text. Explain why it is used in such a way?

ЛЕКЦИЯ № 39. The progress of digestion

The process of digestion begins when food is taken into the mouth. Chewing breaks the food into smaller pieces, thereby exposing more surfaces to the saliva. Saliva itself has a double function. It moistens the food, so facilitating swallowing, and it contains the enzyme which begins the conversion of carbohydrates into simple sugars.

Although enzymatic action begins in the mouth, the major processes of digestion do not occur until the food passes down through the esophagus into the stomach. The stomach has both a chemical and a physical function. The walls of the stomach, which are protected by a layer of mucus, secrete gastric juices composed of several enzymes and hydrochloric acid. The most powerful enzyme is pepsin, which begins the process of converting proteins into amino acids. In addition, during these chemical reactions waves of contraction; and relaxation, known as peristalsis, move the walls of the stomach. They turn the food particles into a semi-solid mass known as chyme.

From the stomach, the chyme passes into the small intestine through the pyloric sphincter. Much undigested food is still present. Proteins have not been completely broken down, carbohydrates are still being converted into simple sugars, and fats remain in large globules. In the small intestine the process of digestion is completed by the action of the bile, which is secreted by the liver and released by the gallbladder, and by the action of various enzymes which are secreted by the pancreas and walls of the small intestine. Food which are still undigested pass on in a liquid state into large intestine. Absorption of the products of digestion taken place mainly through the wall of the small intestine.

Digestion

Chewing movements of the teeth, tongue, cheeks, lips and lower jaw break down food, mix it with saliva and roll it into a moist, soft mass called a bolus, suitable for swallowing.

Having been rendered suitable for swallowing the food is pushed back into the pharynx by the tongue, and enters the esophagus to be transported rapidly down the neck and thorax, through the diaphragm to the stomach. The mucous membrane of the stomach is equipped with millions of glands secreting mucus, digestive enzymes and hydrochloric acid.

The small intestine is the region within which the process of digestion is completed and its products are absorbed. Although its epithelial lining forms many small glands, they mainly produce mucus. Most of the enzymes present are secreted by the pancreas, whose duct, opens into the duodenum. Bile from the liver also enters the duodenum.

The absorption of the products of digestion also takes place in the small intestine, although water, salts, and glucose are absorbed from the stomach and the large intestine.

The large intestine is chiefly concerned with the preparation, storage and evacuation of undigestible and unabsorbable food residue.

New words

process of digestion — процесс переваривания

to begin — начинаться

food — пища

to be taken — быть взятым

mouth — рот

chewing — жевание

smaller — меньший

pieces — части

thereby — таким образом

exposing — демонстрация

saliva — слюна

double — двойной

to moisten — увлажнять

facilitating — облегчение

contains — содержит

enzyme — фермент

conversion — преобразование

carbohydrates — углеводы

although — хотя
 action — действие
 to pass down — передавать
 through — через
 stomach — живот
 chemical — химикат
 physical function — физическая функция
 rendered — предоставленный
 suitable — подходящий
 tongue — язык
 rapidly — быстро
 equipped — оборудованный
 hydrochloric acid — соляная кислота
 absorption — поглощение

Спряжение глаголов в Past Simple Tense — правильные глаголы (действие совершалось в прошлом, когда время указано точно).

Спряжение глагола to work в Past Simple Tense Таблица 10

I worked	I did not work
He worked	He did not work
She worked	She did not work
It worked	It did not work
We worked	We did not work
You worked	You did not work
They worked	They did not work

Did I work?	Yes, I did	No, I didn't
Did he work?	Yes, he did	No, he didn't
Did she work?	Yes, she did	No, she didn't
Did it work?	Yes, it did	No, it didn't
Did we work?	Yes, we did	No, we didn't
Did you work?	Yes, you did	No, you didn't
Did they work?	Yes, they did	No, they didn't

**Спряжение глаголов в Past Simple Tense —
неправильные глаголы Таблица 11**

No, they didn't	I did not write
He wrote	He did not write
She wrote	She did not write
It wrote	It did not write
We wrote	We did not write
You wrote	You did not write
They wrote	They did not write

Did I write?	Yes, I did	No, I didn't
Did he write?	Yes, he did	No, he didn't
Did she write?	Yes, she did	No, she didn't
Did it write?	Yes, it did	No, it didn't
Did we write?	Yes, we did	No, we didn't
Did you write?	Yes, you did	No, you didn't
Did they write?	Yes, they did	No, they did not

***Перепишите следующий текст,
употребив глаголы в прошедшем времени.***

On Monday we have five lessons. The first lesson is Russian. At this lesson we write a dictation and do some exercises. Jack goes to the blackboard. He answers well and gets a « five». Pete does not get a «five'», because he does not know his lesson. After the second lesson I go to the canteen. I eat a sandwich and drink a cup of tea. I do not drink milk. After school I do not go home at once, I go to the library and take a book. Then I go home.

Answer the questions.

1. When the process of digestion begins?
2. What does chewing do?
3. Does saliva have a double function?

4. What does saliva contain?
5. Where does the enzymatic action begin?
6. What functions does the stomach have?
7. What is the most powerful enzyme?
8. What does pepsin begin?
9. By what is the food pushed back into the pharynx?
10. Where the absorption of the product's of digestion also takes place?

Make the sentences of your own using the new words (10 sentences).

Find the verb to be in the text. Explain why it is used in such a way?

ЛЕКЦИЯ № 40. Sources of energy

The fuels of the body are carbohydrates, fats and proteins. These are taken in the diet.

Carbohydrates are the principal source of energy in most diets. They are absorbed into the blood stream in the form of glucose. Glucose not needed for immediate use is converted into glycogen and stored in the liver. When the blood sugar concentration goes down, the liver converts some of its stored glycogen into glucose.

Fats make up the second largest source of energy in most diets. They are stored in adipose tissue and around the principal internal organs. If excess carbohydrate is taken in, this can be converted into fat and stored. The stored fat is utilized when the liver is empty of glycogen.

Proteins are essential for the growth and rebuilding of tissue, but they can also be utilized as a source of energy. In some diets, such as the diet of the Eskimo, they form the main source of energy. Proteins are first broken down into amino acids. Then they are absorbed into the blood and pass round the body. Amino acids not used by the body are eventually excreted in the urine in the form of urea. Proteins, unlike carbohydrates and fats, cannot be stored for future use.

The digestive system, or gastrointestinal tract, begins with the mouth, where food enters the body, and ends with the anus, where solid waste material leaves the body. The primary function of the organs of the digestive system are threefold.

First, complex food material which is taken into the mouth must be digested mechanically and chemically, as it travels through, the gastrointestinal tract.

Second, the digested food must be absorbed by passage through the walls of the small intestine into the blood stream so that the valuable energy-carrying nutrients can travel to all cells of the body.

The third function of the gastrointestinal tract is to eliminate the solid waste materials which are unable to be absorbed by the small intestine.

In the man the food in the mouth is masticated, that is to say it is bitten and broken up by the teeth and rolled into the bolus by the tongue.

The degree of chewing which is possible depends on the jaw articulation, the latter depending on the food. Mastication is voluntary, but it may be reflex, each closure of the jaw acting as a stimulus for their re-opening.

After mastication the bolus is swallowed: the swallowing starts as a voluntary movement, but its accomplishment is a chain of reflexes involving the movement of the food by peristalsis, the closure of the nasal and tracheal openings, and the cessation of respiration. Cranial nerves V, IX, and XII are involved.

Peristalsis is a type of muscular contraction characteristic of the gut and consists in waves of contraction, these running along the muscles, both circular and longitudinal, towards the anus.

If the food is fluid it enters the stomach six seconds after the beginning of the act, but if it is solid it takes much longer, up to fifteen minutes, to pass down the esophagus.

In the stomach the food is thoroughly mixed by the series of contractions, three or four a minute, the contraction waves passing from the middle of the stomach to the pylorus. These tend to drive the food in the same direction, but the pylorus being closed, there is axial reflex, owing to which the food is well mixed. After a time — about a minute when water has been swallowed — the pylorus relaxes at each wave, allowing some of the stomach contents to enter the duodenum. Fat stays in the stomach longer than carbohydrate, but all food leaves generally in three or four hours. In the small intestine the food continues to be moved by peristalsis, the latter controlled by the deep nerve plexus. The small intestine undergoes segmentation movements, the food contents being thoroughly mixed. The wall becomes constricted into a number of segments and then about five seconds later the constrictions disappear, there being another set exactly out of phase with the first. The large intestine undergoes infrequent powerful contractions, food having entered it. From the large intestine the food enters the rectum.

New words

fuels — топливо
carbohydrates — углеводы
fats — жиры
proteins — белки
diet — диета

principal source — основной источник
 energy — энергия
 glucose — глюкоза
 immediate — непосредственный
 use — использование
 is converted — преобразован
 glycogen — гликоген
 stored — сохраненный
 liver — печень
 sugar — сахар
 adipose — животный жир
 excess — избыток
 utilized — используемый
 empty — пустой
 essential — основа
 growth — рост
 rebuilding — восстановление
 acids — кислоты
 amino acids — аминокислоты
 contractions — сокращения
 pylorus — пилорус
 direction — направление
 axial reflex — осевое отражение

Past Continuous Tense (Past Progressive Tense) (действие в процессе, совершалось в определенный момент или протекало в течение четко ограниченного периода времени в прошлом).

**Спряжение глагола to work
в Past Continuous Tense Таблица 12**

I was working	I was not working
He was working	He was not working
She was working	She was not working
It was working	It was not working
You were working	You were not working
You were working	They were working
They were working	They were not working

**Спряжение глагола to work
в Past Continuous Tense Окончание табл. 12**

Was I working?	Yes, I was	No, I wasn't
Was he working?	Yes, he was	No, he wasn't
Was she working?	Yes, she was	No, she wasn't
Was it working?	Yes, it was	No, it wasn't
Were we working?	Yes, we were	No, we weren't
Were you working?	Yes, you were	No, you weren't
Were they working?	Yes, they were	No, they weren't

***Раскройте скобки, употребляя глаголы
в Present Continuous или Past Continuous.***

1. I (to write) an English exercise now.
2. I (to write) an English exercise at this time yesterday.
3. My little sister (to sleep) now.
4. My little sister (to sleep) at this time yesterday.
5. My friends (not to do) their homework now. They (to play) vol-
ley-ball.
6. My friends (not to do) their homework at seven o'clock yesterday.
They (to play) volley-ball.
7. You (to eat) ice-cream now?
8. You (to eat) ice-cream when I rang you up yesterday?
9. What your father (to do) now?
10. What your father (to do) from eight till nine yesterday?
11. Why she (to cry) now?
12. Why she (to cry) when I saw her yesterday?
13. She (to read) the whole evening yesterday.
14. She (not to read) now.
15. Now she (to go) to school.
16. What you (to do) now? — I (to drink) tea
17. You (to drink) tea at this time yesterday? — No, I (not to drink)
tea at this time yesterday, I (to eat) a banana
18. My sister is fond of reading. She (to read) the whole-evening
yesterday, and now she (to read) again.
19. Look! My cat (to play) with a ball.
20. When I went out into the garden, the sun (to shine) and birds
(to sing) in the trees.

Answer the questions.

1. What are the fuels of the body?
2. What is the principal source of energy in most diets?
3. Where are the carbohydrates absorbed?
4. What is converted into glycogen and stored in the liver?
5. What makes up the second largest source of energy in most diets?
6. Where fats are stored?
7. When is the stored fat utilized?
8. What are proteins essential for?
9. In what are proteins first broken down?
10. What is going on with the food in the stomach?

Make the sentences of your own using the new words (10 sentences).
Find the verb to be in the text. Explain why it is used in such a way?

ЛЕКЦИЯ № 41. The act of swallowing

The act of swallowing is divided into three stages.

The first stage is under voluntary control. The food which has been transformed into a soft, mass by the act of mastication is brought into position upon the root of the tongue, and by the action of the lingual muscles is rolled backwards towards the base of the tongue.

The second stage is brief and is occupied in guiding the food through the pharynx and past the openings that lead from it. The muscular movements during this stage are purely reflex in nature. The third stage involves the passage of the food down the esophagus. The food is seized by peristaltic wave which, traveling along the esophagus, carries the material before it into the stomach. The cardiac sphincter which guards the lower end of the esophagus and which at other times is kept tonically closed relaxes upon the approach of the bolus which is then swept into the stomach by the wave of constriction which follows.

Shape of the stomach

The normal position of the empty human stomach is not horizontal, as used to be thought before the development of roentgenology. This method of examination has revealed the stomach to be either somewhat J-shaped or comparable in outline to a reversed L. The majority of normal stomachs are J-shaped. In the J-shaped type the pylorus lies at a higher level than the lowest part of the greater curvature and the body of the stomach is nearly vertical.

The stomach does not empty itself by gravity, but through the contraction of its muscular wall like any other part of the digestive tube, of which it is merely a segment.

Gastric motility shows great individual variation; in some types of stomach the wave travels very rapidly, completing its journey in from 10 to 15 seconds. In others the wave takes 30 seconds or goes to pass from its origin to the pylorus. The slow waves are the more common.

IRON in the body.

It is accepted that the total amount of iron in the body is between 2 and 5 g., varying with body-weight and hemoglobin level; about

two-thirds of this is in the form of hemoglobin and about 30% is storage iron; iron in myoglobin and enzymes makes up the small remaining fraction together with iron in transport, which is only 0,12%. There is a big difference between the sexes: in the adult male the total iron is about 50 mg. per kg. body-weight. But in the adult female the figure is only 35 mg. per kg., mainly because the normal blood-level of hemoglobin is lower than in the male. Iron exists in the body mainly in two forms: firstly, as heme in hemoglobin, and cytochrome concerned with the utilization of oxygen; and secondly, bound to a protein without heme formation, as storage and transport iron. Iron in the body has a very rapid turnover, since some 3 million red blood cells are broken down per second and the greater part of the iron released is returned to the bone marrow and re-formed into fresh hemoglobin; some 6,3 g. of hemoglobin containing 21 mg. of iron is handled this way every 24 hours.

The amount of iron in the body is regulated by control of absorption, since excretion is very small. The amount of iron absorbed from food differs with different foodstuffs, so the composition of the diet is important. Absorption can be increased in the normal individual when the blood-hemoglobin is lower than normal and the iron stores are low. Iron stores are normally lower in women than men and so they tend to absorb more iron. Iron absorption can decrease in older persons, especially in those over 60. Many estimates have agreed that the average Western diet provides between 10 and 15 mg. of iron daily, of which only 5—10% is absorbed.

Iron absorption takes place mainly in the upper jejunum, though some is absorbed in all parts of the small intestine and even in the colon. Iron in food is mostly in ferric form and must be reduced to the ferrous form before it can be absorbed; this reduction begins in the stomach — though very little is absorbed there — and continues in the small intestine. The iron is absorbed via the brush-border of the intestine and then may take one of two paths; it is either passed into the blood, where it combines with a globulin, and passes to the marrow or to storage sites; or it combines with the protein, which is then deposited in the intestinal cells.

Iron is lost mostly through the gastrointestinal tract by way of red cells and intestinal cells containing iron lost in the constant desquamation from the intestinal mucosa.

Fat factor

An enzyme abnormality has been discovered in the red blood cells of people who are overweight. It's the first clue that obesity in humans may be caused by a biochemical defect — not simply by overeating.

Researchers found that obese people have lower levels of a special enzyme that functions as a pump, transporting potassium and sodium in and out of cells. They suggest that with low levels of this pumping enzyme, less energy is used. Thus fewer calories are burned up as heat, while more are stored as fat.

New words

act — акт

three — три

stage — стадия

first — начальный

voluntary control — добровольный контроль

soft — мягкий

mass — масса

mastication — пережевывание

position — положение

root — корень

lingual muscles — языковые мускулы

second — секунда

brief — резюме

occupied — занятый

guiding — руководство

movements — движения

purely — просто

nature — природа

seized — захваченный

peristaltic — перистальтический

wave — волна

traveling — путешествие

along — вперед

before — прежде

cardiac sphincter — сердечный клапан

total — общее количество

amount — количество

iron — железо
 varying — изменение
 hemoglobin — гемоглобин
 storage — хранение
 myoglobin — миоглобин
 fraction — фракция
 together — вместе
 body-weight — масса тела

Present Perfect Tense (действие, совершившееся в прошлом, связано с настоящим).

Спряжение глагола to write в Present Perfect Tense Таблица 13

I have (written)	I have not (written)
He has (written)	He has not (written)
She has (written)	She has not (written)
It has (written)	It has not (written)
We have (written)	We have not (written)
You have (written)	You have not (written)
They have (written)	They have not (written)

Have I written?	Yes, I have	No, I haven't
Has he written?	Yes, he has	No, he hasn't
Has she written?	Yes, she has	No, she hasn't
Has it written?	Yes, it has	No, it hasn't
Have we written?	Yes, we have	No, we haven't
Have you written?	Yes, you have	No, you haven't
Have they written?	Yes, they have	No, they haven't

Запомните типичные для Present Perfect обстоятельства: *already, not yet, just, ever, never*.

Сравните также:

I have bought a book today (this week, this month) — неистекший отрезок времени — Present Perfect.

I bought a book yesterday (last week, last month) — истекший отрезок времени — Past Simple.

Запомните также следующие предложения.

I have never been to France.
Have you ever been to London?
I haven't seen you for ages.
I haven't met him for a long time.
I haven't been to Moscow since last year.

В следующих предложениях измените время глагола на Present Perfect. Переведите предложения на русский язык

1. I am eating my breakfast.
2. We are drinking water.
3. He is bringing them some meat and veg etables.
4. You are putting the dishes on the table.
5. They are having tea
6. She is taking the dirty plates from the table.
7. The children are putting on their coats.
8. The pupils are writing a dictation.
9. My friend is helping me to solve a difficult problem.
10. I am learning a poem.
11. She is telling them an interesting story.
12. Kate is sweeping the floor.
13. The waiter is putting a bottle of lemonade in front of him.
14. Susan is making a new dress for her birthday party.
15. She is open ing a box of chocolates.
16. They are writing a dictation.
17. I am drawing a picture.
18. She is cooking dinner.
19. We are dancing.
20. They are jumping.

Answer the questions.

1. Into how many stages is the act of swallowing divided?
2. Is the first stage under voluntary control?
3. What is the second stage in the act of swallowing?
4. Through what in the second stage the food is guiding?

5. What does the third stage in the act of swallowing involve?
6. How is the normal position of the empty human stomach?
7. How are shaped the majority of normal stomachs?
8. How can absorption be increased?
9. Who has normally lower stores of iron?
10. Where is iron lost mostly?

Make the sentences of your own using the new words (10 sentences).
Find the verb to be in the text. Explain why it is used in such a way?

ЛЕКЦИЯ № 42. Liver

Liver, the pancreas and the kidneys are the organs primarily engaged in the intermediary metabolism of the materials resorbed from the gastro — intestinal tract and in the excretion of metabolic waste products. Of these 3 organs the liver performs the most diverse functions. It acts as the receiving depot and distributing center for the majority of the products of intestinal digestion and plays a major role in the intermediary metabolism of carbohydrates, fats, proteins and purines.

It controls the concentration of cholesterol esters in the blood and utilizes the sterol in the formation of bile acid. The liver takes in the regulation of the blood volume and in water metabolism and distribution. Its secretion, the bile, is necessary for fat digestion.

The liver is a site for the formation of the proteins of the blood plasma, especially for fibrinogen, and also forms heparin, also forms heparin, carbohydrate which prevents the clotting of the blood. It has important detoxicating functions and guards the organism against toxins of intestinal origin as well as other harmful substances. The liver in its detoxicating functions and manifold metabolic activities may well be considered the most important gland of the body.

New words

liver — печень
pancreas — поджелудочная железа
kidneys — почки
organ — орган
primarily — прежде всего
engaged — вовлеченный
intermediary — промежуточный
metabolism — метаболизм
gastro-intestinal tract — желудочно-кишечный тракт
excretion — выделение
waste — отходы
diverse — разнообразный
functions — функции

depot — отложение
 digestion — переваривание
 major role — главная роль
 cholesterol — холестерин
 esters — жиры
 sterol — стерин
 bile acid — желчная кислота
 regulation — регулирование
 fat digestion — переваривание жиров
 blood plasma — плазма крови
 fibrinogen — фибриноген
 clotting — тромб
 origin — происхождение
 heparin — гепатит
 detoxicating functions — функции детоксикации
 toxins — токсины
 manifold — разнообразный
 gland of the body — железа тела

Спряжение глагола to write в Past Perfect Tense Таблица 15

I had written	I had not written
He had written	He had not written
She had written	She had not written
It had written	It had not written
We had written	We had not written
You had written	You had not written
They had written	They had not written

Had I written?	Yes, I had	No, I hadn't
Had he written?	Yes, he had	No, he hadn't
Had she written?	Yes, she had	No, she hadn't
Had it written?	Yes, it had	No, it hadn't
Had we written?	Yes, we had	No, we hadn't
Had you written?	Yes, you had	No, you hadn't
Had they written?	Yes, they had	No, they hadn't

Поставъте глаголы в Past Simple и Past Perfect.

1. When I (to come) home, mother already (to cook) dinner.
2. When father (to return) from work, we already (to do) our homework.
3. When the teacher (to enter) the classroom, the pupils already (to open) their books.
4. Kate (to give) me the book which she (to buy) the day before.
5. Nick (to show) the teacher the picture which he (to draw).
6. The boy (to give) the goats the grass which he (to bring) from the field.
7. Mother (to see) that Nick (not to wash) his hands.
8. The teacher (to understand) that Marina (not to do) her homework.
9. I (to know) that my friend (not yet to come).
10. Tom (to return) from the cinema at five o'clock.
11. Tom (to return) from the cinema by five o'clock.
12. I (to finish) my homework at seven o'clock.
13. I (to finish) my homework by seven o'clock.
14. He (to think) that he (to lose) the money.
15. Ann (to tell) me that she (to see) an interesting film.
16. When I (to wake) up yesterday, father already (to go) to work.
17. Nick (to think) that his father (not yet to come) home.
18. Mary (to tell) us that she (to cook) a good dinner.
19. Yesterday I (to find) the book which I (to lose) in summer.
20. When we (to come) to the station, the train already (to leave).

Answer the questions.

1. Which organs are primarily engaged in the intermediary metabolism?
2. Which of 3 organs perform the most diverse functions?
3. How does it act?
4. Which role does liver play?
5. What does it control?
6. Where the cholesterol esters are concentrated?
7. What the bile is necessary for?
8. What does liver utilize?
9. What prevents the clotting of the blood?
10. What is the most important gland of the body?

Make the sentences of your own using the new words (10 sentences).

Find the Present Simple Tense in the text. Explain why it is used in such a way?

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) liver; b) jam; c) kidney;
- 2) a) pancreas; b)organ; c) winter;
- 3) a) summer; b) blood; c) vein;
- 4) a) cholesterol; b) ice; c) bile;
- 5) a) clotting; b) snow; c) vessel.

ЛЕКЦИЯ № 43. The urinary system

The urinary system, consisting of the kidneys, bladder, and excretory ducts (ureters and urethra) is formed mainly from mesodermal and endodermal derivatives with a smaller contribution from the ectoderm. Three separate systems form sequentially. The pronephros is vestigial; the mesonephros may function transiently, but then mainly disappears; the metanephros develops into the definitive kidney. The pronephric/ mesonephric ducts provide important contributions to the male reproductive system. The permanent excretory ducts are derived from the metanephric ducts, the uro-genital sinus, and surface ectoderm.

Renal development is characterized by three successive, slightly overlapping kidney systems.

Pronephros: Segmented nephrotomes appear in the cervical intermediate mesoderm of the embryo in the fourth week. These structures grow laterally and canalize to form nephric tubules. Successive tubules grow caudally and unite to form the pronephric duct, which empties into the cloaca. The first tubules formed regress before the last ones are formed. By the end of the fourth week, the pronephros disappears.

Mesonephros: In the fifth week, the mesonephros appears as «S-shaped» tubules in the intermediate mesoderm of the thoracic and lumbar regions of the embryo.

The medial end of each tubule enlarges to form a Bowman's capsule into which a tuft of capillaries, or glomerulus, invaginates.

The lateral end of each tubule opens into the mesonephric (Wolffian) duct, an intermediate mesoderm derivative.

Mesonephric tubules function temporarily and degenerate by the beginning of the third month. The mesonephric duct persists in the male as the ductus epididymidis, ductus deferens, and the ejaculatory duct.

Metanephros: During the fifth week, the metanephros, or permanent kidney, develops from two sources: the ureteric bud, a diverticulum of the mesonephric duct, and the metanephric mes, from inter-

mediate mesoderm of the lumbar and sacral regions. The ureteric bud penetrates the metanephric mass, which condenses around the diverticulum to form the metanephrogen cap. The bud dilates to form the renal pelvis, which subsequently splits into the cranial and caudal major calyces. Each major calyx buds into the metanephric tissue to form the minor calyces. One-to-three million collecting tubules develop from the minor calyces, thus forming the renal pyramids. Penetration of collecting tubules into the metanephric mass induces cells of the tissue cap to form nephrons, or excretory units. The proximal nephron forms Bowman's capsule, whereas the distal nephron connects to a collecting tubule.

Lengthening of the excretory tubule gives rise to the proximal convoluted tubule, loop of Henle, and the distal convoluted tubule.

The kidneys develop in the pelvis but appear to «ascend» into the abdomen as a result of fetal growth of the lumbar and sacral regions. With their ascent, the ureters elongate, and the kidneys become vascularized by lateral splanchnic arteries, which arise from the abdominal aorta.

Bladder and urethra

Adrenal glands lie above the kidneys and are of dual origin. The cortex develops from the mesoderm of the coelomic epithelium, and the medulla is derived from neural crest cells, which migrate to the area and differentiate to form catecholamine-producing cells. Urorectal septum divides the cloaca into the anal canal and urogenital sinus by the seventh week.

The upper and largest part of the urogenital sinus becomes the urinary bladder, which is initially continuous with the allantois. As the lumen of the allantois becomes obliterated, a fibrous cord, the urachus, connects the apex of the bladder to the umbilicus. In the adult, this structure becomes the median umbilical ligament. The mucosa of the trigone of the bladder is formed by the incorporation of the caudal mesonephric ducts into the dorsal bladder wall. This mesodermal tissue is eventually replaced by endodermal epithelium so that the entire lining of the bladder is of endodermal origin. The smooth muscle of the bladder is derived from splanchnic mesoderm.

Male urethra is anatomically divided into three portions: prostatic, membranous, and spongy (penile).

The prostatic urethra, membranous urethra, and proximal penile urethra develop from the narrow portion of the urogenital sinus below the urinary bladder. The distal spongy urethra is derived from the ectodermal cells of the glans penis.

Female urethra: The upper two-thirds develops from the mesonephric ducts, and the lower portion is derived from the urogenital sinus.

The urinary system is the major system involved in the excretion of metabolic waste products and excess water from the body. It is also important in maintaining a homeostatic balance of fluids and electrolytes. The urinary system consists of two kidneys, two ureters, the urinary bladder, and the urethra. Urine is produced by the kidneys and is then transmitted via the ureters to the bladder for temporary storage. The urethra is the final pathway that conveys urine to the exterior. This system also has an important endocrine function in the production of renin and erythropoietin, which influence blood pressure and red blood cell (RBC) formation, respectively.

New words

urinary system — мочевая система
consisting of — состоящий из
kidneys — почки
bladder — мочевого пузыря
excretory ducts — выделительные трубочки
mesodermal — мезодермальный
endodermal — эндодермальный
derivatives — производные
contribution — вклад
sequentially — последовательно
pronephros — первичная почка
vestigial — остаточный
transiently — коротечно
definitive — категорический
permanent — постоянный
duct — трубочка
bud — зародыш
to dilates — расширять
urogenital — мочеполовой
cloaca — клоака

anorectal canal — канал анаректальный
waste products — ненужные продукты
maintaining — поддержание
a homeostatic balance — гомеостатический баланс
fluids — жидкости
electrolytes — электролиты

***Раскройте скобки, употребляя глаголы
в Past Simple, Past Continuous и Past Perfect.***

1. When I called at his house, they (to tell) me that he (to leave) an hours before.
2. When I came to the station, I (not to) find my friend there as I (to be) five minutes late and the train (to leave).
3. He (to want) to visit the place where he (to live) in his childhood.
4. The telegram (to come) some minutes after he (to leave).
5. She (to look) very tired as she (to work) hard.
6. I (to return) to the hotel only late at night as I (to lose) my way in the fog. When I (to come) up to my room, I (to see) Pete who (to stand) at the door of the room. He (to wait) for me as he (to lose) his key and could not get in.
7. When I (to wake) up, it (to be) already ten o'clock. I (to call) my brother. Nobody (to answer). He already (to leave).
8. I (to go) up to the open window. The rain (to stop) and the sun (to shine) brightly. The birds in the garden (to sing). The morning (to be) fine.
9. When the rain (to stop) I (to look) out of the window and (to see) John who (to stand) under a tree waiting for me.
10. Last night we (to go) to a football match.
11. We (to take) a bus. The bus (to be) full, of people as many people (to want) to see the match.
12. We (to get) off the bus and (to go) in the direction of the stadium.
13. While we (to cross) the road, I (to see) Victor.
14. He (to stand) at the corner.
15. He said he (to wait) for his friend who (to come) to St. Petersburg the day before and (to wish) to see the new stadium.
16. A man (to come) up to me and asked if I (to have) a spare ticket for-the match.

17. Victor told us that two boys just (to ask) him whether he (to have) a spare ticket.
18. We (to enter) the stadium just as the foot ball players (to come) out on to the field.
19. At the entrance to the stadium we (to meet) Sergei.
20. He (to show) us to our seats and we (to agree) to meet in the refreshment-room during the interval. He (to ask) me if I (to play) football in my childhood.

***Раскройте скобки, употребляя глаголы
в Past Simple, Past Continuous и Past Perfect.***

1. I (to sit) in an armchair and (to think) of my coming trip across the North Sea when the door suddenly (to open) and an old friend of mine whom I (not to see) for a very long time (to enter) the room.
2. She (to come) to see us just at the time when we (to have) dinner. It (to be) the first time I (to see) her.
3. I (to see) him just as he (to leave) the hotel.
4. I (not to see) him before we (to meet) at the concert.
5. He (to leave) the house before I (to have) time to ask him anything.
6. He (to tell) me he (to learn) it from the newspaper.
7. He (to enter) the room, (to take) something from the desk and (to go) out.
8. There (to be) two men in the room. One of them (to write) something while the other (to read) a newspaper.
9. He (not to tell) me that he (to receive) a telegram from her.
10. I (to ask) him if he (to know) where she (to live). I (to say) I (not to know) her address.
11. He (to ask) me if I (can) give him your address.
12. She (to say) that he (to give) her the wrong address.
13. I (to ask) him where he (to put) my letter.
14. He (to tell) us that they (to spend) all the money.
15. After spending several days in Paris he (to feel) lonely and (to want) to return home.
16. I (to think) he already (to go) home.
17. I (to find) the old man in the garden. He (to talk) to some children who (to stand) around listening to him.
18. He (to speak) a language we never (to hear) before.

19. Yesterday I (to look) at the sky for an hour.
20. Mandy (to read) a book the whole evening.

Answer the questions.

1. What is the urinary system consists of?
2. How many separate systems form sequentially?
3. Is the pronephros vestigial?
4. How may mesonephros function?
5. How does metanephros develop?
6. How is the renal development characterized?
7. Where does the ureteric bud penetrate?
8. What does the proximal nephron form?
9. Where do the adrenal glands lie?
10. Into how many portions is the mile urethra anatomically divided?

Make the sentences of your own using the new words (10 sentences).

Find the Present Simple in the text. Explain why it is used in such a way?

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

- 1) a) kidney; b) head; c) urethra;
- 2) a) teeth; b) bladder; c) parenchyma;
- 3) a) cloaca; b) urogenital; c) nasal;
- 4) a) neck; b) pronephros; c) kidney;
- 5) a) liquid; b) cell; c) blood.

ЛЕКЦИЯ № 44. Kidneys

The kidneys are retroperitoneal organs that remove urea and other waste products from the blood. In addition, they regulate the chemical composition of plasma and the extracellular fluid of the body. Each kidney is composed of stroma and parenchyma. The stroma consists of a tough fibrous connective tissue capsule and a delicate interstitial connective tissue composed of fibroblasts, wandering cells, collagen fibrils, and a hydrated proteoglycan extracellular matrix, which is collectively called the renal interstitium. The parenchyma consists of more than one million elaborate uriniferous tubules that represent the functional units of the kidney.

The kidney contains a hilum, a cortex, and a medulla. The hilum is located medially and serves entrance as the point of entrance and exit for the renal artery, renal veins, and ureter. The renal pelvis, the expanded upper, divides into two or three entrance into the kidney. These, in turn, divide into eight minor calyces. Branches of the renal artery, vein, and nerve supply each part of the kidney.

The cortex forms the outer zone of the kidney, as well as several renal columns, which penetrate the kidney.

The medulla appears as a series of medullary pyramids. The tips of the pyramids point toward the at the hilus. The apex of each pyramid stream into a minor calyx. Two or three pyramids may unite to form a papilla. Uriniferous tubules consist of two functionally related portions called the nephron and the collecting tubule.

Urinoferous tubules consist of two functionally related portions called the nephron and collecting tubule.

Glomerulus is made up of several anastomotic capillary loops interposed between an afferent and an efferent arteriole. The endothelium of the glomerulus is thin and fenestrated. Plasma filtration (ultrafiltration) occurs in the glomerulus.

Bowman's capsule consists of an inner visceral layer and an outer parietal layer. The space between these layers, the urinary space, is continuous with the renal tubule.

Visceral layer is apposed to the glomerulus and closely follows the branches of the glomerular capillaries. The visceral layer is composed of a single layer of epithelial cells resting on a basal lamina, which is fused with the basal lamina of the capillary endothelium. The cells of the visceral layer, called podocytes, are large and their nuclei bulge into the capsular space.

Cytoplasmic extensions of podocytes, called pedicles, rest on the basal lamina. The pedicles of adjacent podocytes interdigitate along the basal lamina.

Between adjacent pedicles, a thin slit diaphragm assists in preventing large plasma proteins from escaping from the vascular system. Parietal layer is composed of a simple squamous epithelium that is continuous with the proximal convoluted tubule epithelial lining. Proximal convoluted tubule is the longest and most convoluted segment of the nephron.

It is lined by a single layer of cuboidal to low columnar cells with rounded nuclei and eosinophilic granular cytoplasm. Cell boundaries interdigitate with those of adjacent cells laterally and basally. The proximal convoluted tubule also possesses an apical brush border that provides the cell with a much greater surface area for reabsorption from, and secretion into, the fluid that becomes urine in the kidney tubules. In fact, most of the components of the glomerular filtrate are reabsorbed in the proximal tubule. Loop of Henle is a hairpin loop of the nephron that extends into the medulla and consists of thick and thin segments. The thick proximal portion of Henle's loop, or the descending thick segment, is a direct medullary continuation of the cortical proximal convoluted tubule.

The descending and ascending thin segments of the loop of Henle are lined by a single layer of flat epithelial cells with nuclei that bulge into the lumen.

The thick distal portion of the loop of Henle, the ascending thick segment, ascends to the cortex and is continuous with distal convoluted tubule. It is lined by cuboidal cells that contain numerous invaginations of cytoplasm and many mitochondria. Distal convoluted tubule is lined by cuboidal cells that contain a granular cytoplasm. Cells of the distal convoluted tubule near the afferent arteriole are taller and more

slender than elsewhere in the distal tubule. They constitute the macula densa. Their nuclei are packed closely, so the region appears darker under the light microscope. The macula densa is thought to sense sodium concentration in the tubular fluid. The major function of the distal tubule is to reabsorb sodium and chloride from the tubular filtrate. Collecting tubules consist of arched and straight segments. The arched collecting tubule segments are located in the cortical labyrinth and empty into the straight collecting tubule segments, which pass through the medullary rays. Epithelial cells of the collecting ducts range from cuboidal to columnar. Identification of these tubules is facilitated by their distinct intercellular borders as a result of the lack of complex interdigitations seen in the proximal and distal tubules. Vascular supply begins with the renal artery, enters the kidney at the hilum, and immediately divides into interlobar arteries. The arteries supply the pelvis and capsule before passing directly between the medullary pyramids to the corticomedullary junction. The interlobar arteries bend almost 90 degrees to form branching, arcuate arteries, which run along the corticomedullary junction. The arcuate arteries subdivide into numerous fine interlobular arteries, which ascend perpendicularly to the arcuate arteries through the cortical labyrinth to the surface of the kidney. Each interlobular artery passes midway between two adjacent medullary rays.

The interlobular arteries then give off branches that become the afferent arterioles of the glomeruli.

As the afferent arteriole approaches the glomerulus, some of its smooth muscle cells are replaced by myoepithelioid cells, which are part of the juxtaglomerular apparatus. The juxtaglomerular apparatus consists of juxtaglomerular cells, polkissen cells, and the macula densa.

The juxtaglomerular cells secrete an enzyme called renin, which enters the bloodstream and converts the circulating polypeptide angiotensinogen into angiotensin I. Angiotensin I is converted to angiotensin II, a potent vasoconstrictor that stimulates aldosterone secretion from the adrenal cortex. Aldosterone increases sodium and water reabsorption in the distal portion of the nephron.

Polkissen cells are located between the afferent and efferent arterioles at the vascular pole of the glomerulus, adjacent to the macula densa.

Their function is unknown. Efferent glomerular arteriole divides into a second system of capillaries, the peritubular plexus, which forms a dense net work of blood vessels around the tubules of the cortex.

Arterial supply of the medulla is provided by the efferent arterioles of the glomeruli near the medulla. The arterioles rectae and the corresponding venae rectae with their respective capillary networks comprise the vasa recta, which supplies the medulla. The endothelium of the venae rectae is fenestrated and plays an important role in maintaining the osmotic gradient required for concentrating urine in the kidney tubules.

Ureters

The calyces, renal pelvis, and ureters constitute the main excretory ducts of the kidneys. The walls of these structures, in particular the renal pelvis and ureter, consist of three coats: an inner mucosa, middle muscularis, and an outer adventitia.

Mucosa of the calyces and ureter is lined by a transitional epithelium, which varies in thickness with the distention of the ureter. In the collapsed state, the cells are cuboidal with larger c shaped cells in the superficial layer. In the relaxed state, the lumen of the ureter is thrown into folds that generally disappear when the organ dilates during urine transport. Muscularis consists of an inner longitudinal and an outer circular layer of smooth muscle. In the distal ureter, an additional discontinuous outer longitudinal layer is present.

Adventitia consists of loose connective tissue with many large blood vessels. It blends with the connective tissue of the surrounding structures and anchors the ureter to the renal pelvis. The urinary bladder functions as a strong organ for urine. The structure of the wall of the bladder is similar to but thicker than of the ureter. Mucosa of the urinary bladder is usually folded, depending the degree of the bladder distention. The epithelium is transitional and the number of apparent layers depends on the fullness of the bladder. As the organ becomes distended, the superficial epithelial layer and the mucosa become flattened, and the entire epithelium becomes thinner. At its fullest distention, the bladder epithelium maybe only two or three cells thick. Lamina

propria consists of connective tissue with abundant elastic fibers. Muscularis consists of prominent and thick bundles of smooth muscle that are loosely organized into three layers. Adventitia covers the bladder except on its superior part, where serosa is present. Male urethra serves as an excretory duct for both urine and semen. It is approximately 20 cm in length and has three anatomic divisions. The prostatic portion is lined by transitional epithelium similar to that of the bladder. The prostatic urethra is surrounded by the fibromuscular tissue of the prostate, which normally keeps the urethral lumen closed. In the membranous and penile portions, the epithelium is pseudostratified up to the glans. At this point, it becomes stratified squamous and is continuous with the epidermis of the external part of the penis. The membranous urethra is encircled by a sphincter of skeletal muscle fibers from the deep transverse perineal muscle of the urogenital diaphragm, which also keeps the urethral lumen closed. The wall of the penile urethra contains little muscle but is surrounded and supported by the cylindrical erectile mass of corpus spongiosum tissue. Female urethra is considerably shorter than that of the male urethra. It serves as the terminal urinary passage, conducting urine from the bladder to the vestibule of the vulva. The epithelium begins at the bladder as a transitional variety and becomes stratified squamous with small areas of a pseudostratified columnar epithelium. The muscularis is rather indefinite but does contain both circular and longitudinal smooth muscle fibers. A urethral sphincter is formed by skeletal muscle as the female urethra passes through the urogenital diaphragm.

New words

retroperitoneal organs — ретроперитонеальные органы

to remove — передвигать

urea — мочеви́на

to regulate — регулировать

the chemical composition — химический состав

extracellular — внеклеточный

stroma — строма

parenchyma — паренхима

fibrous capsule — волокнистая капсула
delicate — тонкий
interstitial — промежуточный
connective tissue — соединительная ткань
fibroblasts — фибробласты
wandering cells — блуждающие клетки
collagen fibrils — волокна коллагена
hydrated — гидратированный
extracellular — внеклеточный
matrix — матрица
cortex — кора
medially — в середине
entrance — вход
the point of entrance — точка входа
exit — выход
renal artery — почечная артерия
renal veins — почечные вены
expanded upper — расширенный верхний
minor calyces — незначительные чашечки
to supply — снабжать
arcuate arteries — дугообразные артерии
to subdivide — подразделять
numerous — многочисленный
interlobul — междолевой
to ascend — поднимать
perpendicularly — перпендикулярно
arcuate arteries — дугообразные артерии

***Сравните употребление всех изученных времен,
соответствующих прошедшему времени
в русском языке.***

1. I just (to see) Jack.
2. She (to wash) the dishes from five till six.
3. Look! She (to draw) a very nice picture.
4. At this time yesterday I (to talk) to my friend.
5. The TV programme (to be on) before I (to come) home.

6. I (not to eat) ice-cream since summer.
7. I understood that she (not to read) my letter.
8. She (to do) the rooms when I (to come) home.
9. It's all right: she (to find) the way out of the situation.
10. He (to come) home late yesterday.
11. She is very glad: she (to finish) her composition at last.
12. He (to trans late) the whole text by eleven o'clock.
13. I never (to be) to Rome.
14. Last year we (to work) very much
15. When I (to have) breakfast, I went to school.
16. I (not to see) you for ages! I am very glad to see you.
17. When you (to see) the «Swan lake»?
18. My sister already (to graduate) from the institute.
19. He repaired the toy which his brother (to break) the day before.
20. I (to see) an interesting TV programme this week.

***Раскройте скобки, употребляя глаголы
в Present Perfect, Past Simple, Past Continuous
или Past Perfect.***

1. Only when she was going to bed, she remembered that she (to forget) to ring up her friend.
2. We already (to study) seven English tenses.
3. He (to spend) two weeks in Scotland two years ago.
4. I (to buy) a lovely fashionable dress. Now I shall look smart at the party.
5. He (to learn) English before he (to go) to the USA.
6. When she (to spend) all her money, she (to go) home.
7. I (to I speak) to my friend yesterday.
8. Look! Kate (to I wash) all the dishes.
9. Your mother (to return) I from work? Can I speak to her?
10. She (to do) her flat the whole day on Saturday.
11. The cat (to drink) all the milk which I (to give) it.
12. You I ever (to be) to Piccadilly Circus?
13. He (not to read) Turgenev since he was a pupil.
14. They (to reach) the river by sunset.

15. I (not yet to receive) an answer to my letter.
16. She is very happy: her son (to finish) school.
17. My brother (to train) at the stadium from six till eight yesterday.
18. My sister (to buy) a pair of nice model shoes this month.
19. I (not to dance) for ages.
20. When Nick (to come) from school, his friends (to play) in the yard.

Answer the questions.

1. What organs are the kidneys?
2. What the kidneys remove?
3. What do the kidneys regulate?
4. What is each kidney composed of?
5. What is the stroma consists of?
6. What is the parenchyma consists of?
7. Does the kidney contain a hilum, a cortex, and a medulla?
8. Where is hilum located?
9. What is the Bowman's capsule consists of?
10. What is Lamina propria consists of?

Make the sentences of your own using the new words (10 sentences).
Find the verb to be in the text. Explain why it is used in such a way?

ЛЕКЦИЯ № 45. The kidney`s function

The kidneys are filters which remove waste products from the blood. In the human each is a bean-shaped organ, some four inches long and about two inches wide. The two are situated high up on the posterior abdominal wall behind the peritoneum and in front of the last ribs and the upper two lumbar transverse processes. Each is invested by a fibrous capsule surrounded by more or less perinephric fat. On the upper pole of each is a supra-renal gland. On the medial side is a notch called the hilum where the vessels and the ureter are attached.

Vertical sections through a kidney disclose three more or less concentric zones. The outer light-colored zone is the renal cortex, within this is the darker renal medulla and within this again is a space — the renal sinus which is normally occupied by a fibrous bag called the renal pelvis. The pelvis opens below into the ureter. The cortex extends inwards in a series of renal columns which divide the medulla into a number of renal pyramids. Each pyramid has a free rounded projection — a renal papilla — which lies in a cap-like extension, of the pelvis called a renal calyx. The pelvis is lined by transitional epithelium, which extends the calyces and covers the papillae.

Within the cortex each minute artery presents along its course a convoluted knot, called a glomerulus; the branch which enters the knot is the afferent vessel, that which leaves is the efferent vessel. Each glomerulus projects into the dilated end of its corresponding renal tubule, from which it is separated by a thin layer of cells called glomerular (Bowman`s) capsule; glomerulus plus capsule form a renal (Nalpiglian) corpuscle. The cortex contains multitudes of such corpuscles, each giving rise to a tubule which passes down into the medulla and back again in the so-called loop of Henle. Back in the cortex the loop ends in a functional tubule which joins a larger collecting tube. Ultimately, a number of collecting tubes combine to form an excretory tube, which opens at the apex of a papilla into a renal calyx. The efferent vessel from the glomerulus accompanies the loop of Henle, supplying the

tubule on the way and finally ends in a small vein. A renal corpuscle plus its complement of tubules and blood vessels is called a renal unit, or nephron; there are said to be one million such units in each kidney, their tubing totaling a length of some twenty miles.

New words

kidney — почка
waste — отходы
bean-shaped organ — орган в форме боба
four inches long — 4 дюйма в длину
two inches wide — 2 дюйма в ширину
posterior — задний
peritoneum — брюшина
ribs — ребра
lumbar — поясничный
transverse — поперечный
perinephric — околопочечный
supra-renal gland — надпочечная железа
notch — разрез
hilum — ворота (органа)
renal cortex — корковый слой
renal medulla — мозговой слой
fibrous — волокнистая
renal pelvis — почечная лоханка
calyces — чашечки
convoluted — замысловатый
dilated — расширенный
to be separated — быть разделенным
loop of henle — петля Шумлянского—Генле

Раскройте скобки, употребляя глаголы в Present Perfect, Past Simple, Past Continuous, Past Perfect.

1. They (to tell) me yesterday that you (to get) an excellent mark.
2. When you (to receive) a letter from your friend?
3. Our grandmother (to cook) dinner from twelve till three yesterday.

4. Look! What beautiful flowers she (to buy)!
5. They (to travel) along the coast of Africa last year.
6. We (not to see) each other for ages.
7. They (to eat) all the apples which I (to bring).
8. When the children (to have) dinner, they (to go) for a walk.
9. Last summer we (to live) in the country and (to go) to the river every day.
10. My sister (to spend) a lot of money yesterday.
11. She is so upset: she (to lose) the key to the front door.
12. By the 1 st of September all the children (to return) from the country.
13. Columbus (to discover) America 500 years ago.
14. Columbus (not to know) that he (to discover) America.
15. I already (to read) five English books.
16. He (to discuss) the problem with a lot of people before he (to take) a decision.
17. Mother (to bake) a delicious cake! Sit down at the table and let's eat it!
18. She (to read) an English book the whole evening yesterday.
19. I never (to be) to Greece.
20. You ever (to be) to the Niagara Falls?
21. At this time yesterday they (to sit) on the sofa and (to listen) to their grandmother who (to tell) them fairy-tales.
22. My friend just (to ring) me up from London.
23. I (to stand) at the tram-stop when it (to begin) raining.
24. We (not to skate) since last winter.
25. We (to go) to the country every year.

Раскройте скобки, употребляя глаголы в одном из следующих времен: Present, Past, Future Simple; Present, Past Continuous; Present, Past Perfect.

1. We (to go) to school every day.
2. Nick (to do) his home-work by seven o'clock yesterday.
3. You (to help) your father tomorrow?
4. We (to bring) a lot of berries from the wood. Now we shall make jam.

5. Look! Jane (to swim) across the river.
6. What you (to do) at six o'clock yesterday?
7. You ever (to see) the Pyramids?
8. I (to go) to the Caucasus two years ago.
9. When Nick (to come) home yesterday, his mother (to return) and (to cook) dinner in the kitchen.
10. When I (to go) to school yesterday, I suddenly (to remember) that I (to for get) to take my English exercise-book.
11. Yester day grandfather (to tell) us how he (to work) at the factory during the war.
12. I always (to come) to school at a quarter to nine.
13. Yesterday I (to come) to school at ten minutes to nine.
14. Tomorrow Nick (not to go) to the cinema because he (to go) to the cinema yesterday.
15. He already (to be) to the cinema this week. Look! He (to cry).
16. What your brother (to do) now?
17. When you (come) to see me? — I (to come) tomorrow.
18. I (not like) apples. And you (to like) them?
19. He (to come) home in the evening yesterday.
20. I (to ring) you as soon as I can.
21. I (to show) my pets if you like.
22. Now he (to try) to help his father in the garden.
23. I (to send) you a telegram tomorrow.
24. When I (to home) home yesterday, my brother (to sleep).
25. You (to visit) the United States of America next year?

Answer the questions.

1. What are the kidneys?
2. What do filters do?
3. What form do kidneys have?
4. How are kidneys wide and long?
5. Where are kidneys situated in the human's body?
6. Where opens the pelvis?
7. How a convoluted vascular knot is called?
8. Where does each glomerulus project?

9. What glomerulus and capsule form?

10. What is nephron consists of?

Make the sentences of your own using the new words (10 sentences).

Find the verb to be in the text. Explain why it is used in such a way?

Find one word, which is a little bit different in meaning from others (найдите одно слово, которое немного отличается от других по смыслу):

1. a) book; b) kidney; c) liver;
2. a) library; b) filters; c) waste;
3. a) peritoneum; b) telephone; c) ribs;
4. a) gland; b) hilum; c) glass;
5. a) apple; b) glomerulus; c) cortex.

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